SIEMENS

SINUMERIK 840D sl

Detailed Maschine Data Description

Parameter Manual

Valid for

Control

SINUMERIK 840D sl/ 840DE sl

Software	*Version*
NCU Systemsoftware für 840D sl/ 840DE sl	2.6 SP1

03/2010

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Legal information

Warning notice systemt

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury will result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury may result if proper precautions are not taken.

CAUTION

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken

NOTICE

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems:

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Structure of the documentation

The SINUMERIK documentation is available in three versions:

- General Documentation
- User Documentation
- Manufacturer/Service Documentation

Information on the following topics is available at
http://www.siemens.com/motioncontrol/docu:

- Ordering documentation
  Here you can find an up-to-date overview of publications.
- Downloading documentation
  Links to more information for downloading files from Service & Support.
- Researching documentation online
  Information on DOConCD and direct access to the publications in DOConWEB.
- Compiling individual documentation on the basis of Siemens contents with the My Documentation Manager (MDM), refer to http://www.siemens.com/mdm.
  My Documentation Manager provides you with a range of features for generating your own machine documentation.
- Training and FAQs
  Information on the range of training courses and FAQs (frequently asked questions) are available via the page navigation.

Target group

This documentation is intended for project engineers, commissioning engineers, machine operators, service and maintenance personnel.

Benefits

The Parameter Manual enables the intended target group to evaluate error and fault indications and to respond accordingly.

With the help of the Parameter Manual, the target group has an overview of the various diagnostic options and diagnostic tools.

Standard version

This Parameter Manual only describes the functionality of the standard version. Extensions or changes made by the machine tool manufacturer are documented by the machine tool manufacturer.

Other functions not described in this documentation might be executable in the control. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

Further, for the sake of simplicity, this documentation does not contain all detailed information about all types of the product and cannot cover every conceivable case of installation, operation or maintenance.

Technical Support

If you have any questions, please contact the following hotline:

	Europe / Africa
Phone	+49 180 5050 222
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€0.14/min. from German landlines, max. 0.42 €/min for calls from a mobile phone.	
Internet	http://www.siemens.de/automation/support-request

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Email	mailto:support.asia.automation@siemens.com

Note

National phone numbers for technical support are provided under the following Internet address: http://www.automation.siemens.com/partner

Questions about this documentation

If you have any queries (suggestions, corrections) in relation to this documentation, please send a fax or email to the following address

Fax	+49 9131 98 2176
Email	mailto:docu.motioncontrol@siemens.com

A fax form is available at the end of this document.

SINUMERIK Internet address

http://www.siemens.com/sinumerik

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Machine and setting data 1

1.1 Important information about the data tables

This list manual provides information on all the machine and setting data in a concise table format. A functional description of the data is provided in the function manual indicated in the cross reference.

You can also find more information in:

- HMI Online Help directly on the control

1.1.1 Structure of the data tables

Standard table

The standard table contains all the important information about the data:

MD number	Identifier			Display filter	Reference	
Unit	Name			Data type	Activation	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Expanded table

The expanded table includes data from the standard table plus additional rows with system-specific values.

MD number	Identifier			Display filter	Reference	
Unit	Name			Data type	Activation	
Attributes						
-	Dimension	Default value	Minimum value	Maximum value	Protection	Class
<System 1>	-	Default value	-	-	-/-	
<System 2>	-	-	-	-	-1/-	

A minus sign "-" in a field means that the same value as for System 1 applies for the specified system.

The entry "-1/-" in the "Protection" field means that the machine data is not available for the specified system.

Example:

10050	SYSCLOCK.CYCLE_TIME			N01, N05, N11	G3	
s	Basic system clock cycle			DOUBLE	POWER ON	
				SFCO		
-	-	0.004	0.000125	0.031	7/2	M
710-2a2c	-	0.002	0.001	0.008	-/-	

1.1.2 Meaning of table fields

MD number

The "MD number" field contains the machine data number. This number is displayed in the data lists on the user interface of the control.

Identifier

The "Identifier" field contains the unique alphanumeric identifier of the machine data. The machine data is, for example, addressed by means of this identifier (with an additional label) for programming in the part program.

This identifier is displayed in the data lists on the user interface of the control.

Reference

As a cross reference to the functional description of the data, the "Reference" field contains the short designation of a supporting manual for a specific function manual.

Reference is made to the following documents:

Function Manual of basic machines, supporting manuals: A2, A3, B1, B2, D1, F1, G2, H2, K1, K2, N2, P1, P3, R1, S1, V1, W1, Z1

Function Manual of expanded functions, supporting manuals: A4, B3, B4, F3, H1, K3, K5, M1. M5, N3, N4, P2, P5, R2, S3, S7, T1, W3, W4, Z2

Function Manual of special functions, supporting manuals: F2, G1, G3, K6, M3, S9, T3, TE01, TE02, TE1, TE3, TE4, TE6, TE7, TE8, TE9, V2, W5, W6, Z3

Funktionshandbuch Antriebsfunktionen, Unterbücher, FBA: DB1, DD1, DD2, DE1, DF1, DG1, DL1, DM1, DS1, DÜ1

Funktionshandbuch Antriebsfunktionen, Unterbücher, FBA: DB1, DD1, DD2, DE1, DF1, DG1, DL1, DM1, DS1, DÜ1

Function Manual Safety Integrated, FBSI

Function Manual Turn, FBMA

Function Manuall of Tool Management, FBW

Function Manual of ISO-dialects for SINUMERIK, FBFA

Function Manual of Synchronized actions, FBSY

Programmiing Manual Fundamentals, PG

Programmiing Manual Job planing, PGA

Unit

The "Unit" field contains the physical unit of the data in the default setting. A minus sign "-" means that the data does not have a physical unit.

Note

For machine data of the Performance 2 [P2] control module, the unit or units are shown with a filter in row 2, column 1.

Name

The "Name" field contains the name of the data in plain text.

Activation

The "Activation" field contains the action that must be performed by the user in order for a change to take effect.

Activation		User action
po	POWER ON	Otherwise: • HMI softkey "Reset (po)" (SINUMERIK Operate/HMI-Advanced SW 7.5 or higher) • HMI softkey "NCK-Reset" (HMI-Embedded) • Reset button on the front of the NCU module • Switch voltage off/on
cf	NEW_CONF	HMI softkey: "Activate MD"
re	RESET	Otherwise: • Channel reset: DBn.DBX 7.7 where n = 21, 22, 23, etc. • Mode group reset: DB11.DBX n.7 where n = 0, 20, 40, etc. • NCK reset: DB11.DBX n.7 where n = 0, 20, 40, etc. in all mode groups of the control • Program end reset (M02/M30)
so	IMMEDI-ATELY	-

The activation levels are listed according to their priority.

- po = highest priority
- so = lowest priority

Axis-specific machine data with effectiveness criterion Reset.
To activate axis-specific machine data with effectiveness criterion RESET, trigger a channel reset in the channel in which the axis is currently located.

Note

Mode group reset generates a reset in all channels which have been combined into one machining unit.

Notice

PLC-controlled axes always require an axial reset.

See Function Manual Extended Functions, Chapter "P2: Positioning Axes" > "Influence of PLC" > "PLC-controlled Axes".

Protection

Protection
The "Protection" field contains the protection level for reading or writing to the data in the format: Read / write.

Value	Protection level
0 or 10	System
1 or 11	Manufacturer
2 or 12	Service
3 or 13	User
4 or 14	Key-operated switch setting 3
5 or 15	Key-operated switch setting 2
6 or 16	Key-operated switch setting 1
7 or 17	Key-operated switch setting 0

The protection level for user data (GUD) is defined with the numbers 10 to 17.

Class

The data class attribute of machines, setting and option data is usually derived from the write authorization of the relevant data.

The following data classes are used:

Data class	Write authorization	Access authorization
S	System	Protection level 0 (password: System)
M	Manufacturer/ Service	Protection level 1 and 2 (password: Service)
U	User	Protection level 3 (password: User) Protection level 4 to 7 (keyswitch)

Display filter

The "Display filter" field contains the identifier of the data filter setting that enables the data to be seen. With the filter setting, the exact data areas needed at a given time can be selected for display.

ID	Data area
EXP	Expert mode
Drive machine data	
D00	Display signals
D01	Controller data
D02	Monitoring/limiting functions
D03	Message data
D04	Status data
D05	Motor/power unit
D06	Measuring system
D07	Safety Integrated
D08	Standard machine
General machine data	
N01	Configuration/scaling
N02	Memory configuration
N03	PLC machine data
N04	Drive control
N05	Status data/diagnostics
N06	Monitoring/limiting functions
N07	Auxiliary functions
N08	Corrections/compensations
N09	Technological functions

ID	Data area
N10	I/O configuration
N11	Standard machine
A12	External language
A13	Safety Integrated
A14	Selection for Safety Integrated
Channelspecific machine data	
C01	Configuration
C02	Memory configuration
C03	Initial settings
C04	Auxiliary functions
C05	Speeds
C06	Monitoring/limiting functions
C07	Transformations
C08	Corrections/compensations
C09	Technological functions
C10	Standard machine
C11	External languages
Axis-specific machine data	
A01	Configuration (including memory)
A02	Measuring system
A03	Machine geometry
A04	Speeds/accelerations
A05	Monitoring/limiting functions
A06	Spindle
A07	Controller data
A08	Status data
A09	Corrections/compensations
A10	Technological functions
A11	Standard machine
A12	External language
A13	Safety Integrated
A14	Selection for Safety Integrated
Display machine data	
H01	ShopMill
H02	ShopTurn
H03	ManualTurn

ID	Data area
H04	Access levels
H05	Standard machine

System

The "System" field contains the system for which the data is valid.

ID	System
840Dsl	840D systems solution line
710	NCU 710
720	NCU 720
730	NCU 730

If this field is empty, the data is valid for all systems.

Additional identifiers:

iajc i = number of axes
j = number of channels
For example: 6a2c = 6 axes, 2 channels

Dimension

The "Dimension" field contains the number of elements of a data field.

Value range

The "Minimum value" and "Maximum value" fields contain the lower limit and upper limit, respectively, of the permissible range of the data.

If the "Minimum value" and "Maximum value" fields contain the string " *** ", an explicit range is not defined for this data. In this case, the range is determined by the specified data type.

SINUMERIK data types

The "Data type" field contains the following data types:

Data type	Value range
BOOLEAN	Machine data bit (1 or 0)
BYTE	Integer values (-128 to 127)
DOUBLE	Real values (± (2.2 * 10^{-308} to 1.8 * 10^{+308}))
DWORD	Integer values (-2147483648 to +2147483647)
DWORD	Hex values (0 to FFFF FFFF)
STRING	Character string (max. 16 characters) consisting of upper-case letters with digits and underscore
UNSIGNED WORD	Integer values (0 to 65536)
SIGNED WORD	Integer values (-32768 to 32767)
UNSIGNED DWORD	Integer values (0 to 4294967300)
SIGNED DWORD	Integer values (-2147483650 to 2147483649)
WORD	Hex values (0000 to FFFF)
FLOAT DWORD	Real values (± (8.43 x 10^{-37} to "3.37 x 10^{38})
UBYTE	Integer values (0 to 255)
LONG	Integer values (4294967296 to 4294967295)

SIMATIC data types

The "Data type" field contains the following data types:

Data type	Meaning	Value range
I8	Integer8	8-bit integer
I16	Integer16	16-bit integer
I32	Integer32	32-bit integer
U8	Unsigned8	8 bits without sign
U16	Unsigned16	16 bits without sign
U32	Unsigned32	32 bits without sign
Float	FloatingPoint32	32-bit floating point number

Attributes

The "Attributes" field contains additional attributes of the data:

Attribute	Meaning
NBUP	No Back UP: The data is not backed up as part of the data backup.
ODLD	Only DownLoaD: The data can only be written to via an INI file, archive, or from the part program.
NDLD	No DownLoaD: The data can only be written to via the HMI user interface.
SFCO	SaFety COnfiguration: Component of the "Safety Integrated" function
SCAL	SCaling ALarm: Scaling data; when changed, alarm 4070 is displayed
LINK	LINK description: The data describes a link cluster, component of the "NCU Link" function
CTEQ	ConTainer EQual: The data must be the same for all axes in an axis container, component of the "Axis container" function
CTDE	ConTainer DEscription: The data describes an axis container, component of the "Axis container" function

1.1.3 Overview of the data

Machine and setting data

The machine and setting data are divided into the following areas:

Range	Designation
From 9000 to 9999	Display machine data
From 10000 to 18999	General NC machine data
From 19000 to 19999	Reserved
From 20000 to 28999	Channelspecific machine data
From 29000 to 29999	Reserved
From 30000 to 38999	Axis-specific machine data
From 39000 to 39999	Reserved
From 41000 to 41999	General setting data
From 42000 to 42999	Channel-specific setting data
From 43000 to 43999	Axis-specific setting data
From 51000 to 51299	General configuration machine data
From 51300 to 51999	General cycle machine data
From 52000 to 52299	Channel-specific configuration machine data

Range	Designation
From 52300 to 52999	Channel-specific cycle machine data
From 53000 to 53299	Axis-specific configuration machine data
From 53300 to 53999	Axis-specific cycle machine data
From 54000 to 54299	General configuration setting data
From 54300 to 54999	General cycle setting data
From 55000 to 55299	Channel-specific configuration setting data
From 55300 to 55999	Channel-specific cycle setting data
From 56000 to 56299	Axis-specific configuration setting data
From 56300 to 56999	Axis-specific cycle setting data
From 61000 to 61999	General machine data for compile cycles
From 62000 to 62999	Channel-specific machine data for compile cycles
From 63000 to 63999	Axis-specific machine data for compile cycles

Data Identifiers

The identifier (designator) specified in the data description is displayed on the HMI user interface. However, if the data is addressed in the parts program, for example, the identifier of the relevant data area must precede the data identifier (designator).

Identifier	Data area
$MM_	Display machine data
$MN_/ $SN_ $MNS_/ $SNS_	General machine/setting data
$MC_/ $SC_ $MCS_/ $SCS_	Channel-specific machine/setting data
$MA_/ $SA_ $MAS_/ $SAS_	Axis-specific machine/setting data

Characters	Meanings
$	System variables
M	Machine data (first letter)
S	Setting data (first letter)
M, N, C, A, D	Subarea (second letter)
S	Siemens data (third letter)

Note:

Axis-specific data can also be addressed with the axis name as an index. The internal axis identifier (AX1, AX2, AX3, etc.) or the identifier specified in MD10000 $MA_AX_CONF_NAME_TAB can be used as the axis name.

Example: $MA_JOG_VELO[Y1]=2000
The JOG velocity of axis Y1 is 2000 mm/min.

If the content of a machine data is a STRING (e.g., X1) or a hexadecimal value (e.g., H41), the content must be enclosed in single quotation marks (e.g., 'X1' or 'H41').

Example: $MN_DRIVE_INVERTER_CODE[0]='H14'

A FD module with performance data 9/18 A is present on the first slot of the drive bus.

Example: $MA_FIX_POINT_POS**[0,X1]**=500.000

The value 500 is assigned to the first fixed point position on axis 1.

Examples:
$MN_AUXFU_GROUP_SPEC[2]='H41'
Output time of the auxiliary functions of the third auxiliary function group.

$MN_AXCONF_MACHAX_NAME_TAB[0]='X1'
The string "X1" is assigned to name the first machine axis.

$MA_REFP_SET_POS[0,X1]=100.00000
A value of 100 mm is assigned to the first reference point value of axis X1.

Examples:
Assignment to channel-specific machine data:

```
CHANDATA(1)                       ;Selection of the
                                  first
                                  ;channel

$MC_CHAN_NAME='CHAN1'             ;Name of the first
                                  ;channel

$MC_AXCONF_GEOAX_NAME_TAB[1]='Y'  ;Name of the second
                                  ;geometry axis of the
                                  ;first channel is Y

R10 = 33.75                       ;R10 of the first
...                               channel

CHANDATA(2)                       ;Selection of the sec-
                                  ond ;channel

$MC_CHAN_NAME='CHAN2'             ;Name of the second
...                               ;channel

R10 = 96.88                       ;R10 of the second
...                               ;channel
```

Product: Handbuch_Sinumerik, Version: V12.0, Language: eng
Objects:

1.2 Display machine data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Description: Description

9006	DISPLAY_SWITCH_OFF_INTERVAL			-	-	
-	Time for screen saver			DWORD	PowerOn	
-						
-	-	60	0	180	7/3	M

Description: This machine data defines the time in minutes after which the screen automatically

switches to dark if no key has been pressed on the keyboard in the meantime.

The value 0 disables automatic light/dark switching.

Note:

The screen is only switched light/dark automatically when IS screen dark = 0.

Related to:

IS screen dark (DB19, ... DBX0.1)

9009	KEYBOARD_STATE			-	-	
-	Keyboard shift behavior at booting			BYTE	PowerOn	
-						
-	-	0	0	2	7/3	M

Description: This machine date defines the Shift behavior (SW-CAPSLOCK) of the keyboard.

Basic configuration of the Shift behavior of the keyboard

0: SW-CAPSLOCK OFF

2: SW-CAPSLOCK ON

9032	HMI_MONITOR			-	-	
-	Define PLC data for HMI screen info			STRING	PowerOn	
-						
-	-		-	-	7/1	M

Description: Pointer, with offset, to a PLC data block. This is required to report

HMI monitor information to the PLC, e.g active HMI task.

Format: PLC-specific format for specifying a data block with byte offset,

e.g. DB60.DBB10 for data block 60, byte 10.

The monitor information reported by the HMI has a maximum length of 8 bytes.

9056	ALARM_ROTATION_CYCLE			-	-	
-	Rotation cycle time for alarm display			DWORD	PowerOn	
-						
-	-	0	0	10000	7/3	M

Description: Rotation cycle time in the alarm display:

<500: no rotation in the alarm line

500 - 10000: cycle duration of alarm rotation in milliseconds

If a valid cycle time has been set, all alarms are displayed in the alarm line one after the other.

Each alarm is displayed for the specified time until it is replaced by the next alarm.

If no alarm is present, cycle alarms or program messages are displayed, if required. However, these do not rotate.

9100	CHANGE_LANGUAGE_MODE			-	-	
-	Language selection mode			BYTE	Immediately	
-						
-	-	1	1	2	7/3	I

Description: Language selection mode is defined:

1 = directly via selection list

2 = via setting of the 1st and 2nd language

9102	SHOW_TOOLTIP			-	-	
-	Display tooltip			BYTE	Immediately	
-						
-	-	1	0	1	7/3	U

Description: If the MD has been set to 1, tooltips will be displayed.

9103	TOOLTIP_TIME_DELAY			-	-	
s	Time delay tooltip display			BYTE	Immediately	
-						
-	-	1	0	60	7/3	U

Description: Time delay for display of the tooltips in seconds.

9105	HMI_WIDE_SCREEN			-	-	
-	Display of the HMI as wide screen with OEM area always visible			BYTE	PowerOn	
-						
-	-	0	0	1	7/2	M

Description: Display of the HMI as wide screen. Above the HMI there is a separate application field that is designed by the machine manufacturer.

9106	SERVE_EXTCALL_PROGRAMS			-	-	
-	Process EXTCALL calls			BYTE	PowerOn	
-						
-	-	1	0	1	7/3	M

Description: HMI processes reload requirements of the NC for EXTCALL calls.

9107	DRV_DIAG_DO_AND_COMP_NAMES			-	-	
-	Expanded drive diagnostics: DO and components			BYTE	Immediately	
-						
-	-	0	0	3	7/3	I

Description: 0: DO and component type names
1: Real DO names and component type names
2: DO type names and real component names
3: Reale DO names and real component names

9108	ENABLE_EPS_SERVICES			-	-	
-	Activation of ePS Network services			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: If the machine data has been set to 1, the "ePS Network services" softkey appears as the operating area.

9110	ACCESS_HMI_EXIT			-	-	
-	Protection level of exit softkey			BYTE	PowerOn	
-						
-	-	1	0	7	7/2	M

Description: Protection level for the exit softkey (HMI restart) in the operating area menu

9900	MD_TEXT_SWITCH			-	-	
-	Plaintexts instead of MD identifier			BOOLEAN	Immediately	
-						
-	-	0	-	-	7/3	U

Description: If the MD has been set to 1, clear text is displayed on the operator panel instead of the machine data identifiers.

9990	SW_OPTIONS			-	-	
-	Enable HMI software options			DWORD	Immediately	
-						
-	-	0	-	-	1/1	I

Description: Here you can enable the HMI software options

1.3 General machine data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Description: Description

1.3.1 System settings

10000	AXCONF_MACHAX_NAME_TAB			N01, N11	K2,F1,G2,F2,K5,M1	
-	Machine axis name			STRING	PowerOn	
-						
710-6a2c	31	X1,Y1,Z1,A1,B1,C1	-	-	7/2	M
710-31a10c	31	X1,Y1,Z1,A1,B1,C1,U1...	-	-	7/2	M
710-31a10c6	31	X1,Y1,Z1,A1,B1,C1	-	-	7/2	M
720-6a2c	31	X1,Y1,Z1,A1,B1,C1	-	-	7/2	M
720-31a10c	31	X1,Y1,Z1,A1,B1,C1,U1...	-	-	7/2	M
720-31a10c6	31	X1,Y1,Z1,A1,B1,C1	-	-	7/2	M
730-6a2c	31	X1,Y1,Z1,A1,B1,C1	-	-	7/2	M
730-31a10c	31	X1,Y1,Z1,A1,B1,C1,U1...	-	-	7/2	M
730-31a10c6	31	X1,Y1,Z1,A1,B1,C1	-	-	7/2	M

Description: List of the machine axis identifiers.

The name of the machine axis is entered in this MD.

In addition to the fixed, defined machine axis identifiers "AX1", "AX2" ..., user-defined identifiers for the machine axes can also be assigned in this data.

The identifiers defined here can be used parallel to the fixed, defined identifiers for addressing axial data (e.g. MD) and machine axis-related NC functions (reference point approach, axial measurement, travel to fixed stop).

Special cases:

- The input machine axis name must not conflict with the names and assignments of the geometry axes (MD20060 $MC_AXCONF_GEOAX_NAME_TAB, MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB) or channel axes (MD20080 $MC_AXCONF_CHANAX_NAME_TAB, MD20070 $MC_AXCONF_MACHAX_USED).
- The input machine axis name must not be the same as the names for Euler angles (MD10620 $MN_EULER_ANGLE_NAME_TAB), names for path-relevant orientation (MMD10624 $MN_ORIPATH_LIFT_VECTOR_TAB), names for normal vectors (MD10630 $MN_NORMAL_VECTOR_NAME_TAB), names for directional vectors (MD10640 $MN_DIR_VECTOR_NAME_TAB), names for rotation vectors (MD10642 $MN_ROT_VECTOR_NAME_TAB), names for intermediate vector components (MD10644 $MN_INTER_VECTOR_NAME_TAB), names for intermediate circle point coordinates with CIP (MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB) or the names for interpolation parameters (MD10650 $MN_IPO_PARAM_NAME_TAB).

- The input machine axis name must not include any of the following reserved address letters:

D Tool offset	(D function)	E Reserved
F Feedrate	(F function)	G Preparatory function
H Auxiliary function	(H function)	L Subroutine call
M Miscellaneous function	(M function)	N Subblock
P Subroutine number of passes		R Arithmetic parameters
S Spindle speed	(S function)	T Tool (T function)

The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).

The use of an axis identifier consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.

If no identifier is assigned to a machine axis, then the predefined name ("AXn") applies to the nth machine axis.

Related to:

MD20060 $MC_AXCONF_GEOAX_NAME_TAB (geometry axis name in the channel [GEOAxisno.]

MD20080 $MC_AXCONF_CHANAX_NAME_TAB (channel axis name in the channel [Channelaxisno.]

10002	AXCONF_LOGIC_MACHAX_TAB			N01	B3,K2	
-	Logical NCK machine axis image			STRING	PowerOn	
-						
-	31	AX1,AX2,AX3,AX4,AX5,AX6...	-	-	3/2	M

Description: List of machine axes available on an NCU. (Logical NCK machine axis image)

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB creates another NCK global, logical layer between the channel axis layer and the machine axes in an NCU or NCU grouping. This layer is called the "Logic NckMachineAxImage", abbreviation: LAI).

Axes can only be assigned between different NCUs via this new intermediate layer!

The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = NCj_AXi assigns the machine axis i on the NCU j to the axis index "n" in the LAI.

This makes the following assignments possible:

1. Local axes (default setting: AX1, AX2 ... AX31)

   The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = AX3 assigns the local axis AX3 to axis index n. (Default setting AX3 is present for n = 3 . Thus there is compatibility in software version 5 for MD blocks for software versions up to 4).

2. Link axes (axes that are physically connected to another NCU). The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = NCj_AXi assigns axis AXi on NCU j to axis index n (link axis).

Limits:

   n Machine axis address (of the local NCU)1 ... 31

   j NCU number1 ... 16

   i Machine axis address (of the local/remote NCU)1 ... 31

3. Axis container in which there are once again either local or link axes. The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = CTr_SLs assigns container r and slot s to axis index n.

Limits:

   n Machine axis address (of the local NCU)1 ... 31

   r Container number1 ... 16

   s Slot number (location) in the container1 ... 32

The channel layer is formed via the related machine data $MD20070 $MC_AXCONF_MACHAX_USED and no longer points (small P5) directly to the machine axes but to the new LAI layer.

$MC_AXCONF_MACHAX_USED [k]=n assigns the LAI axis number "n" to the axis index "k" in the channel layer.

The machine axis and the corresponding NCK can then be determined from the LAI axis number.

If a number of NCUs point to the same machine axis in the cluster as a result of MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB, then the axial machine data MD30554 $MA_AXCONF_ASSIGN_MASTER_NCU must define which NCU generates the master NCU and the setpoint values for the position controller after startup.

Related to:

   MD12... $MN_AXCT_AXCONF_ASSIGN_TABi (make entries in containers i)

10010	ASSIGN_CHAN_TO_MODE_GROUP			N01, N02, N11	K1,K5	
-	Channel valid in mode group			DWORD	PowerOn	
-						
710-6a2c	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		2	7/2	M
710-31a10c	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		10	7/2	M
710-31a10c6	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		4	7/2	M
720-6a2c	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		2	7/2	M
720-31a10c	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		10	7/2	M
720-31a10c6	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		4	7/2	M
730-6a2c	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		2	7/2	M
730-31a10c	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		10	7/2	M
730-31a10c6	10	1,0,0,0,0,0,0,0,0,0,0,0,000,0,0,0		4	7/2	M

Description: This MD assigns the channel to a mode group

Entry value 1 => Assigned to 1st mode group

Entry value 2 => Assigned to 2nd mode group

etc.

From software version 4, it is permissible not to assign a mode group number to individual channels.

Channel gaps are allowed, in order to favor uniform configuration in similar types of machines. In this case, the number 0 is assigned to the channel instead of assigning a mode group number equal to or greater than 1. The channel is not activated, however it is handled like an active channel when counting the channels.

E.g.

```
ASSIGN_CHAN_TO_MODE_GROUP[0] = 1
ASSIGN_CHAN_TO_MODE_GROUP[1] = 1
ASSIGN_CHAN_TO_MODE_GROUP[2] = 0   ; gap
ASSIGN_CHAN_TO_MODE_GROUP[3] = 1
```

Application example:

Select desired channel via HMI and enter with MD10010 $MN_ASSIGN_CHAN_TO_MODE_GROUP = 1.

Note:

This MD must still be entered even when only one mode group is present.

10050	SYSCLOCK_CYCLE_TIME			N01, N05, N11, -	G3,G2,R1	
s	System clock cycle			DOUBLE	PowerOn	
SFCO						
-	-	0.002	0.001	0.008	7/2	M

Description: Basic cycle time of the system software

The cycle times settings of cyclical tasks (position controller/ IPO) are multiples of this basic cycle. Apart from special applications in which POSCTRL_SYSCLOCK_TIME_RATIO is set greater than 1, the basic cycle corresponds to the position controller cycle.

For PROFIBUS/PROFINET:

In the case of systems with a PROFIBUS DP connection, this MD corresponds to the PROFIBUS DP cycle time. This time is read from the configuration file (SDB-Type-2000) during startup and written to the MD.

This MD can only be changed via the configuration file.

Note:

Reducing this MD can result in an automatic correction of POSCTRL_CYCLE_DELAY that cannot be undone by a subsequent increase!

Details:

The basic cycle is incremented in multiples (SYSCLOCK_SAMPL_TIME_RATIO) of units of the measured value sampling cycle. During system startup, the entered value is automatically rounded up to a multiple of this incrementation.

Note:

Discrete timer division ratios can give rise to the entered value producing a value that is not an integer after a Power OFF/ON.

For example:

```
Input                          = 0.005s
                               after Power OFF/ON  =0.00499840
                    or
Input                          = 0.006s
                               after Power OFF/ON  =0.0060032
```

10059	PROFIBUS_ALARM_MARKER			N05	G3	
-	PROFIBUS/PROFINET alarm flag (internal only)			BYTE	PowerOn	
NBUP, NDLD						
-	-	0	-	-	0/0	S

Description: PROFIBUS/PROFINET alarm flag:

In this machine data, alarm requests for the PROFIBUS/PROFINET layer are stored beyond a reboot.

If conflicts arise between machine data 10050, 10060, 10070 and the data in the SDB on startup, the machine data are matched according to SDB, and an alarm is output on the next start up. These alarm requests are stored here.

Related to:

MD10050 $MN_SYSCLOCK_CYCLE_TIME,
MD10080 $MN_SYSCLOCK_SAMPL_TIME_RATIO

10060	POSCTRL_SYSCLOCK_TIME_RATIO			N01, N05	G3	
-	Factor for position control cycle			DWORD	PowerOn	
SFCO						
-	-	1	1	31	7/2	M

Description: The position-control cycle is stated as a multiple of the time units of the system basic cycle SYSCLOCK_CYCLE_TIME.

The regular setting is 1. The position-control cycle then corresponds to the system basic cycle SYSCLOCK_CYCLE_TIME.

Setting values > 1 costs computing time for the operating system to calculate the additional timer interrupts, and should therefore only be used in those cases in which there is a task in the system that is to run faster than the position-control cycle.

For PROFIBUS/PROFINET:

In the case of systems with a PROFIBUS DP connection, this MD represents the ratio between the PROFIBUS DP cycle and the position controller cycle.

10061	POSCTRL_CYCLE_TIME			N01, N05	G3	
-	Position control cycle			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/RO	S

Description: Position controller cycle time:

Display of the position controller cycle time (not modifiable !).

It is compiled internally from the machine data SYSCLOCK_CYCLE_TIME and POSCTRL_SYSCLOCK_TIME_RATIO.

10062	POSCTRL_CYCLE_DELAY			N01, N05	G3	
s	Position control cycle offset			DOUBLE	PowerOn	
-						
-	-	0.0	0.000	0.008	7/2	M

Description: For PROFIdrive only:

Only relevant to operation with PROFIBUS drives.

Position controller cycle offset in relation to the PROFIBUS DP cycle.

Offsets that exceed the set DP cycle or are smaller than the maximum Tdx, are automatically corrected to a substitute value half the size of the DP cycle.

MD10062 $MN_POSCTRL_CYCLE_DELAY > 0:Default for position controller offset

MD10062 $MN_POSCTRL_CYCLE_DELAY = 0:Automatic determination of the position controller offset with max. Tdx from STEP7 project

Tdx_max is determined through all equidistant buses.

The actually active offset value is displayed in MD 10063[1].

Note:

MD10062 $MN_POSCTRL_CYCLE_DELAY > 0 can reduce MD10050 $MN_SYSCLOCK_CYCLE_TIME to the automatic correction of this MD that cannot be undone by a subsequent increase.

Recommendation:

In this case set the original value or default value once again.

10063	POSCTRL_CYCLE_DIAGNOSIS			EXP, N01, N05	-	
s	Active timing			DOUBLE	PowerOn	
-						
-	3	0.0,0.0,0.0	-	-	7/RO	M

Description: Diagnostic data related to the PROFIBUS/PROFINET cycle.

[0]: Latest date at which the actual values must be available (Tdx)

[1]: Actually active position controller cycle offset (Tm)

[2]: Latest date at which the setpoints were output by the position controller

Diagnostic data are initialized with ZERO with each NCK power up

10065	POSCTRL_DESVAL_DELAY			N01	B3	
s	Position setpoint delay			DOUBLE	PowerOn	
-						
-	-	0.0	-0.1	0.1	7/2	M

Description: This MD can parameterize a delay of the setpoints in the position contoller. The area of application is NCU-link when different position control cycles are parameterized on the NCUs and if the axes should nevertheless interpolate with one another. (Used for example for non-circular turning.)

This MD is used to optimize the automatic setting.

Related to:

MD32990 $MA_POSCTRL_DESVAL_DELAY_INFO

10070	IPO_SYSCLOCK_TIME_RATIO			N01, N05, N11, -	G3,R1	
-	Factor for interpolation cycle			DWORD	PowerOn	
SFCO						
-	-	4	1	100	7/2	M

Description: The interpolator cycle is stated as a multiple of the time units of the system basic cycle SYSCLOCK_CYCLE_TIME.

Only integer multiples of the position control cycle can be set (set in POSCTRL_SYSCLOCK_TIME_RATIO). Values that are not an integer multiple of the position control cycle are automatically increased to the next integer multiple of the position control cycle before they become active (on next power up).

This is accompanied by alarm 4102 "IPO cycle increased to [ ] ms".

10071	IPO_CYCLE_TIME			N01, N05, N11, -	G3	
-	Interpolator cycle			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/RO	S

Description: Interpolation time

Display of the interpolator cycle time (not modifiable !).

It is compiled internally from the machine data SYSCLOCK_CYCLE_TIME and IPO_SYSCLOCK_TIME_RATIO.

10072	COM_IPO_TIME_RATIO			N01, N05	-	
-	Division ratio between IPO and communication task			DOUBLE	PowerOn	
-						
-	-	1.0	0.0	100.0	7/2	M

Description: Division ratio between IPO and communication tasks. A value of 2 means, e.g., that the communication task is only processed in every second IPO cycle. This makes more time available for the other tasks. Overlarge values slow down the communication between the HMI and NCK.

Numerical values less than 1 downscale the IPO cycle. This value is adjusted so that only runtimes that are a multiple of the position controller time are possible for the communication task. A call period of about 10 ms is practical for the communication task.

10073	COM_IPO_STRATEGY			EXP	-	
-	Strategy for activation of communication.			DWORD	PowerOn	
-						
-	-	0x0F	1	0x7F	0/0	S

Description: The call frequency of the communication task can be controlled by MD10072 $MN_COM_IPO_TIME_RATIO.

The communication tasks are activated cyclically. That has some advantages and disadvantages:

Advantages:

- The communication behavior of the NCK is deterministic in relation to the communication task.

Disadvantages:

- The communication task can lead to level overflows.
- In an unloaded NCK system, the speed of communication is determined by MD10072 $MN_COM_IPO_TIME_RATIO. As this machine data is power ON, it cannot adapt to the current NCK operating mode. A typical problem is that uploading a part program can take a very long time on an unloaded NCK. In this case, the bottleneck is the communication task that only progresses in the relation defined by machine data COM_IPO_TIME_RATIO.

This machine data has been introduced to eliminate the above-mentioned disadvantages. It makes the times at which the communication software is activated controllable. The machine data is bit-coded. The bits have the following meanings:

Bit 0:

The communication software is calculated cyclically

Bit 1:

The level time overflow monitoring is switched off for the cyclical communication task. This bit is only practical if bit zero is set. The task is implemented in a non-cyclical level that has a higher priority than the preparation/communication level. The communication task makes a delay of the time defined in COM_IPO_TIME_RATIO after each cycle.

Bit 2:

The communication software is calculated at the start of the task which the domain services accept.

Bit 3:

The communication software is calculated at the end of the task which the domain services accept.

Bit 4:

The communication software is calculated at the start of the task which the domain services accept if a PDU upload has arrived. This bit is only useful if bit 2 is set.

Bit 5:

The communication software is calculated at the end of the task which the domain services accept if a PDU upload has arrived. This bit is only useful if bit 3 is set.

This machine data is only active in systems containing the Softbus communication software. This is in P6 the 840Di with MCI2 software and the solution line systems for P7.

The default value is 0x0F. This means that the COS is calculated prior to and after communiction in order to minimize latencies.

10080	SYSCLOCK_SAMPL_TIME_RATIO			EXP, N01	G3	
-	Division ratio for actual value recording cycle time			DWORD	PowerOn	
-						
-	-	1	1	31	-1/0	S

Description:

For SIMODRIVE611D only:

SYSCLOCK_SAMPL_TIME_RATIO sets the division factor of a cycle divider

that is arranged as hardware between the cycle of the measured value sampling

and the interrupt controller.

- The sampler cycle (upstream of the divider) taps the actual value inputs and triggers the digital analog converter.
- The output of the divider generates a timer interrupt as the basic cycle of the

operating system (SYSCLOCK_CYCLE_TIME).

A value greater than 1 may only be entered in SYSCLOCK_SAMPL_TIME_RATIO in exceptional cases:

Values > 1 increase the size of the increments in which the basic cycle can be set. (see SYSCLOCK_CYCLE_TIME)

Special cases:

1. When using the conventional drive interface (analog speed interface), the divider is set according to the following criteria:

   It is advantageous for the control to keep the dead time between reading in the current axis actual positions and outputting the corresponding setpoint values as short as possible. The delay time of the position controller output can be set in fractions of the position control cycle time by setting SYSCLOCK_SAMPL_TIME_RATIO to values > 1. The difficulty with this is reliably determining the time after which the position controller delivers valid results. Multiple triggering of the input/output hardware during one position controller cycle could also be achieved by setting POSCTRL_SYSCLOCK_TIME_RATIO to values > 1. However, the disdvantage with this is the unnecessarily high rate of generating timer interrupts for the operating system. This procedure is not recommended.

2. When using the digital drive controller the division factor is set automatically. The sample cycle time is then set as the 1, 2, 3, ... 8-fold of 125µs.

10088	REBOOT_DELAY_TIME			EXP	K3	
s	Reboot delay			DOUBLE	Immediately	
-						
-	-	0.2	0.0	1.0	2/2	M

Description: The reboot following PI "_N_IBN_SS" is delayed by the time MD10088 $MN_REBOOT_DELAY_TIME.

The suppressable NOREADY alarm 2900 is triggered immediately by PI "_N_IBN_SS".

If MD10088 $MN_REBOOT_DELAY_TIME falls below the MD36620 $MA_SERVO_DISABLE_DELAY_TIME value of an axis, the axis is decelerated during MD10088 $MN_REBOOT_DELAY_TIME. The servo enable is then disabled. That is, the full MD36620 $MA_SERVO_DISABLE_DELAY_TIME is NOT waited.

Alarm 2900 does not become active if MD10088 $MN_REBOOT_DELAY_TIME = 0.0, and there is no reboot delay.

The NCK waits beyond the stated delay time until the PI has been able to be acknowledged to the HMI. The total delay time may be as much as 2 s.

10089	SAFE_PULSE_DIS_TIME_BUSFAIL			N01, N06, -	FBSI	
s	Delay time pulse suppr. for bus failure			DOUBLE	PowerOn	
-						
-	-	0.0	0	0.8	7/2	M

Description: Time after the failure of the drive bus at which safe pulse disable takes place. The drive can still respond autonomously to the bus failure during this time (see extended stop and retract)

This time is not waited before disabling pulses in the following cases:

- On selection of an external Stop A, a test stop or a test stop external switch off
- If SBH is active or on selection of SBH
- A pulse disable is parameterized immediately if an SG stage is active or on selection of an SG stage for which an immediate pulse disable is parameterized in $MA_SAFE_VELO_STOP_MODE or $MA_SAFE_VELO_STOP_REACTION.

Note:

$MN_SAFE_PULSE_DIS_TIME_BUSFAIL is transferred to the drive MD 1380 with the copy function of the SI-MD and compared in the data cross-check. This general machine data is contained in the axial checksum calculation of the safety relevant machine data ($MA_SAFE_ACT_CHECKSUM, $MA_SAFE_DES_CHECKSUM).

10090	SAFETY_SYSCLOCK_TIME_RATIO			N01, N06, -	FBSI	
-	Factor for monitoring cycle			DWORD	PowerOn	
SFCO						
-	-	3	1	50	7/1	M

Description: Ratio between the monitoring cycle and the system clock cycle. The monitoring cycle is the product of this data and $MN_SYSCLOCK_CYCLE_TIME.

Special cases:

The monitoring cycle is checked during power on:

- It must be an integer multiple of the position-control cycle
- It must be < 25 ms

The factor is rounded down to the next possible value if the conditions are not fulfilled. The actual set monitoring cycle is displayed by $MN_INFO_SAFETY_CYCLE_TIME.

A new value is also generated for the cross-check cycle, which is displayed by data $MN_INFO_CROSSCHECK_CYCLE_TIME.

Note:

The monitoring cycle defines the monitoring response time. It must be noted that the CPU load increases as the monitoring cycle becomes shorter.

Related to:

MD 10050: $MN_SYSCLOCK_CYCLE_TIME

MD 10091: $MN_INFO_SAFETY_CYCLE_TIME

MD 10092: $MN_INFO_CROSSCHECK_CYCLE_TIME

10091	INFO_SAFETY_CYCLE_TIME			N01, N06, N05, -	FBSI	
s	Display of monitoring cycle time			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/RO	S

Description: Display data: Displays the actually active monitoring cycle. The data cannot be written.

The data value is recalculated as soon as one of the following data are changed:

SAFETY_SYSCLOCK_TIME_RATIO,

POSCTRL_SYSCLOCK_TIME_RATIO

SYSCLOCK_CYCLE_TIME

The new value does not become active until after the next Power On.

Related to:

MD 10090: $MN_SAFETY_SYSCLOCK_TIME_RATIO

10092	INFO_CROSSCHECK_CYCLE_TIME		N01, N06, N05, -	FBSI	
s	Display of cycle time for cross-checking		DOUBLE	PowerOn	
-					
-	-	0.0	-	-	7/RO	S

Description: Display data: Maximum cross-checking cycle in seconds.

Derived from INFO_SAFETY_CYCLE_TIME and the number of data to be cross-checked (this may vary according to the type of drive used for the individual axes).

The data value is recalculated as soon as one of the following data are changed:

SAFETY_SYSCLOCK_TIME_RATIO,

POSCTRL_SYSCLOCK_TIME_RATIO

SYSCLOCK_CYCLE_TIME

The new value does not become active until after the next Power On.

Related to:

MD 10090: $MN_SAFETY_SYSCLOCK_TIME_RATIO

MD 36992: $MA_SAFE_CROSSCHECK_CYCLE

10093	INFO_NUM_SAFE_FILE_ACCESS			EXP, N06, N05, -	FBSI	
-	Number of SPL file accesses			DWORD	PowerOn	
-						
-	-	0	-	-	0/RO	S

Description: Display data: SPL file /_N_CST_DIR/_N_SAFE_SPF has been accessed n-times in a protected state. This MD is intended for service purposes only. The MD can only take the values 0 and 1. The value cannot be changed.

10094	SAFE_ALARM_SUPPRESS_LEVEL		EXP, N06, N05, -	FBSI	
-	Alarm suppress level		BYTE	PowerOn	
-					
-	-	2	0	113	7/2	M

Description: Affects the display of safety alarms. The monitoring channels NCK and drive or NCK and PLC display alarms with the same meaning in several situations.

To reduce the volume of the alarm display, this MD is set to define whether safety alarms with the same meaning are to be hidden or not. This does not affect the dual-channel stop response.

0 = Dual-channel triggered alarms are displayed in full

- Dual-channel display of all axial safety alarms
- Alarm 27001, error code 0 is displayed
- Alarms 27090, 27091, 27092, 27093, and 27095 are dual-channel and are displayed several times.

1 = Alarms with the same meaning are only displayed once.

The following alarms can be affected by this:

27010 = C01707

27011 = C01714

27012 = C01715

27013 = C01706

27020 = C01710

27021 = C01709

27022 = C01708

27023 = C01701

27024 = C01700

In the case of these alarms, only one of the alarms listed (270xx or C01xxx) is triggered.

The alarm of the monitoring channel that later triggers the alarm with the same meaning

is no longer displayed.

Furthermore, alarm 27001 with error code 0 is suppressed. This alarm is triggered

as a result of drive alarm C01711. In this case, drive parameters

r9710[0,1], r9711[0,1], r9735[0,1], r9736[0,1], r9737[0,1],

r9738[0,1], r9739[0,1] provide further information about the cause of the error.

2 = Default setting

In addition to the functionality with MD value = 1, the alarms from the SPL processing

(27090, 27091, 27092, 27093, and 27095) are displayed in one channel and only once. This

also applies to the alarms for PROFIsafe communications (27250 and following).

3 = Axial alarms 27000 and A01797 are replaced by alarm message 27100 for all axes /

drives. Alarm 27040 is replaced by alarm 27140 for all axes/

drives.

12 = The alarms are prioritized beyond the functionality with MD value = 2. Obvious subsequent alarms are no longer displayed or are automatically deleted from the display.

The following alarms can be affected by this:
27001, 27004, 27020, 27021, 27022, 27023, 27024, 27091,
27101, 27102, 27103, 27104, 27105, 27106, 27107

13 = The alarms are prioritized beyond the functionality with MD value = 3 (as with MD value 12).

1xx = If SPL commissioning mode is active ($MN_PREVENT_SYNACT_LOCK[0,1] = 0), the global group alarm 27135 will be displayed instead of the axial checksum alarms 27032, 27035, and 27060.

This machine data must be set to 0 to create an acceptance log, so that the triggering of all alarms can be logged.

10095	SAFE_MODE_MASK			EXP, N05, -	FBSI	
-	'Safety Integrated' operating modes			DWORD	PowerOn	
-						
-	-	0	0x00000000	0x00000006	7/2	M

Description: Bit 1 = 0: The "Modular PROFIsafe I/O connection" function is not active.

Bit 1 = 1: The "Modulare PROFIsafe I/O connection" function is active.

Bit 2 = 0: The reduced language scope for SAFE.SPF is only activated during ramp-up in the case of automatic startup ($MC_PROG_EVENT_MASK bit 5)

Bit 2 = 1: The reduced language scope for SAFE.SPF is also activated if the CALL command is used to call SAFE.SPF.

10096	SAFE_DIAGNOSIS_MASK			EXP, N06, N05, -	FBSI	
-	'Safety Integrated' diagnosis functions			DWORD	NEW CONF	
-						
-	-	1	0	0x0007	7/2	M

Description:

Bit 0 = 0:

SGE differences between NCK and drive monitoring channels are not displayed

Bit 0 = 1:

Default setting: SGE differences between NCK and drive monitoring channels are displayed. Differences between the following SGEs are displayed (the bit numbers stated refer to the axial map of the SGEs; they correspond to the assignment of the axial VDI interface):

Bit 0: DB31, ... DBX22.0 (SBH/SG deselection)

Bit 1: DB31, ... DBX22.1 (SBH deselection)

Bit 3: DB31, ... DBX22.3 (SG selection, bit 0)

Bit 4: DB31, ... DBX22.4 (SG selection, bit 1)

Bit 12: DB31, ... DBX23.4 (activate SE 2)

Bit 28: DB31, ... DBX33.4 (SG offset, bit 0)

Bit 29: DB31, ... DBX33.5 (SG offset, bit 1)

Bit 30: DB31, ... DBX33.6 (SG offset, bit 2)

Bit 31: DB31, ... DBX33.7 (SG offset, bit 3)

The differences are displayed by message alarm 27004.

Bit 1 = 0: Default setting: Display of a non-executed SPL start after expiry of the timer defined in MD SAFE_SPL_START_TIMEOUT with alarm 27097

Bit 1 = 1: Display of alarm 27097 is suppressed

Alarm 27097 indicates that despite the SPL configuration an SPL start has not been executed

after expiration of the time specified in MD SAFE_SPL_START_TIMEOUT. Alarm description 27097 explains why.

Bit 2 = 0: Default setting: Communication errors are displayed with SFC error codes in alarm 27354

Bit 2 = 1: Display of alarm 27354 is suppressed

10097	SAFE_SPL_STOP_MODE			N01, N06, -	FBSI	
-	Stop reaction for SPL errors			BYTE	PowerOn	
-						
-	-	3	3	4	7/2	M

Description: Selection of the stop response when the NCK / PLC SPL detects errors during a cross-check.

3: Stop D

4: Stop E

Entering the value 4 in this MD (Stop E) leads to alarm 27033, "Axis %1 Parameterization of MD10097 $MN_SAFE_SPL_STOP_MODE is invalid" unless external Stop E is enabled in all axes with SI function enable (MD36901 $MA_SAFE_FUNCTION_ENABLE is not equal to 0).

As a remedy, either Stop D must be parameterized, or bits 4 and 6 must be set in MD36901 $MA_SAFE_FUNKTION_ENABLE for all affected axes.

If this MD is set to 4, NC/PLC interface signal DB18 DBX36.1 (Stop E) must also be set to 1 to make this parameterization known to the PLC. A different parameterization leads to alarm 27909, "Error in NCK / PLC data cross check"

10098	PROFISAFE_IPO_TIME_RATIO			N01, N06, -	FBSI	
-	Factor for PROFIsafe communication			DWORD	PowerOn	
SFCO						
-	-	1	1	25	7/1	M

Description: Ratio between PROFIsafe communication and interpolator cycle. The actual PROFIsafe communication cycle is the product of this data and IPO_CYCLE_TIME, and is displayed in MD INFO_PROFISAFE_CYCLE_TIME. The OB40 on the PLC side is triggered from the NCK side in this cycle to run the communication between F master and F slaves.

The PROFIsafe communication must not exceed 25 ms.

10099	INFO_PROFISAFE_CYCLE_TIME			N01, N06, N05, -	FBSI	
s	PROFIsafe communication cycle time			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/RO	S

Description: Displays the maximum time frame within which the OB40 is initiated for PROFIsafe communication.

The value is derived from the interpolator cycle and MD $MN_PROFISAFE_IPO_TIME_RATIO.

Overshooting the communication cycle is also displayed here.

This is purely a display data. The value cannot be changed.

10110	PLC_CYCLE_TIME_AVERAGE			N01, N07	B1	
s	Average PLC acknowledgement time			DOUBLE	PowerOn	
-						
-	-	0.05	-	-	7/2	M

Description: Time information for the CNC about the OB1 cycle time. During this cycle time, it is guaranteed that the auxiliary functions will be acknowledged.

By means of the MD, the status transitions:

"channel operates/ channel in RESET/ channel failure --> channel interrupted" can be delayed for the PLC in case of a RESET. With the output "channel interrupted", the NCK waits at least the time indicated in the MD + 1 IPO cycle.

With the time indication, the path feedrate during path control operation in case of an auxiliary function output during motion is controlled in a way to ensure that the minimum travel time corresponds to the time information. This ensures a uniform velocity behavior which is not disturbed by waiting for the PLC acknowledgement. The internal incrementation is performed in the interpolation cycle.

For the auxiliary function output in the continuous-path mode, the MD is also relevant for the FM357 and 802/802s systems. With SW 5.1 and higher, the other systems are parameterized directly via the PLC.

10130	TIME_LIMIT_NETTO_COM_TASK			EXP, N01	OEM	
s	Runtime limitation of communication to HMI			DOUBLE	PowerOn	
-						
-	-	0.05	0.01	1.000	0/0	S

Description: Net runtime limit of the communication sub-task

Preprocessing and the communications task share the time that is not used up by the cyclical tasks. Of this remaining time, communication uses the set time at the expense of preprocessing time; in other words, the net block cycle time is increased by the set value. This machine data serves the purpose of optimizing the block cycle time with the function "Reloading part programs block-by-block".

10131	SUPPRESS_SCREEN_REFRESH			EXP	A2	
-	Screen refresh response under overload			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	M

Description: There are part programs in which the main run (HL) has to wait until the pre-processing (VL) makes new blocks available.

The pre-processing and display update compete for NC computing time. The MD defines how the NC is to respond when the pre-processing is too slow.

0: When the VL of a channel is too slow, the updating of the display is suppressed in all channels.

1: When the VL of a channel is too slow, the updating of the display is suppressed only in the time-critical channels in order to gain time for the pre-processing.

2: The updating of the display is never suppressed.

10132	MMC_CMD_TIMEOUT			EXP, N01, N06	PA,M4	
s	Monitoring time for HMI command in the part program			DOUBLE	PowerOn	
-						
-	-	3.0	0.0	100.0	7/2	M

Description: Monitoring time in seconds until the HMI acknowledges a command from the part program.

The following times are monitored:

- In the case of an HMI command without acknowledgement: time from triggering the transfer of the command string until successful transmission to the HMI
- In the case of an HMI command with synchronous and asynchronous acknowledgement: time from triggering the transfer of the command strings until receipt of the acceptance acknowledgement from the HMI
- For EXTCALL command and execution from external drives: time between the transmission triggering of the command string and the successful sending to the HMI.

10134	MM_NUM_MMC_UNITS			EXP, N01, N02	B3	
-	Possible number of simultaneous HMI communication partners			DWORD	PowerOn	
-						
-	-	6	1	10	2/2	M

Description: Possible number of simultaneous HMI communication partners with which the NCU can exchange data.

This value affects then number of communication orders that the NCK can manage. The higher the value, the more HMIs that can be simultaneously connected to the NCK without leading to communication problems.

DRAM is made available for this function in the NCU corresponding to the input in the machine data. The inputs for changing the memory areas have to be taken into account.

The unit of MD10134 $MN_MM_NUM_MMC_UNITS is a "resource unit".

A standard HMI needs 1 resource unit, an HMI100/103 needs 2. OEM variants may need more or less resources.

- If the value is set lower than would be needed for the number of connected HMIs, this is not inevitably problematical. Actions may not function sporadically during multiple, simultaneous, communication-intensive operations (e.g. loading a program): Alarm 5000 is displayed. The operation then has to be repeated.
- If the value is et higher, more dynamic memory is occupied than necessary. The value should be reduced appropriately if the memory is required for other purposes.

References: /FB/, S7, "Memory Configuration"

10136	DISPLAY_MODE_POSITION			N01	-	
-	Display mode for actual position in the WCS			DWORD	Reset	
-						
-	-	0	0	1	7/1	M

Description: Defines how the position and the distance to go are displayed in the WCS.

0: Display as in software version 5 and earlier

1: At end of block, the actual value display is in principle the same as the programmed end point, irrespective of where the machine actually is (e.g. as a result of the tool radius compensation). The distance to go is the same as the actual distance to be traversed. This means that the displayed actual postion has to be the same as the displayed end position minus the distance to go, irrespective of the actual machine position. If the block end points are changed by chamfers, radii, contour definitions, splines or SAR in comparison to the NC programm, then these changes are reflected in the display as if thay had been programmed. This does not apply to changes resulting from tool radius compensation or smoothing.

10160	PREP_COM_TASK_CYCLE_RATIO			EXP, N01	ECO	
-	Factor for communication with HMI			DWORD	PowerOn	
-						
-	-	3	1	50	7/1	M

Description: This machine data specifies the division ratio used for activating the communication task in the non-cyclic time level. This allows the time share of preparation in the non-cyclic time level to be increased, which reduces block cycle times. External communication (file transfer) is slowed down in particular during program execution (block reload).

10161	COM_CONFIGURATION			EXP, N01	-	
-	Configuration of communication			DWORD	PowerOn	
-						
-	8	5, 5,18, 1,16, 8,18,18	-	-	0/0	S

Description: Values 1-3 define the maximum number of PDUs that are accepted in one pass.

Value 0 stands for infinite, i.e. all present jobs are executed immediately. These three values become active after PowerOn.

1st value: max. number of variable job PDUs executed per pass.

2nd value: max. number of PI job PDUs executed per pass.

3rd value: max. number of domain job PDUs executed per pass.

Values 4-8 define the credit assignment for optimized download.

4th value: number of PDUs that are assigned as credit at the begin of acknowledgement under opt. domain service (here, the file header and therefore the file on NCK are still unknown)

5th value: number of PDUs that will be requested by default under opt. domain service, if there is no explicit memory limit for the file

6th value: min. number of PDUs that are requested with the data request message (so that data request messages are not displayed again and again)

7th value: max. number of PDUs that are requested with the data request message (max. value is 255, as the log cannot handle more than that!)

8th value: max. number of PDUs that may be present in total

10170	PREP_PLCBG_TASK_CYCLE_RATIO			EXP, N01	ECO	
-	Factor for communication with SW PLC2xx			DWORD	PowerOn	
-						
-	-	1	1	50	-1/0	S

Description: This machine data specifies the division ratio used for activation of the background task of the software PLC2xx in the non-cyclic time level.

As this cycle should be executed as often as possible (once in each PLC cycle), a ratio to the PREP task of 1:1 should be set. The frequency of activation depends on the computing time of the cyclic tasks (SERVO, IPO, COM, PLC) and the settings for the other subtasks (ratio to PREP, net runtime) or the utilization of the non-cyclic tasks PREP, EXCOM, DRIVE.

10171	TIME_LIMIT_NETTO_PLCBG_TASK			EXP, N01	ECO	
s	Runtime limitation of communication to SW PLC2xx			DOUBLE	PowerOn	
-						
-	-	0.005	.001	0.100	0/0	S

Description: Net runtime limit of the Soft PLC2xx background subtask

The machine data determines the minimum computing time assigned to the SW PLC2xx

background task, if activated, as a whole (interrupted by the cyclic tasks

and Linux)

If the task does not give up control on its own (as there is nothing to do),

it will disable both the feed and the other subtasks for this period of time.

If there is only few computing time left, relatively long periods of time may be created this way.

10172	PLCINT_POSCTRL_TIME_RATIO			EXP, N01	ECO	
-	Division ratio between servosynch. task of software PLC2xx and servotask			DWORD	PowerOn	
-						
-	-	1	1	10	-1/0	S

Description: A cyclic task of software PLC2xx, which is implemented on the servo level of the PLC, is started in a ratio synchronously with the servo task. A ratio of 1 must be set in order to achieve a quick reaction to external events.

10173	TIME_LIMIT_PLCINT_TASK			EXP, N01	ECO	
s	Runtime limitation of servosynch. task of software PLC2xx			DOUBLE	PowerOn	
-						
-	-	0.00005	0.00001	0.0001	-1/0	S

Description: Runtime limit of the servosynchronous soft PLC2xx interrupt task

This machine data defines the maximum amount of computing time given at any one time to the servosynchronous task of the softeware PLC2xx to execute the PLC user program on the PLC servo interrupt level.

10174	TIME_LIMIT_PLCINT_TASK_DIAG			EXP, N01, N05	-	
s	Runtimes of the servosynch. task of software PLC2xx with timeout			DOUBLE	PowerOn	
-						
-	3	0.0,0.0,0.0	-	-	-1/RO	M

Description: Diagnostic data of the runtimes of the servosynchronous task of the SW-PLC2xx in the case of a time-out.

[0]: Current runtime that has led to a time-out

[1]: Minimum runtime so far measured

[2]: Maximum runtime so far measured

Diagnostic data are initialized with ZERO at each NCK power up

10185	NCK_PCOS_TIME_RATIO			EXP, N01	-	
-	Processing time share NCK			DWORD	PowerOn	
-						
-	-	65	10	90	7/2	S

Description: This machine data defines the maximum proportion of CPU time given to the NCK in a PC-based system. The division specified by the user is implemented as well as possible.

When implementing the specification, the system takes into account limiting values for the absolute proportion of CPU time that must not be over or undershot.

Adaptations are made without generating an alarm.

10190	TOOL_CHANGE_TIME			N01	BA	
-	Tool changing time for simulation			DOUBLE	PowerOn	
-						
-	-	0.	-	-	7/2	M

Description: This data defines how much time is estimated for a tool change (only relevant for a simulation).

10192	GEAR_CHANGE_WAIT_TIME			N01	S1	
s	Gear stage change waiting time			DOUBLE	PowerOn	
-						
-	-	10.0	0.0	1.0e5	7/2	M

Description: External events which trigger reorganization, wait for the end of a gear stage change. GEAR_CHANGE_WAIT_TIME now determines the waiting time for the gear stage change. Time unit in seconds.

When this time expires without the gear stage change having been terminated, the NCK reacts with an alarm.

Among others, the following events will cause reorganization:

User ASUB

Mode change

Delete distance-to-go

Axis replacement

Activate user data

10200	INT_INCR_PER_MM			N01	G2,K3	
-	Calculation resolution for linear positions			DOUBLE	PowerOn	
-						
-	-	1000.	1.0	1.0e9	7/2	M

Description: This MD defines the number of internal increments per millimeter.

The accuracy of the input of linear positions is limited to the calculation accuracy by rounding the product of the programmed value and the calculation accuracy to an integer.

In order to keep the executed rounding easily understandable it is useful to use powers of 10 for the calculation accuracy.

10210	INT_INCR_PER_DEG			N01	G2,K3,R2	
-	Calculation resolution for angular positions			DOUBLE	PowerOn	
-						
-	-	1000.0	1.0	1.0e9	7/2	M

Description: This MD defines the number of internal increments per degree.

The accuracy of the input of angular positions is limited to the calculation accuracy by rounding the product of the programmed value and the calculation accuracy to an integer.

In order to keep the executed rounding easily understandable it is useful to use powers of 10 for the calculation accuracy.

10220	SCALING_USER_DEF_MASK			EXP, N01	G2	
-	Activation of scaling factors			DWORD	PowerOn	
SCAL						
-	-	0x200	0	0x3FFF	7/2	M

Description: Bit mask for selecting the base values for the data (e.g. machine and setting data) that have a physical unit, they are interpreted in the default units shown below according to the basic system (metric/inch). If other input/output units are to be selected for individual physical units then these are activated with the scale factors associated with this machine data (entered in MD10230 $MN_SCALING_FACTORS_USER_DEF[n]).

This does not affect the programming of geometry and feed values.

Bit set:

Data of the assigned physical variable (see list) are scaled to the unit defined by MD10230 $MN_SCALING_FACTORS_USER_DEF[n].

Bit not set:

Data of the assigned physical variable are scaled to the default unit shown below.

Assigned physical variable	Default units for: MD10240 $MN_SCALING_SYSTEM_IS_METRIC	
Bit no. (Stated as hex value)	1 = METRIC	0 = INCH
0 Linear position	1 mm	1 inch
1 Angular position	1 degree	1 degree
2 Linear velocity	1 mm/min	1 inch/min
3 Angular speed	1 rpm	1 rpm
4 Linear acceleration	1 m/s²	1 inch/s²
5 Angular acceleration	1 rev/s²	1 rev/s²
6 Linear jerk	1 m/s³	1 inch/s³
7 Angular jerk	1 rev/s³	1 rev/s³
8 Time	1 s	1 s
9 Position-controller servo gain	1/s	1/s
10 Revolutional feedrate	1 mm/rev	1 mm/rev
11 Compensation value linear pos.	1 mm	1 mm
12 Compensation value angular pos.	1 degree	1 degree
13 Cutting rate	1 m/min	1 feet/min

Example:

SCALING_USER_DEF_MASK =?H3?; (Bit nos. 0 and 1 as hex values)

The scale factor defined in the associated MD10230 $MN_SCALING_FACTORS_USER_DEF[n] is activated for linear and angular positions.

If this machine data is changed, a power on is required as otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

  First start up and then enter the associated machine data with physical units.
- MD changed via machine data file

  First start up and then reload the machine data file so that the new physical units are taken into account.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example: Input/output of linear velocities is to be in cm/min:

SCALING_USER_DEF_MASK = 0x4 (bit no. 2 as hex value)

SCALING_FACTORS_USER_DEF[2] = 0.1666666667 (10/60)

[Related to:

MD10230 $MN_SCALING_FACTORS_USER_DEF[n] (scaling factors of the physical variables)

10230	SCALING_FACTORS_USER_DEF			EXP, N01	G2	
-	Scaling factors of physical variables			DOUBLE	PowerOn	
SCAL						
-	15	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	1e-9	-	7/2	M

Description: The scaling factor of a physical variable that has a unit other than the default unit setting (set bit in MD10220 $MN_SCALING_USER_DEF_MASK) is entered in this MD. The factor must refer to the unit used internally for the physical variable in question.

Index [n]	Assigned physical variable	Internal unit
0	Linear position	1 mm
1	Angular position	1 degree
2	Linear velocity	1 mm/s
3	Angular speed	1 degree/s
4	Linear acceleration	1 mm/s²
5	Angular acceleration	1 degree/s²
6	Linear jerk	1 mm/s³
7	Angular jerk	1 degree/s³
8	Time	1 s
9	Position-controller servo gain	1/s
10	Revolutional feedrate	1 mm/degree
11	Compensation value linear position	1 mm
12	Compensation value angular position	1 degree
13	Cutting rate	1 mm/s

The scaling factor is assigned to the physical variable using the index [0...12]. If this machine data is changed, a startup is required because otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

  First start up and then enter the associated machine data with physical units.
- MD changed via machine data file

  First start up and then reload the machine data file so that the new physical units are taken into account.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example(s):

Input/output of angular speeds is to be in new degree/min:
$MN_SCALING_USER_DEF_MASK = 'H8'; (bit no. 3 as hex value)
$MN_SCALING_FACTORS_USER_DEF[3] = 0.01851852; (400/360/60)

[3]: Index for angular speed.

Related to:

MD10220 $MN_SCALING_USER_DEF_MASK (activation of scaling factors).

10240	SCALING_SYSTEM_IS_METRIC			N01	G2,K3,A3,S1	
-	Basic system metric			BOOLEAN	PowerOn	
SCAL						
-	-	TRUE	-	-	7/2	M

Description: The MD defines the basic system used by the control for scaling length-dependent physical variables for data input/output.

All corresponding data are stored internally in the basic units of 1 mm, 1 degree and 1 sec.

In the case of access from the interpreter (part program and download), from the operator panel (variable service) or through external communication, scaling takes place in the following units:

MD10240 $MN_SCALING_SYSTEM_IS_METRIC = 1: scaled in:

mm, mm/min, m/s2 , m/s3, mm/rev.

MD10240 $MN_SCALING_SYSTEM_IS_METRIC = 0: scaled in:

inch, inch/min, inch/s2, inch/s3, inch/rev.

The selection of the basic system also defines the interpretation of the programmed F value for linear axes:

	metric	inch
G94	mm/min	inch/min
G95	mm/rev.	inch/rev.

If this machine data is changed, a startup is required because otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

First start up and then enter the associated machine data with physical units.

- MD changed via machine data file

First start up and then reload the machine data file so that the new physical units are taken into account.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example(s):

Setup is in the metric system and then changed over to the inch system.

Special cases, errors:

The factor used for changing from 1 mm to 1 inch can be changed with MD10250 $MN_SCALING_VALUE_INCH.

10250	SCALING_VALUE_INCH			EXP	G2	
-	Conversion factor for INCH			DOUBLE	PowerOn	
SCAL						
-	-	25.4	1e-9	-	0/0	S

Description: The MD contains the conversion factor from metric to inch.

This factor is only active with the selection of the non-metric basic system (MD10240 $MN_SCALING_SYSTEM_IS_METRIC = 0) in the following conversions:

- Programmed F values for linear axes
- Input/output of lengths and length-dependent data (e.g. when uploading machine data, work offsets)

Programmed geometry axis positions are converted by this factor when the measuring system programmed with G70/G71 is different from the selected basic system (SCAL-ING_ SYSTEM_IS_METRIC).

Programmed synchronous axis positions are converted by the corresponding axial factors (MD31200 $MA_SCALING_FAKTOR_G70_G71) when the measuring system programmed with G70/G71 is different from the selected basic system (MD10240 $MN_SCALING_SYSTEM_IS_METRIC). Settings other than the default 25.4 should only be made in exceptional cases as the correct display of the unit on the operator interface depends on this value.

If this machine data is changed, a startup is required because otherwise the associated machine data that have physical units would be incorrectly scaled.

Proceed as follows:

- MD changed manually

  --> Start up and then enter the associated machine data with physical units.

- MD changed via machine data file

  --> Perform power on and then reload the machine data file so that the new physical units are taken into account.

If the machine data are altered, alarm 4070 "Scaling machine data altered" is output.

Application example(s):

This conversion factor is used if a changeover is made from metric to inch or a customized measuring system. Then all the input machine data, among other things, are converted by this factor. The converted values are then given at the next read out and on the operator panel.

Related to:

MD10240 $MN_SCALING_SYSTEM_IS_METRIC

10260	CONVERT_SCALING_SYSTEM			EXP	-	
-	Enable basic system conversion			BOOLEAN	PowerOn	
LINK						
-	-	FALSE	-	-	1/1	M

Description: Determines the handling of MD10240 $MN_SCALING_SYSTEM_IS_METRIC.

0: Inch/metric behavior conforms to SW1-SW4

1: Inch/metric behavior from SW5

Inch/metric functionality of SW5:

1. Switch over the systems of units with HMI softkey
2. New G codes G700/G710
3. Data backup with system of unit recognition INCH/METRIC
4. Automatic data conversion on change of system of units

- All zero point offsets
- Compensation data (EEC, QEC)
- Tool offsets
- etc.

The change from MD10260 $MN_CONVERT_SCALING_SYSTEM leads to alarm 4070!

This alarm is designed to indicate that data which remain active after a POWERON are not subjected to automatic conversion from SW1-SW4 and SW5 formats.

10270	POS_TAB_SCALING_SYSTEM			N01, N09	T1,N3,G2	
-	System of units of position tables			BYTE	Reset	
-						
-	-	0	0	1	7/2	M

Description: Defines the measuring system for the positional data for the following machine data

MD10910 $MN_INDEX_AX_POS_TAB_1
MD10930 $MN_INDEX_AX_POS_TAB_2
SD41500 $SN_SW_CAM_MINUS_POS_TAB_1
SD41501 $SN_SW_CAM_PLUS_POS_TAB_1
SD41502 $SN_SW_CAM_MINUS_POS_TAB_2
SD41503 $SN_SW_CAM_PLUS_POS_TAB_2
SD41504 $SN_SW_CAM_MINUS_POS_TAB_3
SD41505 $SN_SW_CAM_PLUS_POS_TAB_3
SD41506 $SN_SW_CAM_MINUS_POS_TAB_4
SD41507 $SN_SW_CAM_PLUS_POS_TAB_4

0: metric
1: inch

This machine data is only evaluated for MD10260 $MN_CONVERT_SCALING_SYSTEM = 1.

Related to:

MD10260 $MN_CONVERT_SCALING_SYSTEM
MD10910 $MN_INDEX_AX_POS_TAB_1
MD10930 $MN_INDEX_AX_POS_TAB_2
SD41500 $SN_SW_CAM_MINUS_POS_TAB_1
SD41501 $SN_SW_CAM_PLUS_POS_TAB_1
SD41502 $SN_SW_CAM_MINUS_POS_TAB_2
SD41503 $SN_SW_CAM_PLUS_POS_TAB_2
SD41504 $SN_SW_CAM_MINUS_POS_TAB_3
SD41505 $SN_SW_CAM_PLUS_POS_TAB_3
SD41506 $SN_SW_CAM_MINUS_POS_TAB_4
SD41507 $SN_SW_CAM_PLUS_POS_TAB_4

10280	PROG_FUNCTION_MASK			EXP, N01	K1	
-	Comparing (> and <) compatible with SW6.3			DWORD	PowerOn	
-						
-	-	0x0	0	0x7	7/2	M

Description: Bit mask for parameterizing various sub-program commands

Bit Hexadec.Meaning with bit set
value

0: 0x1Comparison commands ">" and "<" are processed as for SW 6.3 and earlier:

Sub-program data of the type REAL are mapped internally in the IEEE 64 bit format. This mode maps decimal numbers inaccurately if this format's 52-bit wide mantissa is inadequate to map the number in binary notation. To solve this problem, all comparison commands (==, <>, >=, <=, > and <) are checked for relative equality of 1E-12.

This procedure is switched off for greater than (>) and less than (<) comparisons by setting bit 0. (Compatibility setting for software releases earlier than SW 6.4)

1: 0x2Programming the channel names from machine data MD20000 $MC_CHAN_NAME

By setting bit 1, the channel name stored in machine data MD20000 $MC_CHAN_NAME can be programmed in the part program. The channel name can thus also be programmed instead of a numerical value for the channel number in programming coordination commands such as (START(), INIT(), WAIT() etc.

2: 0x4reserved

10284	DISPLAY_FUNCTION_MASK			EXP, N01	-	
-	BTSS-variable lastBlockNoStr active			DWORD	PowerOn	
-						
-	-	0x0	-	-	7/2	M

Description: Bit mask for parameterizing various display variables:

BitNo. Hexadec. Meaning with bit set
value

Bit0: 0x1

Parameters are assigned to the OPI variable lastBlockNoStr in the SPARP and SPARPP blocks.

Bit1: 0x2

Concerns the OPI variable cmdSpeed in the SPARPP block. If the bit is set, the variable returns the programmed speed even if the spindle is at a standstill or in another mode (positioning mode, axis mode).

Bit2 0x4

Concerns the OPI variable cmdSpeed in the SPARPP block. (reserved for constant cutting speed)

Bit8: 0x100

Servotrace manages larger numerical values internally. Overruns in data format are avoided. The accuracy may be reduced with large numerical values.

10290	CC_TDA_PARAM_UNIT			N09	G2	
-	Physical units of tool data for compile cycles			DWORD	PowerOn	
-						
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2	M

Description:

```
Physical units for the user-defined tool-specific data:
0 ;No unit
1 ;Linear position       [ mm ; inch ]
2 ;Angular position      [ degree ; degree ]
3 ;Linear velocity       [ mm/min ; inch/min ]
4 ;Angular speed         [ rpm ; rpm ]
5 ;Linear acceleration   [ m/s²  ; inch/s² ]
6 ;Angular acceleration. [ rev/s ² ; rev/s ² ]
7 ;Linear jerk           [ m/s ³ ; inch/s ³  ]
8 ;Angular jerk          [ rev/s ³ ; rev/s ³ ]
9 ;Revolutional feedrate [ mm/rev ; inch/rev ]
Only available if bit 2 (0x4) is set in MD18080
$MN_MM_TOOL_MANAGEMENT_MASK
```

10291	CCS_TDA_PARAM_UNIT			N09	-	
-	physical units of SIEMENS-OEM tool data			DWORD	PowerOn	
-						
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2	M

Description:

```
Physical units for application-specific tool-specific data:
0:   No unit
1:   Linear position             [ mm; inch ]
2:   Angular position            [ degree ; degree ]
3:   Linear velocity             [ mm/min ; inch/min ]
4:   Angular speed               [ rpm ; rpm ]
5:   Linear acceleration         [ m/s² ; inch/s² ]
6:   Angular acceleration        [ rev/s² ; rev/s² ]
7:   Linear jerk                 [ m/s³ ; inch/s³ ]
8:   Angular jerk                [ rev/s³ ; rev/s³ ]
9:   Feedrate per revolution     [ mm/rev; inch/rev]
Only available if Bit 2 (0x4) is set in MD18080
$MN_MM_TOOL_MANAGEMENT_MASK.
Related to:
 MD18204 $MN_MM_NUM_CCS_TDA_PARAM
```

10292	CC_TOA_PARAM_UNIT			N09	G2	
-	Physical units of cutting edge data for compile cycles			DWORD	PowerOn	
-						
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2	M

Description:

```
Physical units for the user-defined cutting edge data:
0  ;No unit
1  ;Linear position        [ mm ; inch ]
2  ;Angular position       [ degree ; degree ]
3  ;Linear velocity        [ mm/min ; inch/min ]
4  ;Angular speed          [ rpm ; rpm ]
5  ;Linear acceleration    [ m/s²  ; inch/s² ]
6  ;Angular acceleration.  [ rev/s ² ; rev/s ² ]
7  ;Linear jerk            [ m/s ³ ; inch/s ³  ]
8  ;Angular jerk           [ rev/s ³ ; rev/s ³ ]
9  ;Revolutional feedrate  [ mm/rev ; inch/rev ]
Only available if bit 2 (0x4) is set in MD18080
$MN_MM_TOOL_MANAGEMENT_MASK
```

10293	CCS_TOA_PARAM_UNIT			N09	-	
-	Physical units of SIEMENS-OEM cutting edge data			DWORD	PowerOn	
-						
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2	M

Description:

```
Physical units for application-specific cutting data:
0 :  No unit
1 :  Linear position              [ mm ; inch ]
2 :  Angular position             [ degree ; degree ]
3 :  Linear velocity              [ mm/min ; inch/min ]
4 :  Angular speed                [ rpm ; rpm ]
5 :  Linear acceleration          [ m/s² ; inch/s² ]
6 :  Angular acceleration         [ rev/s² ; rev/s² ]
7 :  Linear jerk                  [ m/s³ ; inch/s³ ]
8 :  Angular jerk                 [ rev/s³ ; rev/s³ ]
9 :  Feedrate per revolution      [ mm/rev; inch/rev]
Only available if Bit 2 (0x4) is set in MD18080
$MN_MM_TOOL_MANAGEMENT_MASK.
Related to:
 MD18206 $MN_MM_NUM_CCS_TOA_PARAM
```

10300	FASTIO_ANA_NUM_INPUTS			N10	A4,TE1	
-	Number of active analog NCK inputs			BYTE	PowerOn	
-						
-	-	0	0	8	7/2	M

Description: This machine data defines the number of usable analog NCK inputs on the control.

Only these analog NCK inputs can be addressed by the NC part program or assigned by NC functions.

If more analog NCK inputs are defined with the machine data than are available in the hardware of the control, the binary analog actual value is set to zero in the control for the inputs that do not exist in the hardware. The NCK value can be altered by the PLC.

Note:

CPU computing time on the interpolation level is required for processing the digital and analog NCK I/Os. The number of active NCK I/Os should therefore be limited to the demands of the machine so that the interpolation cycle time is not unnecessarily loaded.

10310	FASTIO_ANA_NUM_OUTPUTS			N10	A4	
-	Number of active analog NCK outputs			BYTE	PowerOn	
-						
-	-	0	0	8	7/2	M

Description: This machine data defines the number of usable analog NCK outputs on the control.

Only these analog NCK outputs can be addressed by the NC part program or assigned by NC functions.

If more analog NCK outputs are defined with the machine data than are available in the hardware of the control, no alarm is triggered. The analog values specified by the part program can be read by the PLC.

Note:

CPU computing time on the interpolation level is required for processing the digital and analog NCK I/Os. The number of active NCK I/Os should therefore be limited to the demands of the machine so that the interpolation cycle time is not unnecessarily loaded.

10320	FASTIO_ANA_INPUT_WEIGHT			N10	A4	
-	Weighting factor for analog NCK inputs			DWORD	PowerOn	
-						
-	8	10000,10000,10000,10000,10000,10000...	1	10000000	7/2	M

Description: A weighting factor can be defined with this MD for each analog NCK input [n] to enable adaptation to the various analog-to-digital converters (depending on the I/O module).

The value to be entered in this machine data is the value that is to be read in the part program with the command x = $A_INA[n] if the associated analog input [n] is set to the maximum value or the value +32767 is defined for this input via the PLC interface.

The value read from the analog-to-digital converter or the PLC interface is multiplied by the factor (FASTIO_ANA_INPUT_WEIGHT / 32767) before it can be read in the part program with the system variable $A_INA[n].

Use of the weighting factor for "Analog NCK inputs without hardware": with a weighting factor of 32767, the values defined by the part program and the PLC are numerically identical (1:1 communication between part program and PLC). This is advantageous when the analog NCK inputs/outputs are used purely as PLC inputs/outputs without analog hardware.

Note:

The comparator threshold values SD41600 $SN_COMPAR_THRESHOLD_1 and SD41601 $SN_COMPAR_THRESHOLD_2 are also normalized to MD10320 $MN_FASTIO_ANA_INPUT_WEIGHT corresponding to their assignment to an analog input.

The CC access to analog values is not affected by FASTIO_ANA_INPUT_WEIGHT.

Related to:

NC/PLC interface signal DB10, DBB148 - 163 (PLC setting value for analog NCK inputs)

10330	FASTIO_ANA_OUTPUT_WEIGHT			N10	A4	
-	Weighting factor for analog NCK outputs			DWORD	PowerOn	
-						
-	8	10000,10000,10000,10 000,10000,10000...	1	10000000	7/2	M

Description: A weighting factor can be defined with this MD for each analog NCK output [n] to enable adaptation to the various digital-to-analog converters (depending on the I/O module used).

[hw] = Index (0 to 7) for addressing the external analog outputs

The value x to be entered in this machine data is the value that is to effect the maximum set value of the associated analog output [n] when programming $A_OUTA[n] = x in the part program or is to generate the value +32767 in the PLC interface for this output.

Use of the weighting factor for "Analog NCK outputs without hardware": With a weighting factor of 32767, the values defined by the part program and the PLC are numerically identical (1:1 communication between part program and PLC). This is advantageous when the analog NCK outputs are used purely as PLC outputs without analog hardware.

Related to:

NC/PLC interface signal DB10, DBB170 - 185 (PLC setting value for analog NCK outputs)

NC/PLC interface signal DB10, DBB210 - 225 (Setpoint for analog NCK outputs)

10350	FASTIO_DIG_NUM_INPUTS			N10	A4,TE1	
-	Number of active digital NCK input bytes			BYTE	PowerOn	
-						
-	-	1	0	5	7/2	M

Description: The number of bytes of the digital NCK inputs that can be used on the control are defined in this machine data.

These digital NCK inputs can be read directly by the part program. Moreover, the signal state at the HW inputs can also be changed by the PLC.

If more digital NCK inputs are defined in the machine data than are available in the control hardware, a signal status of 0 is set in the control for the inputs that do not exist in the hardware. The NCK value can be altered by the PLC.

Related to:

NC/PLC interface signal DB10 DBB0 (Disable the digital NCK inputs 1-8);

NC/PLC interface signal DB10 DBB122,124,126,128 (Disable the external digital inputs 9-40)

NC/PLC interface signal DB10 DBB1(PLC setting for digital NCK inputs 1-9)

NC/PLC interface signal DB10 DBB123,125,127,129 (PLC values for external digital inputs 9-40)

NC/PLC interface signal DB10, DBB60, DBB186 (Actual value for digital NCK inputs)

10360	FASTIO_DIG_NUM_OUTPUTS			N10	A4,TE8	
-	Number of active digital NCK output bytes			BYTE	PowerOn	
-						
-	-	0	0	5	7/2	M

Description: The number of bytes for digital NCK outputs that can be used on the control are defined in this machine data.

These digital NCK outputs can be set directly by the part program. The PLC is able to

- set the digital outputs to "0" in a defined way with NC/PLC interface signal DB10, DBB4, DBB130 (Disable the digital NCK outputs).
- alter the NCK value with NC/PLC interface signal DB10, DBB5, DBB131 (Overwrite mask for digital NCK outputs).
- specify a PLC value with NC/PLC interface signal DB10, DBB7, DBB133 (Setting mask for digital NCK outputs).

If more digital NCK outputs are defined in the machine data than are available in the control hardware, no alarm is triggered. The signal states specified by the part program can be read by the PLC.

Special cases:

Digital NCK outputs 5 to 8 can be processed only by the PLC (no hardware outputs).

Related to:

NC/PLC interface signal DB10, DBB4, DBB130 (Disable the digital NCK outputs)

NC/PLC interface signal DB10, DBB5, DBB131 (Overwrite mask for digital NCK outputs)

NC/PLC interface signal DB10, DBB6, DBB132 (PLC setting value for digital NCK outputs)

NC/PLC interface signal DB10, DBB7, DBB133 (Setting mask for digital NCK outputs)

NC/PLC interface signal DB10, DBB64, DBB190 (Setpoint for digital NCK outputs)

10361	FASTIO_DIG_SHORT_CIRCUIT			N10	A4	
-	Short circuit of digital inputs and outputs			DWORD	PowerOn	
-						
-	10	0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: Defined short circuits between digital output and input signals of the high-speed NCK I/Os are realized by linking the signals read in from the high-speed NCK I/Os or the PLC interface to defined output signals.

The output signals always remain unchanged by the link, the inputs that have to be taken into account internally arise from the read inputs and the link. If a plurality of output bits are specified for one input bit in overwrite mode, the last defined assignment in the list determines the result.

The definition of non-existent or non-activated inputs/outputs is ignored without an alarm.

Bits 0-7:Number of the input byte to be written (1 - 5)

Bits 8-15:Bit number within the input byte (1 - 8)

Link:

The type of link is selected by adding a hexadecimal number to the input bit number:

- 00 Overwrite input identically to output
- A0 Input is AND-gated to the read input with the status of the stated output
- B0 Input is OR-gated to the read input with the status of the stated output

Bits 16-23:Number of the output byte to be used (1 - 5)

Bits 24-31:Bit number within the output byte (1 - 8)

Example:

$MN_FASTIO_DIG_SHORT_CIRCUIT[0] = 0x04010302

Input: 3rd bit of the 2nd byte
Output: 4th bit of the 1st byte (= 4th onboard NCU output)
The input status is overwritten by the specified output

$MN_FASTIO_DIG_SHORT_CIRCUIT[1] = 0x0705A201

Input: 2nd bit of the 1st byte (= 2nd onboard NCU input)
Output: 7th bit of the 5th byte
The input status is AND-gated with the specified output

$MN_FASTIO_DIG_SHORT_CIRCUIT[2] = 0x0103B502

Input: 5th bit of the 2nd byte
Output: 1st bit of the 3rd byte
The input status is OR-gated with the specified output

Related to:

MD10350 $MN_FASTIO_DIG_NUM_INPUTS,
MD10360 $MN_FASTIO_DIG_NUM_OUTPUTS.

References: /FB/, A4, "Digital and Analog NCK I/Os"

10362	HW_ASSIGN_ANA_FASTIN			N10	A4,TE1	
-	Hardware assignment of the fast analog NCK inputs			DWORD	PowerOn	
-						
-	8	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2	M

Description:

For PROFIBUS/PROFINET:

1st + 2nd byte indicate the logical start address of the I/O slot on the PROFIBUS/PROFINET:

Value 0000 means NO active slot

Values 0001..0100 are reserved for the PLC process image (the value of input slots can be read by the NCK without errors, but output slots are forbidden in this range, and cause an alarm on power up)

1st byte = LowByte of the logical start address

2nd byte = HighByte of the logical start address

3nd byte = 0 = without meaning

4th byte = 5 = segment no. for PROFIBUS/PROFINET

The individual bytes are explained in MD10366 $MN_HW_ASSIGN_DIG_FASTIN.

[hw] = Index (0 to 7) for addressing the external analog inputs

Related to:

MD10366 $MN_HW_ASSIGN_DIG_FASTIN

MD10368 $MN_HW_ASSIGN_DIG_FASTOUT

MD10364 $MN_HW_ASSIGN_ANA_FASTOUT

10364	HW_ASSIGN_ANA_FASTOUT			N10	A4,TE3	
-	Hardware assignment of external analog NCK outputs			DWORD	PowerOn	
-						
-	8	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2	M

Description:

For PROFIBUS/PROFINET:

1st + 2nd byte indicate the logical start address of the I/O slot on the PROFIBUS/PROFINET:

Value 0000 means NO active slot

Values 0001..0100 are reserved for the PLC process image (the value of input slots can be read by the NCK without errors; however, output slots are forbidden in this range, and cause an alarm on power up)

1st byte = LowByte of the logical start address

2nd byte = HighByte of the logical start address

3rd byte = 0 = without meaning

4th byte = 5 = segment no. for PROFIBUS/PROFINET

The individual bytes are explained in MD10366 $MN_HW_ASSIGN_DIG_FASTIN.

Related to:

MD10366 $MN_HW_ASSIGN_DIG_FASTIN

MD10368 $MN_HW_ASSIGN_DIG_FASTOUT

MD10362 $MN_HW_ASSIGN_ANA_FASTIN

10366	HW_ASSIGN_DIG_FASTIN			N10	A4,TE1	
-	Hardware assignment of external digital NCK inputs			DWORD	PowerOn	
-						
-	10	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2	M

Description:

```
For PROFIBUS/PROFINET:
   1st + 2nd byte indicate the logical start address of the I/O
slot on the PROFIBUS/PROFINET:
Value 0000 means NO active slot
Values 0001..0100 are reserved for the PLC process image (the
value of input slots can be read by the NCK without errors; how-
ever, output slots are forbidden in this range, and cause an alarm
on power up)
   1st byte = LowByte of the logical start address
   2nd byte = HighByte of the logical start address
   3rd byte = 0 = without meaning
   4th byte = 5 = segment no. for PROFIBUS/PROFINET
Module no.:   1 ... MD_MAXNUM_SIMO611D_AXES:
  Number of the logical slot in which the terminal block with the
  external I/Os is inserted. The logical slot is assigned to a
  physical slot by MD13010 $MN_DRIVE_LOGIC_NR, it is activated by
  MD13000 $MN_DRIVE_IS_ACTIVE.
1st + 2nd bytes give the logical start address of the I/O slot on
the PROFIBUS
1st byte = low byte
2nd byte = high byte
Value 0000 means NO active slots
Values 0001..007F  are reserved for the PLC (NCK can also read the
value for input slots without error, but output slots are forbid-
den in this range and lead to an alarm during startup)
Values 0080..02FF  are valid
Values > 02FF  are invalid
Example:
HW_ASSIGN_DIGITAL_FASTIN[3] = '05000302'
1st + 2nd byte:   0302 (hex) = logical start address 770 (decimal)
3rd byte:   00 = no significance
4th byte:   05 = ID for PROFIBUS/PROFINET
Related to:
  MD10368 $MN_HW_ASSIGN_DIG_FASTOUT
  MD10362 $MN_HW_ASSIGN_ANA_FASTIN
  MD10364 $MN_HW_ASSIGN_ANA_FASTOUT
```

10368	HW_ASSIGN_DIG_FASTOUT			N10	A4	
-	Hardware assignment of external digital NCK outputs			DWORD	PowerOn	
-						
-	4	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2	M

Description:

For PROFIBUS/PROFINET:

1st + 2nd byte indicate the logical start address of the I/O slot on the PROFIBUS/PROFINET:

Value 0000 means NO active slot

Values 0001..0100 are reserved for the PLC process image (the value of input slots can be read by the NCK without errors; however, output slots are forbidden in this range, and cause an alarm on power up)

1st byte = LowByte of the logical start address

2nd byte = HighByte of the logical start address

3rd byte = 0 = without meaning

4th byte = 5 = segment no. for PROFIBUS/PROFINET

The individual bytes are explained under MD10366 $MN_HW_ASSIGN_DIG_FASTIN.

[hw] = Index (0 to 3) for addressing the external digital output bytes

Related to:

MD10366 $MN_HW_ASSIGN_DIG_FASTIN

MD10362 $MN_HW_ASSIGN_ANA_FASTIN

MD10364 $MN_HW_ASSIGN_ANA_FASTOUT

10385	PROFISAFE_MASTER_ADDRESS			N01, N06, -	FBSI	
-	PROFIsafe address master module			DWORD	PowerOn	
-						
-	-	0	0	0x0500FA7D	7/2	M

Description:

Definition of the PROFIsafe address of the F master NCK/PLC. Used for unique assignment between F master and F slave. This parameter must be entered corresponding to the parameter "F_source_address" set in S7-ES for the F slaves. Communication is only attempted to be set up with F slaves which have this address entered.

10386	PROFISAFE_IN_ADDRESS			N01, N06, -	FBSI	
-	PROFIsafe address input module			DWORD	PowerOn	
-						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0x0501FFFF	7/2	M

Description:

PROFIsafe destination address of an input module

Format: 0s 0x aaaa

s: Bus segment (5 = DP connection on the PLC side)

x: Sub-slot address

Value range: 0...1

x = 0 addresses the F user data signals 1...32

x = 1 adresses the F user data signals 33...64

aaaa: Hexadecimal PROFIsafe address of the F module

10387	PROFISAFE_OUT_ADDRESS			N01, N06, -	FBSI	
-	PROFIsafe-address output module			DWORD	PowerOn	
-						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0x0501FFFF	7/2	M

Description:

```
PROFIsafe destination address of an output module
Format: 0s 0x aaaa
s: Bus segment (5 = DP connection on the PLC side)
x: Sub-slot address
    Value range: 0...1
   x = 0 addresses the F user data signals 1...32
   x = 1 adresses the F user data signals 33...64
aaaa: Hexadecimal PROFIsafe address of the F module
```

10388	PROFISAFE_IN_ASSIGN			N01, N06, -	FBSI	
-	Input.assignment $A_INSE to PROFIsafe module			DWORD	PowerOn	
-						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2	M

Description:

```
Assignment between external SPL interface $A_INSE and PROFIsafe
input module
The three lower digits indicate the 1st range limit for the
$A_INSE variables to be fed.
The three higher digits indicate the 2nd range limit for the
$A_INSE variables to be fed.
Example:
PROFISAFE_IN_ASSIGN[0] = 4001 or alternatively 1004:
The system variables $A_INSE[1...4] are fed with the state of the
input terminals of the PROFIsafe module specified by MD
PROFISAFE_IN_ADDRESS[0].
```

10389	PROFISAFE_OUT_ASSIGN			N01, N06, -	FBSI	
-	Outp.assignment $A_OUTSE to PROFIsafe module			DWORD	PowerOn	
-						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2	M

Description:

```
Assignment between external SPL interface $A_OUTSE and PROFIsafe
output module
The three lower digits indicate the 1st range limit for the
$A_OUTSE variables to be connected.
The three higher digits indicate the 2nd range limit for the
$A_OUTSE variables to be connected.
Example:
PROFISAFE_OUT_ASSIGN[0] = 64061 or alternatively 61064:
The system variables $A_OUTSE[61...64] are fed to the output ter-
minals of the PROFIsafe module specified by MD
PROFISAFE_OUT_ADDRESS[0].
```

10390	SAFE_IN_HW_ASSIGN			N01, N06, -	FBSI	
-	Input assignment of external SPL interface			DWORD	PowerOn	
-						
-	8	0,0,0,0,0,0,0,0	-	-	-1/2	M

Description: An input byte of the NCK I/Os can be assigned byte by byte to the system variables $A_INSE[x] with this machine data.

```
n   System variables  Comment
=0  $A_INSE[1...8]    Assignment for 1st byte
=1  $A_INSE[9..16]    Assignment for 2nd byte
=2  $A_INSE[17..24]   Assignment for 3rd byte
=3  $A_INSE[25..32]   Assignment for 4th byte
=4  $A_INSE[33..40]   Assignment for 5th byte
=5  $A_INSE[41..48]   Assignment for 6th byte
=6  $A_INSE[49..56]   Assignment for 7th byte
=7  $A_INSE[57..64]   Assignment for 8th byte
```

Related to:

MD 10392: $MN_SAFE_OUT_HW_ASSIGN

See MD 10366:$MN_HW_ASSIGN_DIG_FASTIN for structure.

This involves the restriction that an I/O module has to be addressed via this MD. Assignment to another system variable is not possible.

10392	SAFE_OUT_HW_ASSIGN			N01, N06, -	FBSI	
-	Output assignment ext. interface SPL			DWORD	PowerOn	
-						
-	8	0,0,0,0,0,0,0,0	-	-	-1/2	M

Description: An output byte of the NCK I/Os can be assigned byte by byte to the system variables $A_OUTSE[x] with this machine data.

```
n    System variables   Comment
=0   $A_OUTSE[1..8]     Assignment for 1st byte
=1   $A_OUTSE[9..16]    Assignment for 2nd byte
=2   $A_OUTSE[17..24]   Assignment for 3rd byte
=3   $A_OUTSE[25..32]   Assignment for 4th byte
=4   $A_OUTSE[33..40]   Assignment for 5th byte
=5   $A_OUTSE[41..48]   Assignment for 6th byte
=6   $A_OUTSE[49..56]   Assignment for 7th byte
=7   $A_OUTSE[57..64]   Assignment for 8th byte
```

Related to:

MD 10390: $MN_SAFE_IN_HW_ASSIGN

10393	SAFE_DRIVE_LOGIC_ADDRESS			N01, N06, -	-	
-	Logical drive addresses SI			DWORD	PowerOn	
-						
-	31	6700,6724,6748,6772,6796,6820,6844...	258	8191	7/2	M

Description: Logical I/O addresses of the SI message frames of the drives on the PROFIBUS.

One address is assigned to one drive.

10394	PLCIO_NUM_BYTES_IN			N10	A4	
-	Number of directly readable input bytes of the PLC I/Os			BYTE	PowerOn	
-						
-	-	0	0	32	7/2	M

Description: The number of PLC I/O input bytes that can be read directly by the NC.

These bytes are not transmitted by the PLC user program but via an interrupt of the PLC operating system.

The access delay is less than 0.5 ms.

The bytes can be read by the part program and from synchronized actions with the system variables:

$A_PBB_IN,

$A_PBW_IN,

$A_PBD_IN,

$A_PBR_IN

.

Notice:

The machine data MD10394 $MN_PLCIO_NUM_BYTES_IN and MD10395 $MN_PLCIO_LOGIC_ADDRESS_IN must be consistent with the PLC-side configuration.

Related to:

MD10395 $MN_PLCIO_LOGIC_ADDRESS_IN

10395	PLCIO_LOGIC_ADDRESS_IN			N10	A4	
-	Start addr. of the directly readable input bytes of the PLC I/Os			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: Starting from this address, the PLC hardware must configure a number of bytes in MD10394 $MN_PLCIO_NUM_BYTES_IN for direct use by the NC. These bytes are not transmitted by the PLC user program, but directly via an interrupt of the PLC operating system. The access delay is less than 0.5 ms. The bytes can be read by the part program and from synchronized actions with the system variables:

$A_PBB_IN,

$A_PBW_IN,

$A_PBD_IN,

$A_PBR_IN

.

Notice:

The machine data MD10394 $MN_PLCIO_NUM_BYTES_IN and MD10395 $MN_PLCIO_LOGIC_ADDRESS_IN must be consistent with the PLC-side configuration.

Related to:

MD10394 $MN_PLCIO_NUM_BYTES_IN

10396	PLCIO_NUM_BYTES_OUT			N10	A4	
-	Number of directly writable output bytes of the PLC I/Os			BYTE	PowerOn	
-						
-	-	0	0	32	7/2	M

Description: The number of PLC I/O output bytes that can be written directly by the NC.

These bytes are not transmitted by the PLC user program but via an interrupt of the PLC operating system.

The access delay is less than 0.5 ms.

The bytes can be written by the part program and from synchronized actions with the system variables:

$A_PBB_OUT,

$A_PBW_OUT,

$A_PBD_OUT,

$A_PBR_OUT

on the NC side.

Attention:

The machine data MD10396 $MN_PLCIO_NUM_BYTES_OUT and MD10397 $MN_PLCIO_LOGIC_ADDRESS_OUT must be consistent with the configuration by the PLC, otherwise other PLC output signals will be overwritten.

10397	PLCIO_LOGIC_ADDRESS_OUT			N10	A4	
-	Start addr. of the directly writable output bytes of PLC I/O			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: Starting from this address, the PLC hardware must configure a number of MD10396 $MN_PLCIO_NUM_BYTES_OUT for direct use by the NC.

These bytes are not transmitted by the PLC user program, but directly via an interrupt of the PLC operating system.

The access delay is less than 0.5 ms.

The bytes can be written by the part program and from synchronized actions with the system variables:

$A_PBB_OUT,

$A_PBW_OUT,

$A_PBD_OUT,

$A_PBR_OUT

.

Notice:

The machine data MD10396 $MN_PLCIO_NUM_BYTES_OUT and MD10397 $MN_PLCIO_LOGIC_ADDRESS_OUT must be consistent with the PLC-side configuration.

Related to:

MD10396 $MN_PLClO_NUM_BYTES_OUT

10398	PLCIO_IN_UPDATE_TIME			N10	A4	
s	Update time for PLCIO input cycle			DOUBLE	PowerOn	
-						
-	-	0.0	0	10000	7/2	M

Description: Specification of the time span during which the data of the PLC I/Os directly readable via $A_PBx_IN system variables are updated.

This time span is rounded up internally to the next-higher multiple of the time predefined by the IPO cycle.

10399	PLCIO_TYPE_REPRESENTATION			N10	A4	
-	Little/Big Endian for PLCIO			BYTE	PowerOn	
-						
-	-	0	0	1	7/2	M

Description: Little/big-Endian format representation of the $A_PBx_OUT, $A_PBx_IN system variable for PLC I/Os directly controllable by NCK.

Value = 0 ; the system variable is represented in the little-Endian format

Value = 1 ; the system variable is represented in the big-Endian format

As a rule, the PLC I/Os must always be controlled in the big-Endian format (value = 1). For compatibility reasons, however, the default setting is the little-Endian format (value = 0).

10400	CC_VDI_IN_DATA			EXP, N02	OEM	
-	Number of input bytes for compile cycles			DWORD	PowerOn	
-						
-	-	0	0	1024	7/1	M

Description: The compile cycle user can freely define data within a data block on the PLC user interface. As the user, he determines the size of the interface from PLC to NCK. This machine data describes the length of the area on the VDI interface in bytes which defines the NCK input interface. The sum of this and MD10410 $MN_CC_VDI_OUT_DATA must not exceed 400 for software version 1.

10410	CC_VDI_OUT_DATA			EXP, N02	OEM	
-	Number of output bytes for compile cycles			DWORD	PowerOn	
-						
-	-	0	0	1024	7/1	M

Description: The compile cycle user can freely define data within a data block on the PLC user interface. As the user, he determines the size of the interface from PLC to NCK. This machine data describes the length of the area on the VDI interface in bytes which defines the NCK output interface. The sum of this and MD10400 $MN_CC_VDI_IN_DATA must not exceed 400.

10420	CC_ASSIGN_FASTOUT_MASK		EXP, N10	OEM	
-	Reservation of external outputs for compile cycles		DWORD	PowerOn	
-					
-	-	0	-	-	7/2	M

Description: Reservation of high-speed hardware outputs for CC applications

Bit 0(LSB)-14: Mask of the digital output bytes reserved for the CC application

Bits 16-30: Mask of the analog outputs reserved for the CC application

The hardware outputs reserved here are included in the multiple assignment monitoring routine when the system is powered up. It is recommended to register all the hardware outputs used by CC applications here.

Bit 15: Suppresses power-up alarm 4275 (multiple assignment of digital output)

Bit 31: Suppresses power-up alarm 4275 (multiple assignment of analog output)

10430	CC_HW_DEBUG_MASK			EXP	OEM	
-	Hardware debug mask for compile cycles			DWORD	PowerOn	
NBUP, NDLD						
-	-	0	0	0x7fffffff	7/1	M

Description: Setting of special responses to peripheral HW interfaces for NCK debug

For practical debugging of NCK software, among other things, the response of peripheral units to the loss of the NCK sign of life must be suppressed when the NCK software has run to a breakpoint.

Bit 0(LSB)-3:

For practical debugging of NCK software, among other things, the response of peripheral units to the loss of the NCK sign of life must be suppressed when the NCK software has run to a breakpoint.

Meaning of set bits:

Bit 0:

Drive modules ignore the loss of the NCK sign of life

Bit 1:

Terminal blocks ignore the loss of the NCK sign of life

Bit 3:

PLC ignores the loss of the NCK sign of life

Bit 4:

Recording of internal and external control commands. Recording the control sequences and storing them in a file in the passive file system. One can trace the exact sequence between the incoming hardware signals of the PLC interface and the internal sequences with the aid of the recording file.

Bit 5:

Servotrace: Enable physical addresses without access control

Bit10:

Test for measuring function. If this bit is set, one can use the GUD Variables CHAN INT MEA_TASK and CHAN INT MEA_COUNTER to transfer the inverse transformation of the measured values into cyclical and non-cyclical tasks.

Bit11:

No EMERGENCY STOP alarm on loss of PLC sign of life. If the PLC sign of life is not obtained within the time defined in MD10100 $MN_PLC_CYCLIC_TIMEOUT, an alarm is not issued, merely the axis release withdrawn. (Application case: debugging the PLC user program)

Bit15:

Reserved for gantry setup help.

10450	SW_CAM_ASSIGN_TAB			N09	N3	
-	Assignment of software cams to machine axes			BYTE	PowerOn	
-						
-	32	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	31	7/2	M

Description:

This machine data allows one machine axis to be assigned to each of the 16 possible cam pairs (each is comprised of one minus and one plus cam).

If a "0" is entered, the corresponding cam is not processed.

The cam signal output is activated via the axial NC/PLC interface signal DB31, ... DBX2.0 (Cam activation)

Index [n] of the machine data addresses the cam pair: n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16

Related to:

NC/PLC interface signal DB31, ... DBX2.0 (Cam activation)

Example:

Cam pair 1 is to be assigned to machine axis 3, and cam pair 3 to machine axis 4. Cam pair 2 is not to be assigned to an axis.

MD10450 $MN_SW_CAM_ASSIGN_TAB[0]= 3

MD10450 $MN_SW_CAM_ASSIGN_TAB[1]= 0

MD10450 $MN_SW_CAM_ASSIGN_TAB[2]= 4

10460	SW_CAM_MINUS_LEAD_TIME			N09	N3	
s	Lead or delay time at minus cams 1-16			DOUBLE	PowerOn	
-						
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2	M

Description:

A lead or delay time can be assigned in this machine data to each minus cam 1-16 to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: --> Lead time

Negative value: --> Delay time

Serves to compensate for the constant proportion of the internal delay time

between actual value acquisition and signal output.

Index [n] of the machine data addresses the cam pair:

n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16

This machine data is added to the setting data SD41520 $SN_SW_CAM_MINUS_TIME_TAB_1[n] and SD41522 $SN_SW_CAM_MINUS_TIME_TAB_2[n].

Related to:

SD41520 $SN_SW_CAM_MINUS_TIME_TAB_1[n] (lead or delay time on minus cams 1 - 8)

SD41522 $SN_SW_CAM_MINUS_TIME_TAB_2[n] (lead or delay time on minus cams 9 - 16)

10461	SW_CAM_PLUS_LEAD_TIME			N09	N3	
s	Lead or delay time at plus cams 1-16			DOUBLE	PowerOn	
-						
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2	M

Description: A lead or delay time can be assigned in this machine data to each plus cam 1-16 to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: --> Lead time

Negative value: --> Delay time

Serves to compensate for the constant proportion of the internal delay time

between actual value acquisition and signal output.

Index [n] of the machine data addresses the cam pair:

n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16

This machine data is added to the setting data SD41521 $SN_SW_CAM_PLUS_TIME_TAB_1[n] and SD41523 $SN_SW_CAM_PLUS_TIME_TAB_2[n].

Related to:

SD41521 $SN_SW_CAM_PLUS_TIME_TAB_1[n] (lead or delay time on plus cams 1 - 8)

SD41523 $SN_SW_CAM_PLUS_TIME_TAB_2[n] (lead or delay time on plus cams 9 - 16)

10470	SW_CAM_ASSIGN_FASTOUT_1		N09	N3	
-	Hardware assignment for output of cams 1-8 to NCK I/Os		DWORD	PowerOn	
-					
-	-	0	-	-	7/2	M

Description: The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital output bytes used for the NCK I/Os is made in this machine data for cam pairs 1 - 8.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7: No. of 1st HW byte used with digital outputs

Bits 8-15: No. of 2nd HW byte used with digital outputs

Bits 16-23: Inversion mask for writing 1st HW byte used

Bits 24-31: Inversion mask for writing 2nd HW byte used

Bit=0: Do not invert

Bit=1: Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND operation of the minus and plus cam signals via the 1st HW byte using the 1st inversion mask.

The status of the non-inverted output signal for linear axes and for rotary axes with "plus cam - minus cam < 180 degrees" is:

"1" between minus and plus cams

"0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam - minus cam >= 180 degrees" is:

"0" between minus and plus cams

"1" outside this range

The following must be specified as the byte address for the digital outputs:

1: for on-board byte

2 - 5: for external bytes

10471	SW_CAM_ASSIGN_FASTOUT_2			N09	N3	
-	Hardware assignment for the output of cams 9-16 to NCK I/Os			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital output bytes used for the NCK I/Os can be made in this machine data for cam pairs 9 - 16.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7: No. of 1st HW byte used with digital outputs
Bits 8-15: No. of 2nd HW byte used with digital outputs
Bits 16-23: Inversion mask for writing 1st HW byte used
Bits 24-31: Inversion mask for writing 2nd HW byte used
Bit=0: Do not invert
Bit=1: Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND operation of the minus and plus cam signals via the 1st HW byte using the 1st inversion mask.

The status of the non-inverted output signal for linear axes and for rotary axes with "plus cam - minus cam < 180 degrees" is:
"1" between minus and plus cams
"0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam - minus cam >= 180 degrees" is:
"0" between minus and plus cams
"1" outside this range

The following must be specified as the byte address for the digital outputs:

1: for on-board byte
2 - 5: for external bytes

10472	SW_CAM_ASSIGN_FASTOUT_3		N09	N3	
-	Hardware assignment for output of cams 17-24 to NCK I/Os		DWORD	PowerOn	
-					
-	-	0	-	-	7/2	M

Description: The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital output bytes of the NCK I/Os used can be made in this machine data for cam pairs 17 - 24.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7: Number of 1st HW byte used with digital outputs

Bits 8-15: Number of 2nd HW byte used with digital outputs

Bits 16-23: Inversion mask for writing 1st HW byte used

Bits 24-31: Inversion mask for writing 2nd HW byte used

Bit=0: Do not invert

Bit=1: Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND operation of the minus and plus cam signals via the 1st HW byte using the 1st inversion mask.

The status of the non-inverted output signal for linear axes and for rotary axes with "plus cam - minus cam < 180 degrees" is:

"1" between minus and plus cams

"0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam - minus cam >= 180 degrees" is:

"0" between minus and plus cams

"1" outside this range

The following must be specified as the byte address for the digital outputs:

1: for on-board byte

2 - 5: for external bytes

10473	SW_CAM_ASSIGN_FASTOUT_4		N09	N3	
-	Hardware assignment for output of cams 25-32 to NCK I/Os		DWORD	PowerOn	
-					
-	-	0	-	-	7/2	M

Description:

The cam signal status can be output to the NCK I/Os as well as to the PLC

The hardware assignment of the minus and plus cam signals to the digital output bytes of the NCK I/Os used can be made in this machine data for cam pairs 25 - 32.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7: Number of 1st HW byte used with digital outputs

Bits 8-15: Number of 2nd HW byte used with digital outputs

Bits 16-23: Inversion mask for writing 1st HW byte used

Bits 24-31: Inversion mask for writing 2nd HW byte used

Bit=0: Do not invert

Bit=1: Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND operation of the minus and plus cam signals via the 1st HW byte using the 1st inversion mask.

The status of the non-inverted output signal for linear axes and for rotary axes with "plus cam - minus cam < 180 degrees" is:

"1" between minus and plus cams

"0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam - minus cam >= 180 degrees" is:

"0" between minus and plus cams

"1" outside this range

The following must be specified as the byte address for the digital outputs:

1: for on-board byte

2 - 5: for external bytes

10480	SW_CAM_TIMER_FASTOUT_MASK		N09	N3	
-	Mask for output of cam signals via timer interr. to NCU		DWORD	PowerOn	
-					
-	-	0	-	-	7/2	M

Description:

A timer-controlled output to the 4 on-board outputs of the NCK I/Os can be selected in this machine data for 4 cam pairs.

In this case, the minus and plus signals of a cam pair are "EXCLUSIVE OR'd" for output as one signal.

Meaning for set bit:

Associated cam (minus and plus cam signals "EXCLUSIVE OR'd") is output via a timer interrupt at one of the 4 on-board outputs of the NCU.

The on-board outputs are assigned in order of increasing machine axis numbers (with assigned cam pairs).

Example:

```
Machine axis 3  = cam pair 1  -->   on-board output 3
Machine axis 1  = cam pair 2  -->   on-board output 1
Machine axis 7  = cam pair 3  -->   on-board output 4
Machine axis 2  = cam pair 4  -->   on-board output 2
```

If a plurality of cam pairs are set for one machine axis, then this axis is assigned in ascending order of the cam pairs.

Example:

```
Machine axis 3  = cam pair 1  -->   on-board output 2
Machine axis 3  = cam pair 2  -->   on-board output 3
Machine axis 7  = cam pair 3  -->   on-board output 4
Machine axis 2  = cam pair 4  -->   on-board output 1
```

This function works independently of the assignment set in MD10470 $MN_SW_CAM_ASSIGN_FASTOUT_1 or MD10471 $MN_SW_CAM_ASSIGN_FASTOUT_2.

Note:

The on-board byte must not be used more than once.

If there is more than one signal change in the IPO cycle for the cam pairs specified in the MD, then the cam pair with the lowest number determines the instant of output. The other signals change at the same time.

10485	SW_CAM_MODE			N09	N3	
-	Behavior of SW cams			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description:

```
Meaning of the individual bits:
Bit 0(LSB) = 0:
   If more than 1 signal change per interpolation cycle is due for
   the cams specified in MD10480 $MN_SW_CAM_TIMER_FASTOUT_MASK,
   the cam having the lowest number will determine the output
   instant. The other signals change at the same instant. That is,
   a maximum of one interrupt-controlled output is effected per
   interpolation cycle.
Bit 0(LSB) = 1:
   Each cam specified in MD10480 $MN_SW_CAM_TIMER_FASTOUT_MASK
   will be output precisely at the time of the interpolation cycle.
   There is no output priority of the cams. A maximum of 8 inter-
   rupt-controlled outputs can be performed per interpolation
   cycle.
Bit 1 = 0:
   Inversion of signal behavior from plus cam, where plus cam -
   minus cam >= 180 degr.
Bit 1 = 1:
   No inversion of signal behavior from plus cam, where plus cam -
   minus cam >= 180 degr.
   Signal behavior on-board output:
   Overtravelling:
   Minus cam plus cam
   Traversing direction:
   positive   0->1          1->0
   negative   1->0          0->1
Bit 2 = 0:
   No path-time cam
Bit 2 = 1:
   Path-time cam for cams where minus position = plus position. The
   lead/delay time applied is independent of:
•  velocity of the axis
•  position of the axis
•  reversal of traversing direction
   The cam is only activated on overtravelling of the cam position.
   A lead/delay time applied to the minus cam is active and leads
   to a shift of the whole cam.
Bit 3 = 0:
   No alignment signal in case of measurement area selection.
Bit 3 = 1:
   Output of an alignment signal for measurement area selection
   (FM only). On-board output 8 is used permanently.
   On-board output 8 = 1: Measurement possible (active range
   enabled)
   On-board output 8 = 0: Measurement not possible
Bit 4 = 0:
   and following free
```

10490	SW_CAM_COMP_NCK_JITTER			N09	-	
s	Cam jitter compensation			DOUBLE	NEW CONF	
-						
-	-	0	0.0	0.0001	7/2	M

Description: The compensation value reduces system-related time inaccuracies during output of highly precise cam signals. The default time encumbers the cyclic time level of the control, and should therefore be selected as short as possible. It is recommended to return a cam signal to a measuring input of the control and to increase the compensation value until the scatter of the measured positions cannot be reduced any further.

Currently only active when MD10485 $MN_SW_CAM_MODE Bit0 = 0.

10500	DPIO_LOGIC_ADDRESS_IN			N10	A4	
-	Logical slot address of the PROFIBUS/PROFINET I/Os			DWORD	PowerOn	
-						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M

Description: Logical slot address of the PROFIBUS/PROFINET I/Os usable by the NCK.

10501	DPIO_RANGE_LENGTH_IN			N10	A4	
-	Length of the PROFIBUS/PROFINET I/O range			DWORD	PowerOn	
-						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	128	7/2	M

Description: Length of the PROFIBUS/PROFINET I/O range consistently usable for the NCK. This range must be defined in STEP 7, hardware configuration.

0: only the first data slot is used.

x: length of the consistent PROFIBUS/PROFINET I/O range

Note: in PROFINET it is not possible to combine several slots in one area.

10502	DPIO_RANGE_ATTRIBUTE_IN			N10	A4	
-	Attributes of the PROFIBUS/PROFINET I/Os			DWORD	PowerOn	
-						
-	16	0x01,0x01,0x01,0x01,0x01,0x01,0x01...	0x00	0x0F	7/2	M

Description: Attributes of the PROFIBUS/PROFINET I/Os

Bit 0: Little/Big Endian format of the system variable $A_DPx_IN[n,m]

0: Little Endian format

1: Big Endian format

Bit 1: (reserved)

Bit 2: Read input data

0: Read possible through system variable and CC binding (increased performance requirements)

1: Read only possible for CC binding (low performance requirements)

Bit 3: Slot sign-of-life alarm

0: Slot sign-of-life alarms are output

1: Slot sign-of-life alarms are suppressed

10510	DPIO_LOGIC_ADDRESS_OUT			N10	A4	
-	Logical slot address of the PROFIBUS/PROFINET I/Os			DWORD	PowerOn	
-						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M

Description: Logical slot address of the PROFIBUS/PROFINET I/Os usable by the NCK.

10511	DPIO_RANGE_LENGTH_OUT			N10	A4	
-	Length of the PROFIBUS I/O range			DWORD	PowerOn	
-						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	128	7/2	M

Description: Length of the PROFIBUS I/O range consistently usable for the NCK. This range must be defined in STEP 7, hardware configuration.

0: only the first data slot is used.

x: length of the consistent PROFIBUS I/O range

Note: in PROFINET it is not possible to combine several slots in one area.

10512	DPIO_RANGE_ATTRIBUTE_OUT			N10	A4	
-	Attributes of the PROFIBUS/PROFINET I/Os			DWORD	PowerOn	
-						
-	16	0x01,0x01,0x01,0x01,0x01,0x01,0x01...	0x00	0x0F	7/2	M

Description: Attributes of the PROFIBUS/PROFINET I/Os

Bit 0: Little/Big Endian format of system variable $A_DPx_OUT[n,m]

0: Little Endian format

1: Big Endian format

Bit 1: Write output data

0: Write only through system variable

1: Write only through CC binding

Bit 2: (reserved)

Bit 3: Slot sign-of-life alarm

0: Slot sign-of-life alarms are output

1: Slot sign-of-life alarms are suppressed

10530	COMPAR_ASSIGN_ANA_INPUT_1		N10	A4	
-	Hardware assignment of analog inputs for comparator byte 1		BYTE	PowerOn	
-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2	M

Description:

This MD assigns analog inputs 1 to 8 to a bit number of comparator byte 1. This input bit of the comparator is set to "1" if the comparison between the applied analog value and the associated threshold value (SD41600 $SN_COMPAR_THRESHOLD_1 fulfills the condition parameterized in (MD10540 $MN_COMPAR_TYPE_1).

An analog input can be assigned to a plurality of comparator input bits.

The following generally applies to comparator byte 1:

```
COMPAR_ASSIGN_ANA_INPUT_1 [b] = n
with index:  b = number of comparator input bit (0 to 7)
             n = number of analog input (1 to 8)
```

Example:

```
COMPAR_ASSIGN_ANA_INPUT_1[0] = 1
COMPAR_ASSIGN_ANA_INPUT_1[1] = 2
COMPAR_ASSIGN_ANA_INPUT_1[2] = 1
COMPAR_ASSIGN_ANA_INPUT_1[3] = 3
COMPAR_ASSIGN_ANA_INPUT_1[4] = 3
COMPAR_ASSIGN_ANA_INPUT_1[5] = 1
COMPAR_ASSIGN_ANA_INPUT_1[6] = 1
COMPAR_ASSIGN_ANA_INPUT_1[7] = 1
```

Analog input 1 affects input bits 0, 2 , 5, 6 and 7 of comparator byte 1

Analog input 2 affects input bit 1 of comparator byte 1

Analog input 3 affects input bits 3 and 4 of comparator byte 1

Related to:

MD10540 $MN_COMPAR_TYPE_1

MD10541 $MN_COMPAR_TYPE_2

10531	COMPAR_ASSIGN_ANA_INPUT_2			N10	A4
-	Hardware assignment of analog inputs for comparator byte 2			BYTE	PowerOn
-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2	M

Description: This MD assigns analog inputs 1 to 8 to a bit number of comparator byte 2. This input bit of the comparator is set to "1" if the comparison between the applied analog value and the associated threshold value (SD41601 $SN_COMPAR_THRESHOLD_2 fulfills the condition parameterized in (MD10541 $MN_COMPAR_TYPE_2).

An analog input can be assigned to a plurality of comparator input bits.

The following generally applies to comparator byte 2:

COMPAR_ASSIGN_ANA_INPUT_2 [b] = n

with index:b = number of comparator input bit (0 to 7)

n = number of analog input (1 to 8)

Example:

COMPAR_ASSIGN_ANA_INPUT_2[0] = 1
COMPAR_ASSIGN_ANA_INPUT_2[1] = 2
COMPAR_ASSIGN_ANA_INPUT_2[2] = 1
COMPAR_ASSIGN_ANA_INPUT_2[3] = 3
COMPAR_ASSIGN_ANA_INPUT_2[4] = 3
COMPAR_ASSIGN_ANA_INPUT_2[5] = 1
COMPAR_ASSIGN_ANA_INPUT_2[6] = 1
COMPAR_ASSIGN_ANA_INPUT_2[7] = 1

Analog input 1 affects input bits 0, 2 , 5, 6 and 7 of comparator byte 2

Analog input 2 affects input bit 1 of comparator byte 2

Analog input 3 affects input bits 3 and 4 of comparator byte 2

Related to:

MD10540 $MN_COMPAR_TYPE_1
MD10541 $MN_COMPAR_TYPE_2

10540	COMPAR_TYPE_1		N10	A4	
-	Parameterization for comparator byte 1		DWORD	PowerOn	
-					
-	-	0	-	-	7/2	M

Description: This MD can be used to make the following settings for the individual output bits (0 to 7) of comparator byte 1:

- Bits 0 to 7: Comparison type mask (for comparator output bits 0 to 7)

  Bit = 1: output bit = 1 if analog value >= threshold value

  Bit = 0: output bit = 1 if analog value < threshold value

  (Threshold value defined by SD41600 $SN_COMPAR_THRESHOLD_1)
- Bits 8 to 15: Not used (defined to be set to 0)
- Bits 16 to 23: Assignment of a HW output byte for outputting the comparator states (statement of the byte address)

  Byte = 0: No output via digital NCK outputs

  Byte = 1: Output via digital onboard NCK outputs (1 to 4)

  Byte = 2: Output via external digital NCK outputs 9 to 16

  Byte = 3: Output via external digital NCK outputs 17 to 24

  Byte = 4: Output via external digital NCK outputs 25 to 32

  Byte = 5: Output via external digital NCK outputs 33 to 40
- Bits 24 to 31: Inversion mask for the output of the comparator states (bits 0 to 7)

  Bit = 0: Output bit is not inverted

  Bit = 1: Output bit is inverted

Related to:

MD10530 $MN_COMPAR_ASSIGN_ANA_INPUT_1

MD10531 $MN_COMPAR_ASSIGN_ANA_INPUT_2

SD41600 $SN_COMPAR_THRESHOLD_1

SD41601 $SN_COMPAR_THRESHOLD_2

MD10360 $MN_FASTIO_DIG_NUM_OUTPUTS

10541	COMPAR_TYPE_2			N10	A4	
-	Parameterization of comparator byte 2			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: This MD can be used to make the following settings for the individual output bits (0 to 7) of comparator byte 2:

- Bits 0 to 7: Comparison type mask (for comparator output bits 0 to 7)

  Bit = 1: output bit = 1 if analog value >= threshold value

  Bit = 0: output bit = 1 if analog value < threshold value

  (Threshold value defined by SD41601 $SN_COMPAR_THRESHOLD_2)
- Bits 8 to 15: not used (defined to be set to 0)
- Bits 16 to 23: Assignment of a HW output byte for outputting the comparator states (statement of the byte address)
- Byte = 0: no output via digital NCK outputs

  Byte = 1: output via digital onboard NCK outputs (1 to 4)

  Byte = 2: output via external digital NCK outputs 9 to 16

  Byte = 3: output via external digital NCK outputs 17 to 24

  Byte = 4: output via external digital NCK outputs 25 to 32

  Byte = 5: output via external digital NCK outputs 33 to 40
- Bits 24 to 31: Inversion mask for the output of the comparator states (bits 0 to 7)

  Bit = 0: Output bit is not inverted

  Bit = 1: Output bit is inverted

Related to:

MD10530 $MN_COMPAR_ASSIGN_ANA_INPUT_1

MD10531 $MN_COMPAR_ASSIGN_ANA_INPUT_2

SD41600 $SN_COMPAR_THRESHOLD_1

SD41601 $SN_COMPAR_THRESHOLD_2

MD10360 $MN_FASTIO_DIG_NUM_OUTPUTS

10600	FRAME_ANGLE_INPUT_MODE			EXP, N01, N09	K2	
-	Sequence of rotation in FRAME			BYTE	PowerOn	
-						
-	-	1	1	2	7/2	M

Description: FRAME_ANGLE_INPUT_MODE sets how the rotations (ROT and AROT) around the three geometry axes are defined if more than one rotation is programmed in a block. The order in which these rotations are programmed within the block is irrelevant.

The rotations can be set to be calculated according to:

- Euler angle with FRAME_ANGLE_INPUT_MODE = 2

  The rotations are calculated according to the Euler angle in the following order:

  1. Rotation around Z
  2. Rotation around X
  3. Rotation around Y

- RPY with FRAME_ANGLE_INPUT_MODE = 1

  The rotations are calculated according to the Euler angle in the following order:

  1. Rotation around Z
  2. Rotation around Y
  3. Rotation around X

10602	FRAME_GEOAX_CHANGE_MODE			EXP, N01, N09	K2	
-	Frames when changing geometry axes			BYTE	PowerOn	
-						
-	-	0	0	5	7/2	M

Description: Geometry axes can be switched over in the following states:

- Selection and deselection of transformations
- Switchable geometry axes GEOAX()

The current total frame is then defined as follows:

0: The current total frame is canceled.

1: The current total frame is recalculated when geometry axes are switched over. Translations, scaling and mirroring for the new geometry axes become active. The rotations of the old geometry axes still apply.

2: The current total frame is recalculated when geometry axes are switched over. Translations, scaling and mirroring for the new geometry axes become active. If rotations were active before switching over to the current base frames, current settable frame or programmable frame, switchover is aborted with an alarm.

3: The current total frame is deleted when selecting and deselecting transformations.When the GEOAX() command is entered, the frame is recalculated and transaction, scaling and mirroring for the new geometry axes become active. The rotations of the old geometry axes still apply.

10604	WALIM_GEOAX_CHANGE_MODE			EXP, N01, N09	A3	
-	Working area limitation by changing geometry axes			BYTE	PowerOn	
-						
-	-	0	0	1	7/2	M

Description: This machine data specifies whether a potentially active working area limitation will remain active after geo axis replacement, or whether it will be deactivated.

Meaning of the MD values:

= 0 Working area limitation will be deactivated when replacing geo axis.

= 1 Working area limitation will remain activated when replacing geo axis.

10610	MIRROR_REF_AX			EXP, N01, N09	K2	
-	Reference axis for mirroring			BYTE	PowerOn	
-						
-	-	0	0	3	7/2	M

Description: 0: Mirroring always takes place in the stated axis, without scaling.

The mirroring of a geometry axis can always be related to a defined

reference axis.

```
1: x is the reference axis
   Mirroring of the x axis is unique.
   Mirroring of the y axis  is mapped on:
    a mirroring of the x axis and
    a rotation of the z axis through 180 degrees.
   Mirroring of the z axis is mapped on:
    a mirroring of the x axis and
    a rotation of the x axis through 180 degrees and
    a rotation of the z axis through 180 degrees
2: y is the reference axis
   Mirroring of the x axis is mapped on:
     a mirroring of the y axis and
     a rotation of the z axis through 180 degrees.
   Mirroring of the y axis is unique.
   Mirroring of the z axis  is mapped on:
     a mirroring of the y axis and
     a rotation of the x axis through 180 degrees
3: z is the reference axis
   Mirroring of the x axis is mapped on:
     a mirroring of the z axis and
     a rotation of the z axis through 180 degrees and
     a rotation of the x axis through 180 degrees
   Mirroring of the y axis is mapped on:
     a mirroring of the z axis and
     a rotation of the x axis through 180 degrees.
   Mirroring of the z axis is unique.
```

10612	MIRROR_TOGGLE			EXP, N01, N09	K2	
-	Mirror toggle			BYTE	PowerOn	
-						
-	-	1	0	1	7/2	M

Description: Mirror toggle function.

1: Programmed axis values are not evaluated. Toggle switching behavior.

0: Programmed axis values are evaluated.

The axes are mirrored in the case of values not equal to 0 if they are not already mirrored. Mirroring is disabled if the value is 0.

10613	NCBFRAME_RESET_MASK			EXP	K2	
-	Active NCU global base frames after reset			DWORD	Reset	
-						
-	-	0xFFFF	0	0xFFFF	7/2	M

Description: Bit mask for the reset setting of the NCU global base frames which are included in the channel.

The following applies:

When MD20110 $MC_RESET_MODE_MASK bit0 = 1 and bit14 = 1

The entire base frame is derived on reset from the linking of the NCU global base frame field elements whose bit in the bit mask is 1.

When MD20110 $MC_RESET_MODE_MASK bit0 = 1 and bit14 = 0

The entire base frame is deselected on reset.

10615	NCBFRAME_POWERON_MASK			EXP, N12	K2	
-	Reset global base frames after power on			DWORD	PowerOn	
-						
-	-	0	0	0xFFFF	7/2	M

Description: This machine data defines whether global base frames are reset in the data management on Power On.

That is

- Offsets are set to 0,
- Scalings are set to 1.
- Mirroring is disabled.

The individual base frames can be selected separately.

Bit 0 means base frame 0, bit 1 base frame 1 etc.

Value=0: Base frame is retained on Power On

Value=1: Base frame is reset in the data management on Power On.

Related to:

MD24004 $MC_CHBFRAME_POWERON_MASK

10617	FRAME_SAVE_MASK			EXP	K2	
-	Behavior of frames in SAVE subroutines			DWORD	PowerOn	
-						
-	-	0	0	0x3	7/2	M

Description: This machine data is used to define which frames are restored with SAVE attribute at return from a subprogram.

Bit 0: Settable frames G54 through G599

Value = 0:

If the same G code is active at subprogram return and subprogram call, the active settable frame is maintained. If not, the settable frame is reactivated when the subprogram is called.

Value = 1:

At subprogram return, the settable frame is reactivated when the subprogram is called.

Bit 1: Basic frame

Value = 0:

The active basic frame is not changed at subprogram return. This is also the case, if a basic frame change is carried out in the subprogram by an operation or by an implicit frame deselection (possibly through TRAFOOF).

Value = 1:

At subprogram return, the basic frame is reactivated when the subprogram is called.

10618	PROTAREA_GEOAX_CHANGE_MODE			EXP, N01, N09	A3	
-	Protection range on change of geometry axes			BYTE	PowerOn	
-						
-	-	0	0	3	7/2	M

Description: This machine data is used to define whether any active protection zones will remain active after a transformation change or geo axis replacement, or whether they will be deactivated.

The machine data is bit-coded with the following meanings:

Bit 0 = 0

Protection zones deactivated on transformation change.

Bit 0 = 1

Active protection zones remain active after transformation change.

Bit 1 = 0

Protection zones deactivated on geo axis replacement.

Bit 1 = 1

Active protection zones remain active after geo axis replacement.

10619	COLLISION_TOLERANCE			EXP	-	
mm	Tolerance for collision check			DOUBLE	NEW CONF	
-						
-	-	1	0.001	1000.0	7/3	M

Description: This parameter is used to set the required collision check accuracy. This means: If the distance between two protection zones is smaller than this value, a collision of those two protection zones may be signalled. But: Two protection zones that overlap by less than this value cannot be classified as colliding.

10620	EULER_ANGLE_NAME_TAB			N01, N09	F2,TE4	
-	Name of Euler angle			STRING	PowerOn	
-						
-	3	A2,B2,C2	-	-	7/2	M

Description:

- The name entered must not conflict with the designation and assignment of machine and geometry axis names.
- The name entered must not conflict with channel axis names in the channel (MD20080 $MC_AXCONF_CHANAX_NAME_TAB), names for directional vectors (MD10640 $MN_DIR_VECTOR_NAME_TAB), names for intermediate point coordinates for CIP (MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB) or the names for interpolation parameters (MD10650 $MN_IPO_PARAM_NAME_TAB).
- The name entered must not contain the following reserved address letters:

  - D Tool offset (D function)
  - E Reserved
  - F Feedrate (F function)
  - G Preparatory function
  - H Auxiliary function (H function)
  - L Subprogram call
  - M Special function (M function)
  - N Subblock
  - P Number of subroutine repetitions
  - R Arithmetic parameter
  - S Spindle speed (S function)
  - T Tool (T function)
- Nor are keywords (e.g. DEF, SPOS etc.) or predefined identifiers (e.g. ASPLINE, SOFT) allowed.
- An angle identifier consists of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99).

10624	ORIPATH_LIFT_VECTOR_TAB			N01, N09	-	
-	Name of retraction vector for path-relative orientation.			STRING	PowerOn	
-						
-	3	A8,B8,C8	-	-	7/2	M

Description: List of identifiers for components of the retraction vector during reorientations for path relative interpolation of the tool orientation.

The rules for axis identifiers as described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, normal vectors, direction vectors, conical interpolation vectors, interpolation parameters, intermediate point coordinates).

10626	ORIPATH_LIFT_FACTOR_NAME			N01, N09	-	
-	Name of relative safety clearance with ORIPATH			STRING	PowerOn	
-						
-	-	ORIPLF	-	-	7/2	M

Description: Identifier for relative factor for determining a safety clearance for the retracting movement during reorientations for path relative interpolation of the tool orientation.

The rules for axis identifiers as described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, normal vectors, direction vectors, conical interpolation vectors, interpolation parameters, intermediate point coordinates).

10630	NORMAL_VECTOR_NAME_TAB			N01, N09	F2	
-	Name of normal vectors			STRING	PowerOn	
-						
-	6	A4,B4,C4,A5,B5,C5	-	-	7/2	M

Description: Normal vector programming from software version 3.2

List of identifiers for the normal vector components at the beginning and end of the block.

The rules for axis identifiers described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, direction vectors, interpolation parameters, intermediate point coordinates).

10640	DIR_VECTOR_NAME_TAB			N01, N09	F2,TE4	
-	Name of direction vectors			STRING	PowerOn	
-						
-	6	A3,B3,C3,AN3,BN3,CN3	-	-	7/2	M

Description: List of identifiers for the direction vector components. (A3 to C3)

List of identifiers for the vector components perpendicular to the direction vector (AN3 to CN3)

The rules for axis identifiers described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).

10642	ROT_VECTOR_NAME_TAB			N01, N09	F2	
-	Name of rotation vectors			STRING	PowerOn	
-						
-	3	A6,B6,C6	-	-	7/2	M

Description: List of identifiers for the rotation vector components in taper direction

The rules for axis identifiers as described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).

10644	INTER_VECTOR_NAME_TAB			N01, N09	F2	
-	Name of intermediate vector components			STRING	PowerOn	
-						
-	3	A7,B7,C7	-	-	7/2	M

Description: List of identifiers for the intermediate vector components

The rules for axis identifiers described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).

10646	ORIENTATION_NAME_TAB			N01, N09	F2	
-	Identifiers for programming a 2nd orientation path			STRING	PowerOn	
-						
-	3	XH,YH,ZH	-	-	7/2	M

Description: List of identifiers for programming of the 2nd space curve for tool orientation

The rules for axis identifiers as described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).

10648	NUTATION_ANGLE_NAME			N01, N09	F2	
-	Name of aperture angle			STRING	PowerOn	
-						
-	-	NUT	-	-	7/2	M

Description: Identifier for the opening angle for orientation interpolation

The rules for axis identifiers as described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10650	IPO_PARAM_NAME_TAB			EXP, N01	K2	
-	Name of interpolation parameters			STRING	PowerOn	
-						
-	3	I,J,K	-	-	7/2	M

Description: List of identifiers for the interpolation parameters

The rules for axis identifiers described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers.

The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

Related to:

MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB

References: /PA/, Programming Guide: Fundamentals

10652	CONTOUR_DEF_ANGLE_NAME			EXP, N01, N12	FBFA	
-	Name of angle for contour definitions			STRING	PowerOn	
-						
-	-	ANG	-	-	0/0	S

Description: Identifier for contour angle

The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, interpolation point coordinates).

10654	RADIUS_NAME			EXP, N01, N12	FBFA	
-	Name of radius for contour definitions			STRING	PowerOn	
-						
-	-	RND	-	-	0/0	S

Description: Identifier for contour radius

The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10656	CHAMFER_NAME			EXP, N01, N12	FBFA	
-	Name of chamfer for contour definitions			STRING	PowerOn	
-						
-	-	CHR	-	-	0/0	S

Description: Identifier for contour chamfer

The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10660	INTERMEDIATE_POINT_NAME_TAB			EXP, N01	K2	
-	Name of interpolation point coordinates for G2/G3			STRING	PowerOn	
-						
-	3	I1,J1,K1	-	-	7/2	M

Description: List of identifiers for the intermediate point coordinates

The rules for axis identifiers described in MD20080 $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

Related to:

MD10650 $MN_IPO_PARAM_NAME_TAB

References: /PG/, Programming Guide: Fundamentals

10670	STAT_NAME			N01, N09	F2	
-	Name of state information			STRING	PowerOn	
-						
-	-	STAT	-	-	7/2	M

Description: Identifier for position information for solving ambiguities in Cartesian PTP travel.

An identifier must be chosen that does not conflict with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10672	TU_NAME			N01, N09	F2	
-	Name of state information of axes			STRING	PowerOn	
-						
-	-	TU	-	-	7/2	M

Description: Identifier for position information of axes for solving ambiguities in

Cartesian PTP travel.

An identifier must be chosen that does not conflict with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).

10674	PO_WITHOUT_POLY			N01	F2	
-	Polynomial programming programmable without G function POLY			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: Until now, the G function POLY has always had to be active during polynomial programming with PO[xx] = (xx),

otherwise an alarm was output.

If MD10674 $MN_PO_WITHOUT_POLY is set to TRUE, no alarm is output with POLY inactive during polynomial programming. The end point of the polynomial is then approached with the linear interpolation G1.

There is no polynomial interpolation if POLY is inactive.

10680	MIN_CONTOUR_SAMPLING_TIME			N01, EXP	-	
s	Minimum contour sampling time			DOUBLE	Reset	
-						
710-6a2c	-	0.004	-	-	0/0	M
710-31a10c	-	0.004	-	-	0/0	M
710-31a10c6	-	0.004	-	-	0/0	M
720-6a2c	-	0.002	-	-	0/0	M
720-31a10c	-	0.002	-	-	0/0	M
720-31a10c6	-	0.002	-	-	0/0	M
730-6a2c	-	0.0005	-	-	0/0	M
730-31a10c	-	0.0005	-	-	0/0	M
730-31a10c6	-	0.0005	-	-	0/0	M

Description: Min. possible contour sampling time in seconds. This MD is used to limit the value that can be entered with MD10682 $MN_CONTOUR_SAMPLING_FACTOR, independently of the current interpolation cycle of the control.

10682	CONTOUR_SAMPLING_FACTOR			N01, EXP	-	
-	Contour sampling factor			DOUBLE	Reset	
-						
-	-	1.0	-	-	1/1	M

Description: This factor defines the maximum time interval in which a curved contour is sampled in the interpolator.

The maximum sampling time results from the set interpolation cycle (see MD10071 $MN_IPO_CYCLE_TIME), the factor set with this data, and the tolerance set for the geometry axes in MD33100 $MA_COMPRESS_POS_TOL[].

The minimum sampling time cannot be shorter than the time set in MD10680 $MN_MIN_CONTOUR_SAMPLING_TIME.

10690	DRAW_POS_TRIGGER_TIME			EXP, N01	-	
s	Trigger time for IPO event 'DRAW_POS'			DOUBLE	NEW CONF	
-						
-	-	0.3	0	30	1/1	M

Description: This can be used to set a time within which an IPO event for position output will always be generated. If a value smaller than the current interpolation cycle is entered here, the trigger will only be activated according to the maximum chord length in the case of complex geometries and in the last interpolation cycle in the case of non-complex geometries.

10700	PREPROCESSING_LEVEL			N01, N02	V2,K1	
-	Program preprocessing level			BYTE	PowerOn	
-						
-	-	0x25	-	-	2/2	M

Description:

Bit 0= 0:

No preprocessing

Bit 0= 1:

The call description of the cycles is formed during control power on. All the programs in the directories _N_CUS_DIR, _N_CMA_DIR and _N_CST_DIR can be called in the part program without EXTERNAL declaration. If the parameter interface of a cycle is changed in the control, then this change does not become active until after Power On.

Bit 1=1:

During control power on, all cycles in the directories _N_CUS_DIR, _N_CMA_DIR and _N_CST_DIR are preprocessed to form a process-optimizing compilation. These cycles are then processed more quickly. Changes to the cycle programs do not become active until after the next Power On.

Bit 2=1:

During control power on, the Siemens cycles in the directory _N_CST_DIR are preprocessed to form a process-optimizing compilation (from SW 3.5).

Bit 3=1:

During control power on, the user cycles in the directory _N_CUS_DIR are preprocessed to form a process-optimizing compilation (from SW 3.5).

Bit 4=1:

Preprocessing the user cycles in the directory _N_CMA_DIR

Bit 5=1:

All files marked with PREPRO in the PROG statement line are preprocessed (from SW 6.4)

Bit 5=0:

During control power on, all cycles in the directories activated by bits 1 to 4 are preprocessed. This also applies to programs that are not marked with PREPRO.

Bit 6=1:

The compilation is stored in SRAM if there is inadequate space in DRAM (from SW 7.1).

Memory space is required for preprocessing cycles. Better utilization of memory can be achieved by selective setting of the preprocessing:

The runtime-critical cycles are brought together in one directory. The remaining cycles are in the other directory.

References:

/PG/, "Programming Guide Fundamentals" (EXTERNAL declaration)

10702	IGNORE_SINGLEBLOCK_MASK			N01	K1,Z1	
-	Prevents stopping at specific blocks in single block mode			DWORD	PowerOn	
-						
-	-	0	0	0x1FFFF	7/2	M

Description: This machine data prevents stopping at certain blocks with single block.

Single block stop can be prevented with the following bits of the mask:

Bit0 = 1

Means that there is no stop in any internal ASUB block. Exception: The single block stop has been explicitly activated by the SBLON command.

There are three different internal ASUBs that are triggered by different events.

- Repos: In the case of the events: change of operating mode to a manual mode (JOG, JOGREF, etc.) unless MODESWITCH_MASK is not set, switch skip block on and off, activate machine data, switch-on overstore, axis replacement, subroutine level abort, switch-on single block, switch dry run feedrate on and off, alarm with compensation block.

- Return: Delete distance-to-go, switchover after TEACH-IN, or deselection of MDI with corresponding MODESWITCH_MASK.

- _N_PROG_EVENT_SPF: Parameterizing MD 20108 $MC_PROG_EVENT_MASK parameterizes the events whereby _N_PROG_EVENT_SPF is executed.

Bit1 = 1

Means that there is no stop in any user ASUB block. Exception: The single block stop has been explicitly activated via the SBLON command.

User ASUBs are linked to an interrupt channel by the part program command SETINT or via the PI- _N_ASUP__. The interrupt channel is then activated via PLC or the high-speed inputs, and the user ASUBs are retracted.

This disables machine data MD20117 $MC_IGNORE_SINGLEBLOCK_ASUP. The NCK behavior corresponds to the machine data assignment MD20117 $MC_IGNORE_SINGLEBLOCK_ASUP= FFFFFFFF.

Bit2 = 1

Means that there is no stop in any intermediate block. Intermediate blocks are generated at, among other events, tool change, ADIS and complicated geometry.

Bit3 = 1

Means that there is no stop in the block search pickup block. The block search pickup block is the 1st block that is loaded into the main run at the start after the search target has been found in the program.

Bit4 = 1

Means that there is no stop in the INIT blocks. INIT blocks are generated from reset immediately after a part program start.

Bit5 = 1

Means that there is no stop in any subprogram block with the parameter DISPLOF.

Bit6 = 1

Means that there is no stop in any block in which the NCK cannot reorganize.

Reorganize is an internal procedure that is needed for mode change after JOG/JOGREF..., switch skip block on and off, activate machine data, axis replacement, switch on overstore, switch on single block, switch dry run feedrate on and off, subroutine level abort, user ASUBs delete distance-to-go, switchover after TEACH-IN. Reorganize is never needed in Reset state.

Example blocks in which reorganize is impossible:

- Tool change
- 1st block after the Repos procedure
- Block after an ASUB from JOG/aborted

Bit7 = 1

Means that there cannot be a stop in any block in which repositioning is impossible.

Reposition is an internal procedure that is needed for mode change after JOG/JOGREF..., switch skip block on and off, activate machine data, axis replacement, switch on overstore, switch on single block, switch dry run feedrate on and off, subroutine level abort, and possibly user ASUBs. Reposition is never needed in Reset state.

Example blocks in which reposition is impossible:

- G33 + blocks in which reorganize is impossible.

Bit8 = 1

Means that there is no stop in a residual block that does not contain traversing information.

Bit9 = 1

Means that there is no stop in a run in/main run synchronization block (e.g.STOPRE, $Variable) that is repeated because of an interruption with Reorg (e.g. mode change).

Bit10= 1

Means that there is no stop in a "tool selection block". "Tool selection block" only occurs with tool management (magazine management or TMMG) active. This block gives the corresponding tool change command to the PLC.

This block is generally generated by T programming from the part program.

Example block "N1010 T="Drill" M6 D1"

Depending on machine data, the "tool selection block" can be held in the interpolator until the PLC has acknowledged the corresponding tool change (see MD20310 $MC_TOOL_MANAGEMENT_MASK). However the program status remains in "run".

Bit11= 1

The control has to automatically generate implicit GET blocks for the axis replacement function (axis replacement: 2 or more channels control one axis alternately) if no explicit GET(D) has been programmed and the following block wants to traverse the axis. (The other channel had previously used this axis).

An explicitly programmed GET may appear as follows "getd(x1,y1,z1) or get(x1,y1,z1)".

There is no stop at explicit or implicit GET blocks in the single block with this bit 11.

Bit12= 1

There is no stop in the single block type 2 in the SBLON block.

Bit13= 1

If an axis is pulled out in the middle of a block and possibly assigned to another channel, then there is no stop at the PRE-MATURE end of this block. This block follows a REPOSA in order to traverse it to the end, there is no stop until this end has been reached.

Bit14=1

In a part program line, in which a substitution subroutine is called due to NC language replacement, only one stop is performed under the condition that the subroutine includes PROC attribute SBLOF. It is irrelevant whether the subroutine is called at block start and/or end or whether it is exited with M17 or RET.

Bit15=1

Means that there is no stop in any user ASUB block. Exception: The single block stop has been explicitly activated via the SBLON command.

There are three different internal ASUBs that are triggered by different events.

- Repos: In the case of the events: change of operating mode to a manual mode (JOG, JOGREF,...) unless MODESWITCH_MASK is not set, switch skip block on and off, activate machine data, switch-on overstore, axis replacement, subroutine level abort, switch-on single block, switch dry run feedrate on and off, alarm with compensation block.

- Return: Delete distance-to-go, switchover after TEACH-IN, or deselection of MDI with corresponding MODESWITCH_MASK.

Bit16=1

Activating SERUPRO (search run via prog test) prevents stopping at single blocks.

Related to:

MD20117 $MC_IGNORE_SINGLEBLOCK_ASUP

10704	DRYRUN_MASK			N01	V1	
-	Dry run feedrate activation			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	M

Description: DRYRUN_MASK == 0

Dryrun can only be switched on or off at the end of the block.

When DRYRUN_MASK = 1 is set, the dry run feedrate can also be activated during program execution (in the part program block).

NOTICE!

After activating dry run feedrate, the axes are stopped for the duration of the reorganization process.

DRYRUN_MASK == 2

Dryrun can be switched on or off in every phase and the axes are not stopped.

NOTICE:

However, the function does not become active until a "later" block in the program execution and this is with the next (implicit) StopRe block.

Related to:

SD42100 $SC_DRY_RUN_FEED

10706	SLASH_MASK			N01	PG,A2	
-	Activation of block skip			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	M

Description: If SLASH_MASK = 0, skip block can only be activated when stopped at the end of the block

If SLASH_MASK = 1, skip block can also be activated during program execution.

NOTICE!

After activating skip block, the axes are stopped for the duration of the reorganization process.

If SLASH_MASK = 2 ,skip block can be activated in every phase.

Notice!

However, the function does not become active until a "later" block in the program execution, and this is with the next (implicit) StopRe block.

10707	PROG_TEST_MASK			N01	K1	
-	Program test mode			DWORD	PowerOn	
-						
-	-	0x1	0	0x7	7/2	M

Description: Bit-coded mask for program test

Bit 0 == 1 Program test cannot be deselected in 'Stopped' program status.

Bit 1 == 1   Enable to activate the program test using the PI command_N_NCKMOD

Bit 2 == 1   Activation of program test via VDI using accelerated feed

Bits 3..31 As yet unused.

10708	SERUPRO_MASK			N01	K1	
-	Seach run modes			DWORD	PowerOn	
-						
-	-	0	0	31	7/2	M

Description: Bit-coded mask for block search via program test (abbr. SERUPRO).

SERUPRO block search is activated with the PI service _N_FINDBL mode paramter == 5.

SERUPRO means SEarchRUn by PROgram test; in other words, proceed under program test from start of program to search target. Note: Program test does not move any axes.

Bit 0 == 0

There is a stop at M0 during the search phase.

Bit 0 == 1

There is no stop at M0 during the search phase.

Bit 1 == 0

Alarm 16942 aborts the search phase on part programm command START.

Bit 1 == 1

Alarm 16942 is switched off.

NOTICE:

A start program command might actually start the other channel!

Bit 2 == 0

Switches the function "Group Serupro" off

Bit 2 == 1

Switches the function "Group Serupro" on.

"Group-Serupro" enables a search routine in which the start part program command is changed into a search routine for the other channel.

Bit 3 == 0

Forces all channels that have started SERUPRO to end SERUPRO simultaneously unless they are aborted via Reset or the channel reaches M30 without finding the search taget. In other words, all channels that find the search target (including self-acting SERUPRO) terminate SERUPRO simultaneously.

Bit 3 == 1

Switches this function off

Bit 4 == 0

Take external override into account in SERUPRO.

Bit 4 == 1

An external override (sent via PLC signal or MCP) is ignored during SERUPRO.

Bit 5 .. 31

As yet unused.

10709	PROG_SD_POWERON_INIT_TAB			EXP, N01	K1	
-	Setting data to be initialized			DWORD	PowerOn	
-						
-	30	43200,43202,0,0,0,0,0, 0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2	M

Description:

```
Setting data to be initialized:
The values of the programmable SD indicated in this MD are set to
their initial values on control power up.
Programmable setting data are:
                                                (GCODE)
SD42000 $SC_THREAD_START_ANGLE                  SF
SD42010 $SC_THREAD_RAMP_DISP                    DITS/DITE
SD42400 $SC_PUNCH_DWELLTIME                     PDELAYON
SD42800 $SC_SPIND_ASSIGN_TAB                    SETMS
SD43200 $SA_SPIND_S                             S wih
G94,G95,G97,G971,G972
SD43202 $SA_SPIND_CONSTCUT_S                  S with G96,G961,G962
SD43210 $SA_SPIND_MIN_VELO_G25                  G25 S
SD43220 $SA_SPIND_MAX_VELO_G26                  G26 S
SD43230 $SA_SPIND_MAX_VELO_LIMS                 LIMS
SD43300 $SA_ASSIGN_FEED_PER_REV_SOURCE          FPRAON
SD43420 $SA_WORKAREA_LIMIT_PLUS                 G26
SD43430 $SA_WORKAREA_LIMIT_MINUS                G25
SD43700 $SA_OSCILL_REVERSE_POS1                 OSP1
SD43710 $SA_OSCILL_REVERSE_POS2                 OSP2
SD43720 $SA_OSCILL_DWELL_TIME1                  OST1
SD43730 $SA_OSCILL_DWELL_TIME2                  OST2
SD43740 $SA_OSCILL_VELO                         FA
SD43750 $SA_OSCILL_NUM_SPARK_CYCLES             OSNSC
SD43760 $SA_OSCILL_END_POS                      OSE
SD43770 $SA_OSCILL_CTRL_MASK                    OSCTRL
SD43780 $SA_OSCILL_IS_ACTIVE                    OS
```

10710	PROG_SD_RESET_SAVE_TAB			EXP, N01	A3, V1	
-	Setting data to be updated			DWORD	PowerOn	
-						
-	30	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2	M

Description: Setting data to be backed up

The values of the SDs listed in this table are stored in non-volatile memory, i.e. they remain valid after power ON. The setting data whose HMI numbers were entered in the backup list are written into the (buffered) active file system after the description of the part program on reset.

Programmable setting data are:

```
                                                (GCODE)
SD 42000   $SC_THREAD_START_ANGLE                  SF
SD 42010:  $SC_THREAD_RAMP_DISP                    DITS/DITE
SD 42400   $SC_PUNCH_DWELLTIME                     PDELAYON
SD 42800   $SC_SPIND_ASSIGN_TAB                    SETMS
SD 43200:  $SA_SPIND_S                             S with
G94,G95,G97,G971,G972
SD 43202:  $SA_SPIND_CONSTCUT_S                    S with
G96,G961,G962
SD 43210   $SA_SPIND_MIN_VELO_G25                  G25S
SD 43220   $SA_SPIND_MAX_VELO_G26                  G26 S
SD 43230   $SA_SPIND_MAX_VELO_LIMS                 LIMS
SD 43300   $SA_ASSIGN_FEED_PER_REV_SOURCE          FPRAON
SD 43420   $SA_WORKAREA_LIMIT_PLUS                 G26
SD 43430   $SA_WORKAREA_LIMIT_MINUS                G25
SD 43700   $SA_OSCILL_REVERSE_POS1                 OSP1
SD 43710   $SA_OSCILL_REVERSE_POS2                 OSP2
SD 43720   $SA_OSCILL_DWELL_TIME1                  OST1
SD 43730   $SA_OSCILL_DWELL_TIME2                  OST2
SD 43740   $SA_OSCILL_VELO                         FA
SD 43750   $SA_OSCILL_NUM_SPARK_CYCLES             OSNSC
SD 43760   $SA_OSCILL_END_POS                      OSE
SD 43770   $SA_OSCILL_CTRL_MASK                    OSCTRL
SD 43780   $SA_OSCILL_IS_ACTIVE                    OS
```

The values of D43420 $SA_WORKAREA_LIMIT_PLUS (working area limitation plus) and SD43430 $SA_WORKAREA_LIMIT_MINUS (working area limitation minus) are to be stored in the buffered RAM after every RESET, M02, M30 or M17.

```
   -->  PROG_SD_RESET_SAVE_TAB[0] = 43420
   -->  PROG_SD_RESET_SAVE_TAB[1] = 43430
```

See also: 'REDEF: change attributes of NC language elements', setting data/PRLOC

10711	NC_LANGUAGE_CONFIGURATION			EXP, N01	K1	
-	NC language commands of inactive options / functions			DWORD	PowerOn	
-						
-	-	0	0	4	0/0	S

Description:

Manner of handling language commands whose associated option or function has not been activated.

All programmable commands in an NC program or cycle program are language commands. Detailed information is available in the description of the language command STRINGIS.

ValueMeaning

0: All language commands are known - especially those whose function has not been activated. That means that all language commands are programmable. Whether the required function is active is not detected until execution. If not, then a specific alarm is generated.

Option approved / not approved (for functions without options "Option approved" applies implicitly):

1: All language commands are known. Language commands with options that have not been approved, are recognized at the beginning of the program interpretation and rejected with alarm 12553 "Option/function inactive".

Example:

If the option data for cylinder transformation has not been set, programming of TRACYL will be rejected with alarm 12553.

2: Only those language commands are known that correspond to the current scope of approved NCK software options. This means that options that are not approved are rejected with 12550 "Name not defined or option/function not available". In this case it is not possible to decide whether the relevant command is not known in Siemens NC language in general or whether it is simply not available on this system.

Example:

If the option data for cylinder transformation has not been set, programming of TRACYL will be rejected with alarm 12550.

Function active/inactive:

3: All language commands are known. Language commands with inactive functions are recognized at the beginning of the program interpretation and rejected with alarm 12553 "Option/function inactive".

Example:

If the option data for cylinder transformation has been set, but transformation has not been activated with MD24100 $MC_TRAFO_TYPE_1, programming of TRACYL will be rejected with alarm 12553.

4: Only those language commands are known that correspond to the current scope of active NCK software functions. This means that any command regarding inactive functions are rejected with alarm 12550 "Name not defined or option/function not available". In this case it cannot be decided whether the relevant command is not known in the Siemens NC language in general or whether it is simply not available on this system.

Example:

If the option data for cylinder transformation has been set, but transformation has not been activated with MD24100 $MC_TRAFO_TYPE_1, programming of TRACYL will be rejected with alarm 12550.

Example:

See description for the STRINGIS language command.

10712	NC_USER_CODE_CONF_NAME_TAB			EXP, N01, N12	TE1,B1	
-	List of reconfigured NC codes			STRING	PowerOn	
-						
-	200	...	-	-	2/2	M

Description: List of identifiers of the NC codes reconfigured by the user.

The list is to be structured as follows:

Even address: Identifier to be changed

Subsequent odd address: New identifier

The following three types of NC codes can reconfigured:

1. G codes e.g.: G02, G64, ASPLINE...
2. NC addresses e.g.: RND, CHF, ...
3. Pre-defined subprograms e.g.: CONTPRON, ...

10713	M_NO_FCT_STOPRE			EXP, N12, N07	H2	
-	M function with preprocessing stop			DWORD	PowerOn	
-						
-	15	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2	M

Description: The M functions defined by MD10713 $MN_M_NO_FCT_STOPRE perform an implicit preprocessing stop.

That is, the interpretation of the next part program line will be stopped until the block with the M function defined in that way has been processed completely

(PLC acknowledgement, motion, etc.).

10714	M_NO_FCT_EOP			EXP, N07	K1,H2	
-	M function for spindle active after reset			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	M

Description: For spindles where a '2' is configured in MD35040 $MA_SPIND_ACTIVE_AFTER_RESET, no spindle reset is enabled with this M function when the part program is terminated. The spindle therefore remains active after the end of the part program.

Proposal: M32

Restrictions: see MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

10715	M_NO_FCT_CYCLE			EXP, N12, N07	H2,K1	
-	M function to be replaced by a subroutine			DWORD	PowerOn	
-						
-	30	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2	M

Description: M number with which a subprogram is called.

The name of the subprogram is stated in MD10716 $MN_M_NO_FCT_CYCLE_NAME[n]. If the M function defined with MD10715 $MN_M_NO_FCT_CYCLE[n] is programmed in a part program block, the subprogram defined in MD10716 $MNM_NO_FCT_CYCLE_NAME[n] is started at the end of the block. If the M function is programmed again in the subprogram, there is no longer substitution by a subprogram call. MD10715 $MN_M_NO_FCT_CYCLE[n] acts both in Siemens mode G290 and in external language mode G291.

The subprograms configured with MD10716 $MN_M_NO_FCT_CYCLE_NAME[n] and MD10717 $MN_T_NO_FCT_CYCLE_NAME must not be active simultaneously in one block (line of a part program). This means that no more than one M/T function replacement can be active in any one block. Neither an M98 nor a modal subprogram call can be programmed in a block with the M function replacement.

Subprogram return and end of part program are also not permitted. Alarm 14016 is output in the event of a conflict.

Restrictions:

M functions with a fixed meaning and configurable M functions are checked for conflicting settings. A conflict is reported with an alarm.

The following M functions are checked:

- M0 to M5,
- M17, M30,
- M19,
- M40 to M45,
- M function for spindle/axis mode switchover according to MD20094 $MC_SPIND_RIGID_TAPPING_M_NR (default: M70),
- M functions for nibbling/punching as configured in MD26008 $MC_NIBBLE_PUNCH_CODE if activated by MD26012 $MC_PUNCHNIB_ACTIVATION.
- M19, M96-M99 for applied external language (MD18800 $MN_MM_EXTERN_LANGUAGE).

Exception: The M function for the tool change defined by MD22560 $MC_TOOL_CHANGE_M_CODE.

10716	M_NO_FCT_CYCLE_NAME			EXP, N12, N07	K1	
-	Subroutine name for M function replacement			STRING	PowerOn	
-						
-	30		-	-	7/2	M

Description: The machine data contains the name of the cycle. This cycle is called if the M function has been programmed from MD10715 $MN_M_NO_FCT_CYCLE.

If the M function is programmed in a motion block, the cycle is executed after the motion.

MD10715 $MN_M_NO_FCT_CYCLE is active in both Siemens mode G290 and in external language mode G291.

If a T number is programmed in the call block, then the programmed T number can be polled in the cycle under the variable $P_TOOL.

M and T function replacements must not be programmed simultaneously in one block. This means that not more than one M or T function replacement may be active in any one block.

Neither an M98 nor a modal subprogram call may be programmed in a block with M function replacement.

Moreover, neither subprogram return nor part program end are allowed.

Alarm 14016 is issued if there is a conflict.

Related to:

MD10715 $MN_M_NO_FCT_CYCLE,
MD10717 $MN_T_NO_FCT_CYCLE_NAME

10717	T_NO_FCT_CYCLE_NAME			EXP, N12, N07	K1	
-	Name of tool-changing cycle for T function replacement			STRING	PowerOn	
-						
-	-		-	-	7/2	M

Description: Cycle name for tool change routine on call-up with a T function.

If a T function is programmed in a part program block, the subprogram defined in T_NO_FCT_CYCLE_NAME is called at the end of the block.

The T number programmed can be polled in the cycle via system variables $C_T / $C_T_PROG as a decimal value and via $C_TS / $C_TS_PROG as a string (only with tool management). MD10717 $MN_T_NO_FCT_CYCLE_NAME is active both in Siemens mode G290 and in external language mode G291.

MD10716 $MN_M_NO_FCT_CYCLE_NAME and MD10717 $MN_T_NO_FCT_CYCLE_NAME must not be active in one block at the same time, i.e. no more than one M/T function replacement can be active per block. Neither an M98 nor a modal subprogram call can be programmed in a block with a T function replacement. Furthermore, neither subprogram return nor part program end are allowed.

Alarm 14016 is output in the event of a conflict.

Related to:

MD10715 $MN_M_NO_FCT_CYCLE,
MD10716 $MN_M_NO_FCT_CYCLE_NAME

10718	M_NO_FCT_CYCLE_PAR			EXP, N12, N07	K1	
-	M function replacement with parameters			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	M

Description: If an M function replacement was configured with MD10715 $MN_M_NO_FCT_CYCLE[n] / MD10716 $MN_M_NO_FCT_CYCLE_NAME[n], a parameter transfer via system variable can be specified for one of these M functions using MD10718 $MN_M_NO_FCT_CYCLE_PAR, in the same way as T function replacement. The parameters stored in the system variables always refer to the part program line where the M function to be replaced was programmed.

The following system variables are available:

$C_ME : Address extension of the replaced M function

$C_T_PROG : TRUE if address T was programmed

$C_T : Value of address T (Integer)

$C_TE : Address extension of address T

$C_TS_PROG : TRUE if address TS was programmed

$C_TS : Value of address TS (string, only with tool management)

$C_D_PROG : TRUE if address D was programmed

$C_D : Value of address D

$C_DL_PROG : TRUE if address DL was programmed

$C_DL : Value of address DL

10719	T_NO_FCT_CYCLE_MODE			EXP, N12, N07	K1	
-	Setting of T function substitution			DWORD	PowerOn	
-						
-	-	0	0	7	7/2	M

Description: This machine data parameterizes the execution of the replacement subprogram for the tool and tool offset selection.

Bit 0 = 0:

D or DL number is transferred to the replacement subprogram (default value)

Bit 0 = 1:

The D or DL number is not transferred to the replacement subprogram if the following conditions are fulfilled: $MC_TOOL_CHANGE_MODE = 1 Programming D/DL with T or M function with which the tool change cycle is called, in a part program line.

Bit 1 = 0

Execution of the replacement subprogram at end of block (default value)

Bit 1 = 1

Execution of the replacement subprogram at block start

Bit 2 = 0:

Execution of the replacement subprogram according to the settin of bit 1

Bit 2 = 1:

Execution of the replacement subprogram at block start and at end of block.

10720	OPERATING_MODE_DEFAULT			N01	H2	
-	Setting of mode after power ON			BYTE	PowerOn	
-						
-	10	7,7,7,7,7,7,7,7,7,7	0	12	7/2	M

Description: Default modes of the mode groups after power ON.

If no mode is selected by the PLC, all the channels associated with mode group n are in the mode preset by OPERATING_MODE_DEFAULT[n -1] after power ON:

0 = Automatic mode

1 = Automatic mode, submode REPOS

2 = MDI mode

3 = MDI mode, submode REPOS

4 = MDI mode, submode Teach In

5 = MDI mode, submode Reference point approach

6 = JOG mode

7 = JOG mode, submode Reference point approach

8 = AUTO mode, submode Teach In

9 = AUTO mode, submode Teach In, submode Reference point approach

10 = AUTO mode, submode Teach In, submode Repos

11 = MDI mode, submode Teach In, submode Reference point approach

12 = MDI mode, submode Teach In, submode Repos

10722	AXCHANGE_MASK			EXP, N01	K5	
-	Paramameters for axis replacement behavior			DWORD	PowerOn	
-						
-	-	0	0	0xFFFF	7/2	M

Description: The axis replacement behavior can be changed with this machine data.

Bit0 = 1

Means that there is an automatic axis replacement via channels even if the axis has been brought into a neutral state by Waitp.

Bit1 = 1

Means that an AXCTSWE fetches all the axis container axes that can be assigned to the channel by means of implicit GET or GETD, and an axis replacement is not permitted again until after the axis container rotation.

Bit2 = 1

Means that, in the case of a GET, an intermediate block without preprocessing stop is generated, and whether a reorganization is needed is not checked until main run.

Bit3 = 1 means, that the NC carries out an axis replacement request for the VDI interface only for:

- an axis exclusively controlled by the PLC ($MA_BASE_FUNCTION_MASK Bit 4 == 1)

- a permanently assigned PLC axis ($MA_BASE_FUNCTION_MASK Bit 5 == 1)

For such axes, the VDI interface signal 'Axis replacement possible' is always 1.

For all other axes, the VDI interface signal 'Axis replacement possible' is always 0.

For permanently assigned PLC axes, an axis replacement is possible only from neutral axis to PLC axis

or from PLC axis to neutral axis.

Bit3 = 0 means that an axis replacement can be requested by the PLC for each axis.

For permanently assigned PLC axes, an axis replacement is only possible from neutral axis to PLC axis

or from PLC axis to neutral axis.

10731	JOG_MODE_KEYS_EDGETRIGGRD			EXP, N01	IAF	
-	Functioning of the JOG keys			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	0/0	S

Description: This data determines whether the signals of the VDI interface, which set the JOG mode (progressive INC10000, ... INC1), work as switches (level triggered) or as push buttons (edge triggered). In the latter case, a setting is made in the NCK to retain the function of the key last pressed.

10735	JOG_MODE_MASK			EXP, N01	K1	
-	Settings for JOG mode			DWORD	PowerOn	
-						
-	-	0	0	0xff	7/2	M

Description:

```
Bit 0:
   Enables JOG in automatic.
   JOG is enabled in automatic when all channels in the mode group
   are in the RESET state and no channel of the DRF mode group has
   been selected. The mode group changes internally to JOG with the
   +/- key and the handwheel, and the axis moves. After the JOG
   motion has ended, a change back to AUTO is also made internally.
Bit 1:
   Position with AxFrame.
   The function 'JOG to position' considers all axial frames and,
   in the case of an axis configured as geometry axis, the tool
   length offset.
Bit 2:
   Travel in opposite direction.
   The functions 'JOG to position' and 'Approach machine fixed
   point manually' allow travel in opposite direction, i.e. away
   from the specified position.
Bit 3:
   Tool radius offset.
   MD21020 $MC_WORKAREA_WITH_TOOL_RADIUS is active with JOG
   motions of the geometry axes.
Bit 4:
   Alarm suppression operating range limit in the basic coordinate
   system in JOG.
   Alarms that would be output in JOG when an operating range limit
   is reached in the basic coordinate system, are suppressed.
Bit 5:
   Alarm suppression operating range limit in the workpiece coor-
   dinate system in JOG.
   Alarms that would be output in JOG when an operating range limit
   is reached in the workpiece coordinate system, are suppressed.
Bit 6, 7:
   JOG of circles:
   Bit 7 and bit 6 = 0: traversing the 2nd geometry axis of the
   active plane to PLUS for radius increase, traversing to MINUS
   for radius decrease independently of inner or outer machining
   being active.
   Bit 7 = 1 and bit 6 = 0: traversing the 2nd geometry axis of the
   active plane to PLUS always travels in the direction of the lim-
   iting circle. This means that the radius is increased on inner
   machining and decreased on outer machining.
   Bit 7 = 1 and bit 6 = 1: traversing the 2nd geometry axis of the
   active plane to MINUS always travels in the direction of the
   limiting circle. This means that the radius is increased on
   inner machining and decreased on outer machining.
Bits 8-31:
   Currently unassigned.
```

10760	G53_TOOLCORR			N12	FBFA	
-	Method of operation of G53, G153 and SUPA			DWORD	NEW CONF	
-						
-	-	0	0	3	7/2	M

Description: With this MD you define whether tool length offset and tool radius offset are also to be suppressed with language commands G53, G153 and SUPA

The machine data is bit-coded.

Bit 0 = 0: G53, G153 and SUPA cause block-by-block suppression of work offsets. The active tool length offset and tool radius offset remain active.

Bit 0 = 1: G53, G153 and SUPA cause block-by-block suppression of work offsets, active tool length offset and tool radius offset. The tool length behavior can be modified with bit 1.

Bit 1 is only evaluated, if the value of bit 0 is 1.

Bit1 = 0: with bit 0 set, the tool length is always suppressed with G53, G153 and SUPA.

Bit1 = 1: with bit 0 set the tool length is only suppressed with G53, G153 and SUPA, if a cutting edge is not selected in the same block (this can also be the cutting edge that is already active).

10780	UNLOCK_EDIT_MODESWITCH			EXP, N01	-	
-	Cancel start disable when editing a part program			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	0/0	S

Description: To avoid inconsistent states, a start disable is forced in Teach In mode when a part program is edited.

This start disable during editing can be canceled together with the operating algorithms of the individual HMIs by an NC reset or a mode group change.

0: Start disable when editing is also canceled with NC Reset

1: Start disable when editing is also canceled on a mode group change.

10800	EXTERN_CHAN_SYNC_M_NO_MIN			EXP, N12	H2	
-	1st M function for channel synchronization			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	M

Description: M number of the first M function which can be used to perform a channel (program) synchronization in ISO2/3 mode.

To avoid conflicts with standard M functions the lowest permissible value is 100. If you enter a value between 0 and 99, alarm 4170 will be issued.

10802	EXTERN_CHAN_SYNC_M_NO_MAX			EXP, N12	H2	
-	Last M function for channel synchronization			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	M

Description: M number of the last M function which can be used to perform a channel (program) synchronization in ISO2/3 mode.

In combination with MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN, the machine data defines an M number range reserved for channel synchronization. This range may be a maximum of 10 times the number of channels as only 10 WAIT marks may be set for each channel.

Alarm 4170 is output if a value is entered between 0 and 99 or less than MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN.

10804	EXTERN_M_NO_SET_INT			EXP, N12	H2,K1	
-	M function to activate ASUB			DWORD	PowerOn	
-						
-	-	96	-	-	7/2	M

Description: M function number used to activate an interrupt program (ASUB) in ISO2/3 mode. The interrupt program is always started by the 1st high-speed input of the numerical control.

The M number defined in the machine data replaces M96 in external language mode.

Restrictions: Refer to MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,
MD10715 $MN_M_NO_FCT_CYCLE,
MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,
MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,
MD10804 $MN_EXTERN_M_NO_SET_INT
MD10806 $MN_EXTERN_M_NO_DISABLE_INT,
MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX
MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MC_NIBBLE_PUNCH_CODE

10806	EXTERN_M_NO_DISABLE_INT			EXP, N12	H2,K1	
-	M function to deactivate ASUB			DWORD	PowerOn	
-						
-	-	97	-	-	7/2	M

Description: M function number used to deactivate an interrupt program (ASUB) in ISO2/3 mode.

The M number defined in the machine data replaces M97 in external language mode.

Restrictions: refer to MD10715 $MN_M_NO_FCT_CYCLE

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

10808	EXTERN_INTERRUPT_BITS_M96			EXP, N12	FBFA	
-	Activate interrupt program (ASUB)			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: Setting the various bits can influence the processing of the interrupt routine activated by M96 P...

Bit 0 = 0,

No interrupt program possible, M96/M97 are normal M functions

Bit 0 = 1,

Using M96/M97 to activate an interrupt program is allowed

Bit 1 = 0,

Continue processing part program at the final position of the next block after the interrupt block

Bit 1 = 1,

Continue processing part program from interrupt position

Bit 2 = 0,

The interrupt signal immediately interrupts the current block and starts the interrupt routine

Bit 2 = 1,

The interrupt routine will not be started until the end of the block

Bit 3 = 0,

Interrupt machining cycle at an interupt signal

Bit 3 = 1,

Do not start interrupt program until the end of a machining cycle.

10810	EXTERN_MEAS_G31_P_SIGNAL			EXP, N12	FBFA	
-	Config. of measuring inputs for G31 P..			BYTE	PowerOn	
-						
-	4	1,1,1,1	0	3	7/2	M

Description: This machine data defines the assignment of measurement inputs 1 and 2 to the P numbers programmed with G31 P1 (- P4). The machine data is bit-coded. Only bits 0 and 1 are evaluated. For example, if bit 0 = 1 in MD10810 $MN_EXTERN_MEAS_G31_P_SIGNAL[1], the 1st measurement input is activated with G31 P2. If MD10810 $MN_EXTERN_MEAS_G31_P_SIGNAL[3]=2, the 2nd measurement input is activated with G31 P4.

Bit 0: = 0, Do not evaluate measurement input 1 with G31 P1 (- P4)

Bit 0: = 1, Activate measurement input 1 with G31 P1 (- P4)

Bit 1: = 0, Do not evaluate measurement input 2 with G31 P1 (- P4)

Bit 1: = 1, Activate measurement input 2 with G31 P1 (- P4)

10812	EXTERN_DOUBLE_TURRET_ON			EXP, N12	FBFA	
-	Double turret with G68			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: This machine data is used to determine whether double-slide machining (channel synchronization for 1st and 2nd channel) is to be started using G68 or whether the second tool of a double turret (= two closely-linked tools at a distance defined in the MD42162 SC_EXTERN_DOUBLE_TURRET_DIST) is to be activated.

FALSE:

Channel synchronization for double-slide machining

TRUE:

Load 2nd tool of a double turret (that is, activate $SC_EXTERN_DOUBLE_TURRET_DISTANCE as additive zero offset and mirroring around Z axis)

10814	EXTERN_M_NO_MAC_CYCLE			EXP, N12	H2,K1	
-	Macro call via M function			DWORD	PowerOn	
-						
-	30	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2	M

Description: A macro is called with this M number.

The name of the subprogram is stated in MD10815 $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n].

If the M function specified with MD10814 $MN_EXTERN_M_NO_MAC_CYCLE[n] is programmed in a part program block, the subprogram defined in MD10815 $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n] is started. All addresses programmed in the block are written into the corresponding variables.

If the M function is programmed again in the subprogram, there is no longer a replacement by a subprogram call.

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE[n] is only active in the external language mode G291.

The subprograms configured with MD10815 $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n] must not be active simultaneously in a block (part program line), i.e. only one M function replacement can become active in any one block. Neither an M98 nor a modal subprogram call may be programmed in the block with the M function replacement.

Subprogram return and the part program end are also not permitted. Alarm 14016 is issued in case of a conflict. Restrictions: see MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,
MD10715 $MN_M_NO_FCT_CYCLE,
MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,
MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,
MD10804 $MN_EXTERN_M_NO_SET_INT
MD10806 $MN_EXTERN_M_NO_DISABLE_INT,
MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX
MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

10815	EXTERN_M_NO_MAC_CYCLE_NAME			EXP, N12	H2	
-	Name of subroutine for M function macro call			STRING	PowerOn	
-						
-	30		-	-	7/2	M

Description: Name of the subprogram started by a call via the M function defined by MD10814 $MN_EXTERN_M_NO_MAC_CYCLE[n].

10816	EXTERN_G_NO_MAC_CYCLE			EXP, N12	FBFA	
-	Macro call via G function			DOUBLE	PowerOn	
-						
-	50	-1.,-1.,-1.,-1.,-1.,-1.,-1.,-1.,-1....	-	-	7/2	M

Description: G number for calling a macro.

The name of the subprogram is stated in MD10817 $MN_EXTERN_G_NO_MAC_CYCLE_NAME[n].

If the G function specified with MD10816 $MN_EXTERN_G_NO_MAC_CYCLE[n] is programmed in a part program block, the subprogram defined in MD10817 $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n] is started. All addresses programmed in the block are written in the corresponding $C_xx variables.

No subprogram call is executed if a subprogram call is already active via an M/G macro or an M replacement. If a standard G function is programmed in this case, this code is executed. Otherwise, alarm 12470 is issued.

MD10816 $MN_EXTERN_G_NO_MAC_CYCLE[n] is only active in the external language mode G291.

Only a single subprogram call may be included in any one block. This means that only a single M/G function replacement may be programmed in a block, and no additional subprogram (M98) or cycle call may be included in the block.

Furthermore, a subprogram return and a part program end are not permitted in the same block.

Alarm 14016 is issued in case of a conflict.

10817	EXTERN_G_NO_MAC_CYCLE_NAME			EXP, N12	FBFA	
-	Name of subroutine for G function macro call			STRING	PowerOn	
-						
-	50		-	-	7/2	M

Description: Name of the subprogram started by call via the G function defined by MD10816 $MN_EXTERN_G_NO_MAC_CYCLE[n].

10818	EXTERN_INTERRUPT_NUM_ASUP			EXP, N12	FBFA	
-	Interrupt number for ASUB start (M96)			BYTE	PowerOn	
-						
-	-	1	1	8	7/2	M

Description: Number of the interrupt input starting an asynchronous subprogram activated in ISO mode. (M96 <program number>)

10820	EXTERN_INTERRUPT_NUM_RETRAC			EXP, N12	FBFA	
-	Interrupt number for rapid retraction (G10.6)			BYTE	PowerOn	
-						
-	-	2	1	8	7/2	M

Description: Number of the interrupt input triggering rapid retraction to the position programmed with G10.6 in ISO mode.

10850	MM_EXTERN_MAXNUM_OEM_GCODES			EXP, N01, N12	-	
-	Maximum number of OEM G codes			DWORD	PowerOn	
-						
-	-	0	0	1000	1/1	M

Description: This machine data is used to define the number of G codes implemented for an external language via an OEM application.

10880	MM_EXTERN_CNC_SYSTEM			N01, N12	FBFA	
-	Definition of the control system to be adapted			DWORD	PowerOn	
-						
-	-	1	1	3	7/2	M

Description: Definition of the external CNC system whose part programs are to be executed on the SINUMERIK control in addition to SINUMERIK code (ISO_1):

1: ISO_21: System Fanuc0 milling (5.1 and higher)

2: ISO_31: System Fanuc0 turning (P5.2 and higher)

3: External language via OEM application (P6.2 and higher)

4: ISO_22: System Fanuc0 Milling (P7 and higher)

5: ISO_32: System Fanuc0 Turning (P7 and higher)

10881	MM_EXTERN_GCODE_SYSTEM			N01, N12	FBFA	
-	ISO_3 Mode: GCodeSystem			DWORD	PowerOn	
-						
-	-	0	0	2	7/2	M

Description: Definition of the GCodeSystem to be actively executed in ISO_3 Mod (turning):

Value = 0 : ISO_3: Code system B

Value = 1 : ISO_3: Code system A

Value = 2 : ISO_3: Code system C

10882	NC_USER_EXTERN_GCODES_TAB			N12	FBFA	
-	List of user-specific G commands of an external NC language			STRING	PowerOn	
-						
-	60		-	-	2/2	M

Description: List of G commands of external NC languages which have been reconfigured by the user.

The implemented G commands are to be taken from the current Siemens documentation for this programming language.

The list is structured as follows:

Even address: G command to be changed

Subsequent odd address: New G command

Only G codes can be reconfigured, e.g.: G20, G71.

10884	EXTERN_FLOATINGPOINT_PROG			N12	FBFA	
-	Evaluation of programmed values without decimal point			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	M

Description: This MD defines how programmed values without a decimal point are evaluated:

0: Values without a decimal point are interpreted in internal units. For example, X1000 = 1 mm (for 0.001 mm input resolution) X1000.0 = 1000 mm

1: Values without decimal point are interpreted as mm, inch or degrees. For example, X1000 = 1000 mm X1000.0 = 1000 mm

Related to:

MD10886 $MN_EXTERN_INCREMENT_SYSTEM

10886	EXTERN_INCREMENT_SYSTEM			N12	FBFA	
-	Incremental system in external language mode			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: This machine data is active for external programming languages, that is if MD18800 $MN_MM_EXTERN_LANGUAGE = 1.

This machine data specifies which incremental system is active:

0: Incremental system IS-B = 0.001 mm/degree
= 0.0001 inch

1: Incremental system IS-C = 0.0001 mm/degree
= 0.00001 inch

Related to:

MD10884 $MN_EXTERN_FLOATINGPOINT_PROG

10888	EXTERN_DIGITS_TOOL_NO			N12	FBFA	
-	Digits for T number in ISO mode			BYTE	PowerOn	
-						
-	-	2	0	8	7/2	M

Description: This machine data is only active when MD10880 $MN_MM_EXTERN_CNC_SYSTEM == 2.

Number of digits of the tool number in the programmed T word.

From the programmed T word, the number of leading digits specified in MD10888 $MN_EXTERN_DIGITS_TOOL_NO are interpreted as the tool number.

The following digits address the offset memory.

Entering a value > 0 in MD $MN_EXTERN_DIGITS_OFFSET_NO renders MD $MN_EXTERN_DIGITS_TOOL_NO ineffective.

$MN_EXTERN_DIGITS_OFFSET_NO has priority over $MN_EXTERN_DIGITS_TOOL_NO.

10889	EXTERN_DIGITS_OFFSET_NO			N12	FBFA	
-	Digits for offset number in ISO mode			BYTE	PowerOn	
-						
-	-	0	0	8	7/2	M

Description: This machine data is only active when $MN_MM_EXTERN_CNC_SYSTEM == 2.

Number of digits of the offset number in the programmed T word.

From the programmed T word, the number of leading digits specified in $MN_EXTERN_DIGITS_OFFSET_NO are interpreted as the offset number.

The following digits address the tool number.

10890	EXTERN_TOOLPROG_MODE		N12	FBFA	
-	Tool change programming for external language		DWORD	PowerOn	
-					
-	-	0x0	-	-	7/2	M

Description:

```
Configuration for programming the tool change in an external pro-
gramming language:
Bit0=0:
  Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: The tool
  number and offset number are programmed in the T word.
  $MN_DIGITS_TOOLNO defines the number of leading digits that
  form the tool number.
  Example:
  $MN_DIGITS_TOOLNO = 2
  T=1234    ; Tool number 12,
            ; Offset number 34
 Bit0=1:
  Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: Only the
  tool number is programmed in the T word. Offset number = Tool
  number. $MN_DIGITS_TOOLNO is irrelevant.
  Example:
  T=12      ; Tool number 12
            ; Offset number 12
 Bit1=0:
  Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: A leading 0
  is added if the number of digits programmed in the T word is the
  same as that in MD10888 $MN_EXTERN_DIGITS_TOOL_NO.
 Bit1=1:
  Only active if MD10880 $MN_MM_EXTERN_CNC_SYSTEM =2: If the num-
  ber of digits programmed in the T word is equal to the number of
  digits defined in MD10888 $MN_EXTERN_DIGITS_TOOL_NO, the pro-
  grammed number is both the offset number and the tool number
 Bit2=0:
  Only active if $MN_MM_EXTERN_CNC_LANGUAGE =2: ISO T offset
  selection only with D (Siemens cutting edge number)
 Bit2=1:
  Only active if $MN_MM_EXTERN_CNC_LANGUAGE =2: ISO T offset
  selection only with H ($TC_DPH[t,d])
 Bit6=0:
              The offset memories for the tool length and tool
radius are linked so that tool length and tool radius are always
selected when either H or D is programmed.
 Bit6=1:
              The offset memories for the tool length and tool
radius are not linked, so that the number of the tool length value
is selected when H is programmed, and the number of the tool
radius value is selected when D is programmed.
```

10900	INDEX_AX_LENGTH_POS_TAB_1			N09	T1	
-	Number of positions for indexing axis table 1			DWORD	Reset	
-						
-	-	0	0	60	7/2	M

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis. The number of indexing positions used in table 1 is defined by MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1.

These indexing positions must be assigned valid values in table 1. Any indexing positions in the table above the number specified in the machine data are ignored. Up to 60 indexing positions (0 to 59) can be entered in the table.

Table length = 0 means that the table is not evaluated. If the length is not equal to 0, then the table must be assigned to an axis with MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB.

If the indexing axis is defined as a rotary axis (MD30300 $MA_IS_ROT_AX = "1") with modulo 360° (MD30310 $MA_ROT_IS_MODULO = "1"), the machine data defines the last indexing position after which, with a further traversing movement in the positive direction, the indexing positions begin again at 1.

Special cases:

Alarm 17090 "Value violates upper limit" if values over 60 are entered in MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD10910 $MN_INDEX_AX_POS_TAB_1 (indexing position table 1)

MD30300 $MA_IS_ROT_AX(rotary axis)

MD30310 $MA_ROT_IS_MODULO (modulo conversion for rotary axis)

10910	INDEX_AX_POS_TAB_1			N09	T1	
mm/inch, degrees	Indexing position table 1			DOUBLE	Reset	
-						
-	60	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis.

[n] = indexing for the entry of the indexing positions in the indexing position table.

Range: 0 y n x 59, where 0 corresponds to the 1st indexing position and 59 to the 60th indexing position.

Note.

Programming with the absolute indexing position (e.g. CAC) starts with indexing position 1. This corresponds to the indexing position with indexing n = 0 in the indexing position table.

The following should be noted when entering the indexing positions:

- Up to 60 different indexing positions can be stored in the table.
- The 1st entry in the table corresponds to indexing position 1; the nth entry corresponds to indexing position n.
- The indexing positions must be entered in the table in ascending order (starting with the negative and going to the positive traversing range) with no gaps between the entries. Consecutive position values must not be identical.
- If the indexing axis is defined as a rotary axis (MD30300 $MA_IS_ROT_AX = "1") with modulo 360° (MD30310 $MA_ROT_IS_MODULO = "1"), then the position values are limited to a range of 0° x pos. < 360°.

The number of indexing positions used in the table is defined by MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1.

Entering the value 1 in axial MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB assigns indexing position table 1 to the current axis.

Special cases:

Alarm 17020 "Illegal array index" if over 60 positions are entered in the table.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1 (number of indexing positions used in table 1)

MD30300 $MA_IS_ROT_AX(rotary axis)

MD30310 $MA_ROT_IS_MODULO (modulo conversion for rotary axis)

10920	INDEX_AX_LENGTH_POS_TAB_2			N09	T1	
-	Number of positions for indexing axis table 2			DWORD	Reset	
-						
-	-	0	0	60	7/2	M

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis. The number of indexing positions used in table 2 is defined by MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2.

These indexing positions in table 2 must be assigned valid values. Any indexing positions in the table above the number specified in the machine data are ignored.

Up to 60 indexing positions (0 to 59) can be entered in the table.

Table length = 0 means that the table is not evaluated. If the length is not equal to 0, the table must be assigned to an axis with MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB.

If the indexing axis is defined as a rotary axis (MD30300 $MA_IS_ROT_AX = "1") with modulo 360° (MD30310 $MA_ROT_IS_MODULO = "1"), the machine data defines the last indexing position after which, with a further traversing movement in the positive direction, the indexing positions begin again at 1.

Not relevant for tool magazines (revolvers, chain magazines)

Special cases:

Alarm 17090 "Value violates upper limit" if a value over 60 is entered in MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD10930 $MN_INDEX_AX_POS_TAB_2 (indexing position table 2)

MD30300 $MA_IS_ROT_AX(rotary axis)

MD30310 $MA_ROT_IS_MODULO (modulo conversion for rotary axis)

10930	INDEX_AX_POS_TAB_2			N09	T1	
mm/inch, degrees	Indexing position table 2			DOUBLE	Reset	
-						
-	60	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis.

[n] = indexing for the entry of the indexing positions in the indexing position table.

Range: 0 y n x 59, where 0 corresponds to the 1st indexing position and 59 to the 60th indexing position.

Note:

Programming with the absolute indexing position (e.g. CAC) starts with indexing position 1. This corresponds to the indexing position with indexing n = 0 in the table.

The following should be noted when entering the indexing positions:

- Up to 60 different indexing positions can be stored in the table.
- The 1st entry in the table corresponds to indexing position 1; the nth entry corresponds to indexing position n.
- The indexing positions should be entered in the table in ascending order (starting with the negative and going to the positive traversing range) with no gaps between the entries. Consecutive position values must not be identical.
- If the indexing axis is defined as a rotary axis (MD30300 $MA_IS_ROT_AX = "1") with modulo 360° (MD30310 $MA_ROT_IS_MODULO = "1"), then the position values are limited to a range of 0° x pos. < 360°.

The number of indexing positions used in the table is defined by MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2.

Entering the value 1 in axial MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB assigns indexing position table 1 to the current axis.

Special cases:

Alarm 17020 "Illegal array index" if over 60 positions are entered in the table.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)

MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2 (num ber of indexing positions used in table 2)

MD30300 $MA_IS_ROT_AX(rotary axis)

MD30310 $MA_ROT_IS_MODULO (modulo conversion for rotary axis)

10940	INDEX_AX_MODE		EXP	T1	
-	Settings for indexing position		DWORD	PowerOn	
-					
-	-	0	0	1	7/2	M

Description:

```
Affects the display of indexing positions (AA_ACT_INDEX_AX_POS_NO
and aaActIndexAxPosNo).
Bit 0 = 0:
   Indexing position display changes on reaching/passing the
   indexing position (indexing range lies between the indexing
   positions, compatible behavior).
Bit 0 = 1:
   Indexing position display changes on passing the half indexing
   axis position (indexing range lies quasi symmetrically round
   the indexing position)
```

11100	AUXFU_MAXNUM_GROUP_ASSIGN		N01, N07, N02	H2	
-	Number of auxiliary functions distr. amongst aux. fct. groups		DWORD	PowerOn	
-					
-	-	1	1	255	7/2	M

Description:

```
The maximum number of auxiliary functions that can be assigned to
a group by
AUXFU_ASSIGN_TYPE,
AUXFU_ASSIGN_EXTENTION,
AUXFU_ASSIGN_VALUE and
AUXFU_ASSIGN_GROUP.
This number includes only the user-defined auxiliary functions,
not the predefined auxiliary functions.
Related to:
   MD22010 $MC_AUXFU_ASSIGN_TYPE[n].
```

11110	AUXFU_GROUP_SPEC			N07	H2	
-	Auxiliary function group specification			DWORD	PowerOn	
-						
-	168	0x81,0x21,0x41,0x41,0x41,0x41,0x41...	-	-	7/2	M

Description: Defines the output options for the auxiliary functions belonging to a group.

However, the output option of an auxiliary function configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex] or MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] has a higher priority.

Bit 0=1"Normal" acknowledgement after an OB1 cycle

Bit 1=1"Quick" acknowledgement with OB40

Bit 2=1No predefined auxiliary function

Bit 3=1No output to PLC

Bit 4=1Spindle response after acknowledgement by the PLC

Bit 5=1Output prior to motion

Bit 6=1Output during motion

Bit 7=1Output at end of block

Bit 8=1No output after block search types 1, 2, 4

Bit 9=1Collection during block search type 5 (SERUPRO)

Bit 10 = 1 No output during block search type 5 (SERUPRO)

Bit 11 = 1Cross-channel auxiliary function (SERUPRO)

Bit 12 = 1Output via synchronized action

Bit 13 = 1 Implicit auxiliary function

Bit 14 = 1 Active M01

Bit 15 = 1 No output during running-in test

Bit 16 = 1 Nibbling off

Bit 17 = 1 Nibbling on

Bit 18 = 1 Nibbling

The MD must be defined for each existing auxiliary function group.

The index [n] corresponds to the auxiliary function group: 0...63

The assignment of individual auxiliary functions to specific groups is defined in channel-specific machine data (AUXFU_PREDEF_TYPE, AUXFU_PREDEF_EXTENTION, AUXFU_PREDEF_VALUE, AUXFU_PREDEF_GROUP, AUXFU_ASSIGN_TYPE, AUXFU_ASSIGN_EXTENTION, AUXFU_ASSIGN_VALUE, AUXFU_ASSIGN_GROUP).

M0, M1, M2, M17 and M30 are assigned to group 1 by default.

The specification of this group (0x81: output duration 1 OB1 pass, output at end of block) must not be changed.

All spindle-specific auxiliary functions (M3, M4, M5, M19, M70) are assigned to group 2 by default.

If several auxiliary functions with different output types (before / during / at end of motion) are programmed in one motion block, then the output of the individual auxiliary functions occurs in accordance with their output types.

All auxiliary functions are output simultaneously in a block with-out motion.

Default setting:

AUXFU_GROUP_SPEC[0]=81H

AUXFU_GROUP_SPEC[1]=21H

AUXFU_GROUP_SPEC[2]=41H

```
...
   AUXFU_GROUP_SPEC[n]=41H
```

11120	LUD_EXTENDED_SCOPE			N01	PG	
-	Function "program global user data (PUD)" is active			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: Activate function "Program-global user data (PUD)":

MD = 0: User data of the main program level are only active on this level.

MD = 1: User data of the main program level are also visible in the subprogram levels.

11140	GUD_AREA_SAVE_TAB			N01	-	
-	Additional saving for GUD modules			DWORD	Immediately	
-						
-	9	0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: This data indicates in which area the contents of the GUD module are also saved.

MD11140 $MN_GUD_AREA_SAVE_TAB[0] : SGUD_DEF

MD11140 $MN_GUD_AREA_SAVE_TAB[1] : MGUD_DEF

MD11140 $MN_GUD_AREA_SAVE_TAB[2] : UGUD_DEF

MD11140 $MN_GUD_AREA_SAVE_TAB[3] : GUD4_DEF

MD11140 $MN_GUD_AREA_SAVE_TAB[4] : GUD5_DEF

MD11140 $MN_GUD_AREA_SAVE_TAB[5] : GUD6_DEF

MD11140 $MN_GUD_AREA_SAVE_TAB[6] : GUD7_DEF

MD11140 $MN_GUD_AREA_SAVE_TAB[7] : GUD8_DEF

MD11140 $MN_GUD_AREA_SAVE_TAB[8] : GUD9_DEF

BitNo. Hexadec. Meaning when bit is set

Value

0 (LSB) 0x00000001 TOA area

11160	ACCESS_EXEC_CST			N01	-	
-	Execution right for /_N_CST_DIR			BYTE	PowerOn	
-						
-	-	7	-	-	7/2	M

Description: Execution right assigned to the program stored in directory /_N_CST_DIR :

Value 0: Siemens password

Value 1: Machine OEM password

Value 2: Password of setup engineer, service

Value 3: End user password

Value 4: Keyswitch position 3

Value 5: Keyswitch position 2

Value 6: Keyswitch position 1

Value 7: Keyswitch position 0

Machine data can only be written with values 0 and 1, and with the corresponding password also active.

11161	ACCESS_EXEC_CMA			N01	-	
-	Execution right for /_N_CMA_DIR			BYTE	PowerOn	
-						
-	-	7	-	-	7/2	M

Description: Execution right assigned to the programs stored in directory /_N_CMA_DIR :

Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

Machine data can only be written with values 0 and 1, and with the corresponding password also active.

11162	ACCESS_EXEC_CUS			N01	-	
-	Execution right for /_N_CUS_DIR			BYTE	PowerOn	
-						
-	-	7	-	-	7/3	U

Description: Execution right assigned to the programs stored in directory /_N_CUS_DIR :

Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

Machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11165	ACCESS_WRITE_CST			N01	-	
-	Write protection for directory /_N_CST_DIR			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	M

Description: Set write protection for cycle directory /_N_CST_DIR:

Assigned to the programs:
Value -1: Keep the value currently set
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11166	ACCESS_WRITE_CMA			N01	-	
-	Write protection for directory /_N_CMA_DIR			DWORD	PowerOn	
-						
-	-	-1	-	-	7/2	M

Description: Set write protection for cycle directory /_N_CMA_DIR:
Assigned to the programs:
Value -1: Keep the value currently set
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11167	ACCESS_WRITE_CUS			N01	-	
-	Write protection for directory /_N_CUS_DIR			DWORD	PowerOn	
-						
-	-	-1	-	-	7/3	U

Description: Set write protection for cycle directory /_N_CUS_DIR:
Assigned to the programs:
Value -1: Keep the value currently set
Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0
The machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11170	ACCESS_WRITE_SACCESS			N01	-	
-	Write protection for _N_SACCESS_DEF			BYTE	PowerOn	
-						
-	-	7	-	-	7/2	M

Description: Set write protection for definition file /_N_DEF_DIR/_N_SACCESS_DEF:

Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11171	ACCESS_WRITE_MACCESS			N01	-	
-	Write protection for _N_MACCESS_DEF			BYTE	PowerOn	
-						
-	-	7	-	-	7/2	M

Description: Set write protection for definition file /_N_DEF_DIR/_N_SACCESS_DEF:

Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

The machine data can only be written with values 0 and 1, and with the corresponding password also active.

11172	ACCESS_WRITE_UACCESS			N01	-	
-	Write protection for _N_UACCESS_DEF			BYTE	PowerOn	
-						
-	-	7	-	-	7/3	U

Description: Set write protection for definition file /_N_DEF_DIR/_N_UACCESS_DEF:

Value 0: Siemens password
Value 1: Machine OEM password
Value 2: Password of setup engineer, service
Value 3: End user password
Value 4: Keyswitch position 3
Value 5: Keyswitch position 2
Value 6: Keyswitch position 1
Value 7: Keyswitch position 0

The machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.

11200	INIT_MD			EXP, N01	IAF,IAD,IA	
-	Standard machine data loaded at next Power On			BYTE	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: A power on must be triggered after setting MD11200 $MN_INIT_MD. The function is executed and the MD reset to "0" at power on.

Meaning of the input:

Bit 0 set:

All machine data (with the exception of the memory-configuring data) will be overwritten with the compiled values at the next NCK power on.

Bit 1 set:

All memory-configuring machine data will be overwritten with the compiled values at the next NCK power on.

Bit 2 set:

The OEM machine data brought in by compile cycles will be deleted from the buffered memory at the next power on.

Bit 3 set:

All setting data will be overwritten with the compiled values at the next power on.

Bit 4 set: All option data will be overwritten with the compiled values at the next power on.

INIT_MD is automatically set to 0 at power on.

Memory configuring MDs are described in:

References: /IAD/, Installation and Setup Guide, Memory Configuration

- MD10010 $MN_ASSIGN_CHAN_TO_MODE_GROUP
- All machine data starting with "MM_"

MD 18000 - 18999 (general MD)

MD 28000 - 28999 (channel-specific MD)

MD 38000 - 38999 (axis-specific MD)

11210	UPLOAD_MD_CHANGES_ONLY			N01, N05	IAD	
-	Machine data backup of changed machine data only			BYTE	Immediately	
-						
-	-	0xFF	-	-	7/3	M

Description: This MD can be set so that only changed MD and setting data are backed up.

It can be set to output, via the RS-232 interface, either all data or only those data which differ from the default setting.

If a value is changed in a data which is stored as an array, then the complete MD array will always be output (e.g. 10000 $MN_AXCONF_MACHAX_NAME_TAB).

Select differential MD upload:

Bit0(LSB) Effectiveness of the differential upload with TEA files

0: All data are output

1: Only those MDs which have changed in comparison to the compiled values are output

Bit1 As bit 0

Bit2 Change to an array element

0: Complete array is output

1: Only those elements of an array which have changed are output

Bit3 R parameters (only for INI files)

0: All R parameters are output

1: Only those R parameters not equal to '0' are output

Bit4 Frames (only for INI files)

0: All frames are output

1: Only those frames which are not zero frames are output.

Bit5 Tool data (cutting edge parameters) (only for INI files)

0: All tool data are output

1: Only those tool data not equal to '0' are output.

Bit6 Buffered system variables ($AC_MARKER[], $AC_PARAM[] only for INI files)

0: All system variables are output

1: Only those system variables not equal to '0' are output

Bit7 Synchronized actions GUD (for INI files only)

0: All Syna GUD are output

1: Only those Syna GUD not equal to '0' are output

Active: The change in the data becomes active on the start of the upload for the next range.

11220	INI_FILE_MODE			N01, N05	G2	
-	Error response to INI file errors			BYTE	Reset	
-						
-	-	1	0	2	7/2	M

Description: If, while reading machine data files (INI files) into controls, data are read in

- that are faulty or
- do not agree with the check sum

then alarms are generated and the reading in may be aborted. The following control behaviors can be selected via machine data settings:

0: Output of an alarm, abort on detection of 1st error. (As SW versions 1 and 2).

1: Output of an alarm, continuation of execution. An alarm with the number of errors is output at the end of execution.

2: Execution continues despite possible errors. An alarm with the number of errors is output at the end of execution.

11230	MD_FILE_STYLE			N01, N05	IAD	
-	Structure of machine data backup files			BYTE	Immediately	
-						
-	-	3	-	-	7/3	M

Description: Appearance of a machine data file at 'upload'

Bit 0 (LSB): Line check sum is generated

Bit 1:

MD numbers are generated

Bit 2:

Channel axis name as field index with axis-MD in the TEA file

Bit 3:

With an NCU-link, the MDs of the LINK axes are also output.

Bit 4:

All local axes are output (even when they are not activated by MD20070 $MC_AXCONF_MACHAX_USED)

Active:

The change in the data becomes active on the start of the upload for the next area.

Default setting:

The line check sums and MD numbers are generated, but not channel names as field index with axis-MD.

11240	PROFIBUS_SDB_NUMBER			N01, N05	K4,FBU	
-	SDB number			DWORD	PowerOn	
-						
-	4	-1,-1,-1,-1	-1	7	-1/2	M

Description: Number of the system data block (SDB) used for configuring the I/Os.

11241	PROFIBUS_SDB_SELECT			N01, N05	-	
-	SDB source selection			DWORD	PowerOn	
-						
-	-	0	0	3	-1/2	M

Description: If MD11240 $MN_PROFIBUS_SDB_NUMBER > 0, SDBs are loaded directly from the directory:

MD11241 $MN_PROFIBUS_SDB_SELECT = 0: /siemens/sinumerik/sdb/...

MD11241 $MN_PROFIBUS_SDB_SELECT = 1: /addon/sinumerik/sdb/...

MD11241 $MN_PROFIBUS_SDB_SELECT = 2: /oem/sinumerik/sdb/...

MD11241 $MN_PROFIBUS_SDB_SELECT = 3: /user/sinumerik/sdb/...

11250	PROFIBUS_SHUTDOWN_TYPE			EXP, N01	G3,FBU	
-	PROFIBUS/PROFINET shutdown handling			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	M

Description: For PROFIBUS/PROFINET only:

Handling of PROFIBUS/PROFINET when shutting down NCK (NCK reset)

Value 0:

The bus is shut down directly from cyclic operation, without 'prewarning'

Value 1:

When shutting down NCK, the bus is changed to the CLEAR state for at least 20 cycles. Then, it is shut down. If this is not possible on the hardware side, the procedure described for value 2 is used instead.

Value 2:

When shutting down NCK, the bus is changed to a state where all drives are sent a zero word as control word1 and control word2 (pseudoclear) for at least 20 cycles. The bus itself remains in the Operate status.

11280	WPD_INI_MODE			N01	IAD	
-	Handling of INI files in workpiece directory			BYTE	PowerOn	
-						
-	-	0	0	1	7/2	M

Description: Processing mode of INI files in the workpiece directory:

Value = 0:

An INI file, _N_werkstück_INI, stored in the workpiece directory is executed on the first NC start after workpiece selection.

Value = 1:

INI files with the names of the selected part program and extensions are executed on the first NC start after workpiece selection

SEA,

GUD,

RPA,

UFR,

PRO,

TOA,

TMA and

CEC

.

11285	MACH_MODEL_MODE			EXP	IAD	
-	Type of file with machine model			BYTE	Immediately	
-						
-	-	0	0	1	3/3	U

Description: If 3D protection zones have been defined, creation of a machine model can be requested with this machine data.

Value 0: No model is created.

Value 1: After each change (including activation) of the 3D protection zones, a machine model is created in user directory / _N_VRML_DIR with the name _N_VRMLMODEL_WRL.

11290	DRAM_FILESYSTEM_MASK			N01	S7	
-	Select directories in DRAM			DWORD	PowerOn	
-						
-	-	0x3f	-	-	2/2	M

Description: Bit0-n = 0:

The files of the corresponding directory should be stored in SRAM

1:

The files of the corresponding directory should be stored in DRAM.

Bit0 CST directory (Siemens cycles)

Bit1 CMA directory (machine manufacturer's cycles)

Bit2 CUS directory (user cycles)

Bit3 MPF directory (main programs)

Bit4 SPF directory (subprograms)

Bit5 WPD directory (workpieces)

11291	DRAM_FILESYST_SAVE_MASK			N01	S7	
-	Back up of directories in DRAM			DWORD	PowerOn	
-						
-	-	0x3f	-	-	0/0	M

Description:

```
Bit0-n =  0:
   No backup is executed. The files stored on the NCK are lost if
   the control is switched off.
          1:
   Backup to the NC's background memory if the files are located in
   the DRAM.
Bit0      CST directory (Siemens cycles)
Bit1      CMA directory (machine manufacturer cycles)
Bit2      CUS directory (user cycles)
Bit3      MPF directory (main programs)
Bit4      SPF directory (subroutines)
Bit5      WPD directory (workpieces)
```

11292	DRAM_FILESYST_CONFIG			EXP	-	
-	Configuration of the DRAM file system			BYTE	PowerOn	
-						
-	-	0x22	-	-	0/0	S

Description:

```
Configuration of the DRAM file system.
It is not permitted to change the default value!
Bit0/1:
   Background memory for the DRAM file system
Bit4/5:
   Memory for a fast backup during editing of DRAM files.
```

11294	SIEM_TRACEFILES_CONFIG			EXP	-	
-	Configuration of the SIEM* trace file			DWORD	PowerOn	
-						
-	-	0	-	-	2/2	M

Description:

```
Configuration of the tracefiles SIEM*
  Bit0:
   Additional information about the PDUs sent is to be entered in
   _N_SIEMDOMAINSEQ_MPF for download
  Bit1:
   Additional information about the PDUs received is to be entered
   in _N_SIEMDOMAINSEQ_MPF for download
  Bit2:
   Trace of warm start and connection abort in_N_SIEMDOMAINSEQ_MPF
  Bit4:
   Additional information about the PDUs sent is to be entered in
   _N_SIEMDOMAINSEQ_MPF for upload
  Bit5:
   Additional information about the PDUs received is to be entered
   in _N_SIEMDOMAINSEQ_MPF for upload
```

11295	PROTOC_FILE_MEM			N01	-	
-	Memory type for log files			BYTE	PowerOn	
-						
-	10	1,1,1,1,1,1,1,1,1,1	0	1	1/1	M

Description: Type of memory in which the contents of log files are stored.

0: SRAM

1: DRAM area TMP

With Powerline, a DRAM file system must be configured with MD18351 $MN_MM_DRAM_FILE_MEM_SIZE if files are to be stored in DRAM.

11297	PROTOC_IPOCYCLE_CONTROL			N01	-	
-	Prevent overrun of IPO time level			BYTE	PowerOn	
-						
-	10	1,1,1,1,1,1,1,1,1,1	0	1	1/1	M

Description: Setting whether an overflow of the time level is to be prevented during the recording of data in the time level of the IPO.

If applicable, data sets are discarded when the function is active, and are not entered in the log file in order to prevent an impending overflow of the IPO time level.

This may mean that data sets are also then lost if a level overflow would not yet have occurred with the function inactive.

11298	PROTOC_PREPTIME_CONTROL			N01	-	
-	Interruption time prep time level in seconds.			DOUBLE	PowerOn	
-						
-	10	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	1/1	M

Description: Time in seconds, for which the prep time level may be blocked. If the PREP does not manage to pass through within the set time, the cyclic events are not logged. It is thus ensured that operation cannot be completely blocked by data recording.

11300	JOG_INC_MODE_LEVELTRIGGRD			N01	H1,R1	
-	INC and REF in jog mode			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	M

Description: 1: Jog mode for JOG-INC and reference point approach

JOG-INC:

When the traversing key is pressed in the required direction (e.g. +), the axis begins to traverse the set increment. If the key is released before the increment has been completely the traversed, the movement is interrupted and the axis stops. If the same key is pressed again, the axis completes the remaining distance-to-go until this is 0.

0: Continuous operation for JOG-INC and reference point approach

JOG-INC:

When the traversing key is pressed (first rising edge) the axis travels the whole set increment. If the same key is pressed again (second rising edge) before the axis has completed traversing the increment, the movement is aborted, i.e. not completed.

The differences in axis travel behavior between the jog mode and continuous operation in incremental traversing are described in detail in the relevant chapters.

For travel behavior in reference point approach see

References: /FB/, R1, "Reference Point Approach"

MD irrelevant for:

Continuous traversing (JOG continuous)

11310	HANDWH_REVERSE			N09	H1	
-	Threshold for direction change handwheel			BYTE	PowerOn	
-						
-	-	2	-	-	7/2	M

Description: Handwheel travel:

Value = 0:

No immediate travel in the opposite direction

Value > 0:

Immediate travel in the opposite direction if the handwheel is turned at least the stated number of pulses in the opposite direction.

Whether this machine data is also active for handwheel travel with DRF depends on bit10 of MD20624 $MC_HANDWH_CHAN_STOP_COND.

11320	HANDWH_IMP_PER_LATCH			N09	H1	
-	Handwheel pulses per detent position			DOUBLE	PowerOn	
-						
-	6	1.,1.,1.,1.,1.,1.	-	-	7/2	M

Description: The connected handwheels are adapted to the control in MD11320 $MN_HANDWH_IMP_PER_LATCH.

The number of pulses generated by the handwheel for each handwheel detent position has to be entered. The handwheel pulse weighting must be defined separately for each connected handwheel (1 to 3). With this adaptation, each handwheel detent position has the same effect as one press of the traversing key in incremental traversal.

Entering a negative value reverses the direction of rotation of the handwheel.

Related to:

MD31090 $MA_JOG_INCR_WEIGHT
(weighting of an increment of a machine axis for INC/manual).

11322	CONTOURHANDWH_IMP_PER_LATCH			N09	H1	
-	Contour handwheel pulses per detent position			DOUBLE	PowerOn	
-						
-	6	1.,1.,1.,1.,1.,1.	-	-	7/2	M

Description: Adaptation factor to the hardware of the contour handwheel:

Enter the number of pulses issued per detent position by the contour

handwheel.

Because of this normalization, a detent position of the contour handwheel

corresponds to one press of a key with incremental jog processes.

Sign reversal reverses the direction of evaluation.

11324	HANDWH_VDI_REPRESENTATION			N01	OEM	
-	Display of handwheel number in VDI Interface			DWORD	PowerOn	
-						
-	-	0	0	1	7/2	M

Description: The number of the handwheel is displayed in the channel/axis-specific signals of the

VDI interface:

Value = 0 :

Bit coded (1 of 3, only 3 handwheels can be displayed)

Value = 1 :

Binary coded (6 handwheels can be displayed)

11330	JOG_INCR_SIZE_TAB			EXP, N09	H1	
-	Increment size for INC/handwheel			DOUBLE	PowerOn	
-						
-	5	1.,10.,100.,1000.,10000.	-	-	7/2	M

Description: In incremental traversal or handwheel travel, the number of increments to be traversed by the axis can be defined by the user, e.g. via the machine control panel.

In addition to the variable increment size (INCvar), 5 fixed increment sizes (INC...) can also be set.

The increment size for each of these 5 fixed increments is defined collectively for all axes by entering values in JOG_INCR_SIZE_TAB [n]. The default setting is INC1, INC10, INC100, INC1000 and INC10000.

The entered increment sizes are also active for DRF.

The size of the variable increment is defined in SD41010 $SN_JOG_VAR_INCR_SIZE.

Related to:

MD31090 $MA_JOG_INCR_WEIGHT (weighting of an increment for INC/manual)

NC/PLC interface signal DB21-30 DBX41.0-.4,DBX47.0-.4,DBX53.0-.4

(Geometry axis 1-3 active machine function: INC1; ...; INC10000)

NC/PLC interface signal DB31, ... DBB65.0 - .5

(active machine function: INC1; ...; INC10000).

11346	HANDWH_TRUE_DISTANCE			N01	H1,P1,W1	
-	Handwheel default path or velocity			BYTE	PowerOn	
-						
-	-	1	0	7	7/2	M

Description: Setting the behavior for traversing with the handwheel, contour handwheel and with FDA=0:

Value = 1: (default value)

The default settings of the handwheel are path defaults. No pulses are lost. Residual axis motions occur as a result of the limitation to a maximal permissible velocity.

Value = 0:

The default settings of the handwheel are velocity defaults. The axes stop as soon as the handwheel stops. The motion is immediately braked if no pulses come from the handwheel in an interpolation cycle.

Therefore, only a short residual motion of the axes can occur as a result of the braking ramp. The handwheel pulses do not supply a path default.

Value = 2:

The default settings of the handwheel are velocity defaults. The axes are to stop as soon as the handwheel stops. The motion is immediately braked if no pulses come from the handwheel in an interpolation cycle.

However, in contrast to

value = 0 braking is not along the shortest possible path but

to the next possible point in a notional grid.

Each increment in the grid corresponds to a displacement which the selected

axis travels per handwheel detent position (see MD31090 $MA_JOG_INCR_WEIGHT and

MD11330 $MN_JOG_INCR_SIZE_TAB, MD20620 $MC_HANDWH_GEOAX_MAX_INCR_SIZE,

MD32080 $MA_HANDWH_MAX_INCR_SIZE). The start of the traversing is taken as the zero point

of the grid.

Value = 3:

The default settings of the handwheel are path defaults. If premature braking is required

on account of settings in other machine data (MD11310 $MN_HANDWH_REVERSE != 0, MD20624 $MC_HANDWH_CHAN_STOP_COND,

MD32084 $MA_HANDWH_STOP_COND), then, in

contrast to value = 1 braking is not along the shortest possible path,

but to the next possible point in a notional grid (see

value = 2).

Value = 6:

Same as value = 2, but travel does not stop at the last possible grid position in front of a limit, but at the limit.

Value = 7:

Same as value = 3, but travel does not stop at the last possible grid position in front of a limit, but at the limit.

11350	HANDWHEEL_SEGMENT			N09	H1	
-	Handwheel segment			BYTE	PowerOn	
-						
-	6	0,0,0,0,0,0	-	-	7/2	M

Description:

```
Machine data defines which
hardware segment the handwheel is connected to:
  0 = SEGMENT_EMPTY     ;no handwheel
  1 = SEGMENT_840D_HW   ;handwheel at 840D HW
  2 = SEGMENT_802DSL_HW ;handwheel at 802DSL HW
  5 = SEGMENT_PROFIBUS  ;handwheel at PROFIBUS
  7 = SEGMENT_ETHERNET  ;handwheel at Ethernet
```

11351	HANDWHEEL_MODULE			N09	H1	
-	Handwheel module			BYTE	PowerOn	
-						
-	6	0,0,0,0,0,0	0	6	7/2	M

Description:

```
Machine data specifies the hardware module to which
the handwheel is connected.
(Content dependent on MD11350 $MN_HANDWHEEL_SEGMENT):
  0 = no handwheel configured
    $MN_HANDWHEEL_MODUL =
  1    ;SEGMENT_840D_HW
  1    ;SEGMENT_802DSL_HW
  1..6 ;SEGMENT_PROFIBUS/PROFINET  ;index for MD11353
$MN_HANDWHEEL_LOGIC_ADDRESS[(x-1)]
  1    ;SEGMENT_ETHERNET
```

11352	HANDWHEEL_INPUT			N09	H1	
-	Handwheel connection			BYTE	PowerOn	
-						
-	6	0,0,0,0,0,0	0	6	7/2	M

Description:

```
Machine data which is intended to select
the handwheels connected to
a hardware module:
  0  = No handwheel configured
  1..6 = Handwheel connection to HW module/Ethernet interface
```

11353	HANDWHEEL_LOGIC_ADDRESS			N04, N10	H1	
-	Logical handwheel slot addresses			DWORD	PowerOn	
-						
-	6	0,0,0,0,0,0	0	8191	7/2	M

Description:

```
For PROFIBUS/PROFINET only:
Logical start address of the hand wheel slots if handwheels are
connected by PROFIBUS/PROFINET ($MN_HANDWHEEL_SEGMENT = 5)
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11354	HANDWHEEL_FILTER_TIME			N09	-	
s	Filter time for handwheel pulses			DOUBLE	PowerOn	
-						
-	6	0.0,0.0,0.0,0.0,0.0,0.0	0.0	2.0	7/2	M

Description: The filter time indicates the time during which the pulses from the handwheel are output to the interpolator. The values are incremented internally in interpolation cycles.

In the case of a filter time setting = 0.0, the pulses from the handwheel are output to the interpolator within a single interpolation cycle. This can cause the controlled axis to exhibit jerk during traversing.

Machine data is valid for the following types of handwheel (see 11350 $MN_HANDWHEEL_SEGMENT):

SEGMENT_ETHERNET:

- Recommended filter time: 0.2 - 0.5 s

11380	MONITOR_ADDRESS			EXP, N06	STZ	
-	Test MD for changing the NCK code or data for Safety Integrated			DWORD	Immediately	
NBUP, NDLD						
-	-	0	-	-	0/0	S

Description: Address of an NCU memory location whose content is displayed in the MD11382 $MN_MONITOR_DISPLAY_INT and 11384 $MN_MONITOR_DISPLAY_REAL.

There are no protective measures incorporated to prevent unauthorized access. That is the input address points to a memory area protected by the system or unoccupied, so refreshing the MD values MONITOR_DISPLAY_INT and MONITOR_DISPLAY_REAL causes a time-out and the NCU remains at a standstill (watchdog LED lights up)!

There is a list of permisible addresses for the test, which depends on the software version.

A restart resets the address to its starting value.

It then points to any writable and readable memory location that is not used by any other system function.

11382	MONITOR_DISPLAY_INT			EXP, N06	STZ	
-	INTEGER display of the addressed location			DWORD	Immediately	
NBUP, NDLD						
-	-	0	-	-	0/0	S

Description: INTEGER display of the addressed location SW3.2

This MD displays the content of the NCU memory location that is defined in MD11380 $MN_MONITOR_ADDRESS. The displayed values contains the four consecutive bytes from the stated address, whereby the first byte is on the extreme right and the fourth on the extreme left.

This MD is a display MD whose content is read anew on every display refresh. Writing to this MD is ignored (without alarm).

11384	MONITOR_DISPLAY_REAL			EXP, N06	STZ	
-	REAL display of the addressed location			DOUBLE	Immediately	
NBUP, NDLD						
-	-	0.0	-	-	0/0	S

Description: REAL display of the addressed location SW3.2

This MD displays the content of the NCU memory location that is defined in MDMD11380 $MN_MONITOR_ADDRESS. The displayed value interprets the eight consecutive memory locations from the stated address as a floating point number with double accuracy (64 bit IEEE format). 0.0 is displayed if this value does not correspond to a valid floating point number.

This MD is a display MD whose content is read anew on every display refresh. Writing to this MD is ignored (without alarm).

11386	MONITOR_INPUT_INT			EXP, N06	STZ	
-	INTEGER input for the addressed location			DWORD	Immediately	
NBUP, NDLD						
-	-	0	-	-	0/0	S

Description: INTEGER input for addressed location, SW3.2

The value is written with the aid of MD11390 $MN_MONITOR_INPUT_STROBE into the address selected with MD11380 $MN_MONITOR_ADDRESS. The 4 bytes from the stated address are taken over by writing the value 1 in the MD11390 $MN_MONITOR_INPUT_STROBE.

In so doing, the byte moves to the extreme right of the memory location MONITOR_ADDRESS, the byte to its left into the memory location MONITOR_ADDRESS+1, etc.

11388	MONITOR_INPUT_REAL			EXP, N06	STZ	
-	REAL input for addressed location			DOUBLE	Immediately	
NBUP, NDLD						
-	-	0.0	-	-	0/0	S

Description: REAL input for addressed location, SW3.2

The value is written with the aid of MD11390 $MN_MONITOR_INPUT_STROBE into the address selected with MD11380 $MN_MONITOR_ADDRESS. The 8 bytes from the stated address are taken over by writing the value 2 in the MD11390 $MN_MONITOR_INPUT_STROBE.

In so doing, the input floating point number is converted into 64 bit IEEE format.

11390	MONITOR_INPUT_STROBE			EXP, N06	STZ	
-	Overwrite the addressed location with MONITOR_INT/REAL			BYTE	Immediately	
NBUP, NDLD						
-	-	0	0	2	0/0	S

Description: Overwriting the addressed location with MD11386 $MN_MONITOR_INPUT_INT/REAL or MD11388$MN_MONITOR_INPUT_REAL SW3.2

An input into this MD takes over the content of the MD11386 $MN_MONITOR_INPUT_INT or the MD11388 $MN_MONITOR_INPUT_REAL. The input value decides which data is taken over:

0: No action

1: Content of MD11386 $MN_MONITOR_INPUT_INT is written in four NCU bytes from MD11380 $MN_MONITOR_ADDRESS.

2: Content of MD11388 $MN_MONITOR_INPUT_REAL is written in eight NCU bytes from MD11380 $MN_MONITOR_ADDRESS.

The content of MONITOR_INPUT_STROBE is reset to 0 after the take-over (no action). A new input can therefore be made immediately.

In order to familiarize oneself with this function, one should first leave MD11380 $MN_MONITOR_ADDRESS at its default value. One can then write data without causing damage.

Examples:

MONITOR_INPUT_INT = 55AA

MONITOR_INPUT_STROBE = 1

=> in MONITOR_DISPLAY_INT appears 55AA

MONITOR_INPUT_REAL = 1.234

MONITOR_INPUT_STROBE = 2

=> in MONITOR_DISPLAY_REAL appears 1.234

Caution!!!

Writing data to unknown addresses can even destroy the NCK system program! That may have unforeseen consequences (danger to machine and people!). If the machine and those present survive such an action undamaged, the system program can usually be restored by power off/on.

11398	AXIS_VAR_SERVER_SENSITIVE			EXP	B3	
-	Axis-Var server response			BYTE	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: The axis-variable server supplies the data for the OPI blocks SMA/SEMA, SGA/SEGA and SSP.

If no value can be supplied for an axis (e.g. because the axis is a link axis) then a default value (usually 0) is returned.

For debugging purposes, this machine data can be used to set the axis-var-server to sensitive so that an error message is returned instead of a default value.

0: default value

1: error message

11400	TRACE_SELECT			EXP	-	
-	Activation of internal trace functions			DWORD	PowerOn	
-						
-	-	0	-	-	0/0	S

Description: Bit string for activating internal trace functions for NCK time measurements, analog output of variables etc.

11405	TCI_TRACE_ACTIVE			EXP	-	
-	Activation of internal task trace function			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	0/0	S

Description: Control the activation of the TCI interface for the NRKpro. It will activate the tci and kernel task traces modules.

11410	SUPPRESS_ALARM_MASK			EXP, N06	D1,M3,K3,S1,V1,W1	
-	Mask for support of special alarm outputs			DWORD	PowerOn	
-						
-	-	0x108000	0	0xFFFFFFFF	7/2	M

Description: Mask for suppressing special alarm outputs

Bit set: The corresponding alarm (warning) is NOT triggered.

Bit 0:

Alarm 15110 "Channel %1 block %2 REORG not possible"

Bit 1:

Alarm 10763 "Channel %1 block %2. The path component of the block in the contour plane is zero"

Bit 2:

Alarm 16924 "Channel %1 Caution: Program testing can modify tool/magazine data"

--> Note: The alarm is only a message alarm

Bit 3:

Alarm 22010 "Channel %1 spindle %2 block %3. Actual gear stage does not correspond to set gear stage"

Bit 4:

Alarm 17188 "Channel %1 D number %2 with tool T nos. %3 and %4 defined"

Alarm 17189 "Channel %1 D number %2 of the tools in magazines/ magazine locations %3 and %4 defined". The two alarms are of equal status and are only message alarms.

Bit 5:

Alarm 22071 "TO unit %1 tool %2 duplo no. %3 is active but not in the active wear grouping." The alarm is only a message alarm.

Bit 6:

Alarm 4027 "NOTICE! MD %1 was also changed for the other axes in the axis container %2 "

Alarm 4028 "NOTICE! The axial MDs in the axis container will be aligned on the next runup "

Bit 7:

Alarm 22070 "TO unit %1 please change tool T= %2 to magazine. Repeat data backup". The alarm is only a message alarm.

Bit 8:

Alarm 6411 "Channel %1 tool %2 with duplo no. %3 has reached tool prewarning limit"

Alarm 6413 "Channel %1 tool %2 with duplo no. %3 has reached tool monitoring limit."

The two alarms are only message alarms. They occur during program execution.

Bit 9:

Alarm 6410 "TO unit %1 tool %2 with duplo no. %3 has reached tool prewarning limit ."

Alarm 6412 "TO unit %1 tool %2 with duplo no. %3 has reached tool monitoring limit ".

The two alarms are only message alarms. They occur as a result of an operator action.

Bit10:

Alarm 10604 "channel %1 block %2 "Thread lead increase too high"

Alarm 10605 "channel %1 block %2 "Thread lead decrease too high"
Bit 11:
Alarm 14088 "Channel 51 block %2 axis %3 doubtful position".
Bit 12:
obsolete (Alarm 10607)"
Bit13:
Alarm 10704 " channel %1 block %2 Protection area monitoring is not
guaranteed."
Bit14:
Alarm 21701 "Measuring reactivated too soon (<2 IPO cycles)"
Bit15:
Alarm 5000 "Communication order cannot be executed"
Bit16:
Alarm 21600 "Monitoring active for ESR"
Bit17:
Alarm 16945 "Channel %1 action %2<ALNX> is delayed until block end"
Note: The alarm is only a message alarm.
Bit18:
Alarm 10750 "Channel %1 block %2 Activation of the tool radius compensation without tool number"
Bit19: Alarm 17193 "Channel %1 block %2 The active tool ist no longer at tool holder no./spindle no. %3, program %4"
Bit20:
Alarm 2900 "Reboot is delayed"
Bit21:
Alarm 22012 "Channel %1 block %2. Leading axis %3 is in simulation mode"
Alarm 22013 "Channel %1 block %2. Following axis %3 is in simulation mode"
Alarm 22014 "Channel %1 block %2. The dynamics of leading axis %3 and following axis %4 are very different"
Alarm 22040 "Channel%1 Block %3 Spindle %2 not referenced with zero mark" is no longer checked (cyclically) with
Bit21 set after power ON of the closed loop position control.
Bit22:
Alarm 26080 "Channel %1 retraction position of axis %2 not programmed or invalid"
Alarm 26081 "Channel %1 single axis trigger axis %2 is triggered, but axis is not PLC controlled"
Bit23:
Alarm 16949 "Correspondence between marks of channel %1 and channel %2
is invalid"
Bit24:
Alarm 16950 "Channel %1 search run with holding block"
Bit25:
Alarm 22016 "Channel %1 block %2 following spindle %3 in range of reduced acceleration capacity"
Bit26:

Alarm 22015 "Channel %1 block %2 following spindle %3 no dynamic response for additional motion"

Bit27:

Alarms 16112 and 22030 "Channel %1 block %2 following spindle %3 impermissible programming"

Bit28:

Alarm 26083 "Channel %1 ESR for PLC controlled axis %2 was triggered"

Bit29:

Alarm 16772 "Channel %1 block %2 axis %3 is following axis, coupling is opened"

Bit30:

Alarm 16600 "Channel %1 block %2 spindle %3 gear stage change not possible"

Bit31:

Alarm 16774 "Channel %1 axis %2 synchronization aborted"

11411	ENABLE_ALARM_MASK			EXP	D1,K1	
-	Activation of warnings			DWORD	Reset	
-						
-	-	0x0	0	0xFFFFFFFF	7/2	M

Description: Mask for generating alarms that are normally suppressed.

Bit set:Alarms of this alarm group are output.

Bit not set:Alarms of this alarm group are not output.

Bit Hex.Meaning
value

===

0: 0x1Alarms that have SHOWALARMAUTO as the alarm response are output.

1: 0x2Alarms that have SHOWWARNING as the alarm response are output.

2: 0x4Alarm 22280 "Thread power up path too short" is output.

3: 0x8Alarms that are triggered by the NCU LINK MODULE are switched on.

4: 0x10Alarm 10883 "Chamfer or rounding must be shortened" allowed.

5: 0x20Alarm 20096 "Brake test aborted" is output.

6: 0x40Alarm 16956 "Program cannot be started because of global start disable" is output.

Alarm14005 "Program cannot be started because of program-specific start disable" is output. Alarm can only be switched on in channel status RESET, in all other channel states it is output without conditions.

7: 0x80Alarm 16957 "Stop delay range is suppressed" is output.

8: 0x100Alarm 1011 fine coding150019 or 150020 "Incorrect axis number in the LINK".

9: 0x200Alarm 22033 Diagnostics 1 to 6 for "Track synchronism" (linkages).

10: 0x400Alarm 15122 "PowerOn after Powerfail: %1 data were restored, thereof %2 machine data, %3 errors" is output.

11: 0x800Alarms 10722, 10723, 10732 or 10733 are output instead of alarms 10720, 10721, 10730 or 10731.

12: 0x1000Alarm 22033 diagnostics greater than or equal to 7 for "Track synchronism" (linkages)

11412	ALARM_REACTION_CHAN_NOREADY			EXP, N01	D1	
-	Alarm response CHAN_NOREADY permitted			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: This MD is used for compatibility with the PLC systems older than SW4.1.

If this MD is not set, the behavior implemented before SW4.1 (configured alarm reaction) is set

With SW 4.1 and higher, it is possible to set signal CHANNEL_NOREADY on the PLC in response to alarms.

If this MD is not set, then the alarm handler internally re-configures BAG_NOREADY into CHAN_NOREADY.

11413	ALARM_PAR_DISPLAY_TEXT			EXP, N01	D1	
-	Alarm parameter as text output			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	0/0	S

Description: If the MD is set, texts can be output as alarm parameters instead of numbers.

11414	ALARM_CLR_NCSTART_W_CANCEL			EXP, N01	D1	
-	Clear NCSTART alarms with CANCEL			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: If this MD is set, then alarms that have ClearInfo=NCSTART are cleared by the Alarm Cancel button as well as by NC-Start.

If this MD is not set, then NCSTART alarms are not cleared by Cancel.

The purpose of this MD is to provide compatibility with system behavior.

11415	SUPPRESS_ALARM_MASK_2			EXP, N06	-	
-	Masking of alarm outputs			DWORD	PowerOn	
-						
-	-	0x8	-	-	7/2	M

Description:

```
Mask for suppressing special alarm outputs
Bit set:Corresponding alarm (warning) is NOT triggered.
Bit  Hex. Meaning
   value
=================================================================
===================
0:   0x116773  "Channel %1 axis %3 is following axis. The axis/
spindle disables for the leading axes differ."
1:   0x22100  "NCK battery warning level reached"
      2101  "NCK battery alarm"
      2102  "NCK battery alarm"
2:   0x42120 "NCK fan alarm" (ineffective on modules which do not
require a fan by design)
3:   0x815120 "PowerFail: Show buffer overflow"
4:   0x1015187 "Error during execution of PROGEVENT file"
5:   0x2015188 "Error during execution of ASUB file"
6:   0x4026120 "$AA_ESR_ENABLE = 1 and axis is to become neutral"
      26121 "Axis is neutral and $AA_ESR_ENABLE =1 is to be set"
      26123 "$AA_ESR_ENABLE = 1 is to be set, but $MA_ESR_REACTION
   is not set"
      26124 "$AC_TRIGGER triggered, but axis is neutral, ESR
   ignores this axis"
7:   0x80:10724 "Software limit violated at start of block"
      10734 "Operating range limit violated at start of block"
      10737 "Work (WCS) operating range limit violated at start of
   block"
8:   0x100:14008 "WRITE command in /_N_EXT_DIR"
      10734 "Operating range limit violated at start of block"
      10737 "Work (WCS) operating range limit violated at start of
   block"
9:   0x20014006 "Invalid program name"
10:  0x400:4006  "Maximum number of axes that can be activated
exceeded"
11:  0x80016017 "LIFTFAST ignores this axis, as it cannot be used
for the current axis type"
12:  0x100022025 "Channel %1 Block %2 Following axis/spindle %3
Synchronism (2): Fine tolerance exceeded"
                - Exception: Alarm is generated if CPMALARM[FAx]
   bit 8 = 0 is programmed for the corresponding following axis/
   spindle.
      22026 "Channel %1 Block %2 Following axis/spindle %3 Synchro-
   nism (2): Coarse tolerance exceeded"
                - Exception: Alarm is generated if CPMALARM[FAx]
   bit 9 = 0 is programmed for the corresponding following axis/
   spindle.
13:  0x200022001 "Braking ramp longer than Stop D time."
           22002 "Braking ramp longer than Stop D time with gear
```

stage %3 reason %4"
14: 0x400016963 "ASUB start refused."
15: 0x800021751,"Limit velocty %2 deg/min on modulo axis %1 exceeded (defective cam output)"
21752,"Axis %1 minimum cam width cam %3 undershot at curr. velocity %2 "
16: 0x800017212 "Channel %1 Tool management: Load manual tool %3, Duplo no. %2 to spindle/toolholder"
17214 "Channel %1 tool management: Unload manual tool %3 from spindle/toolholder %2"
17215 "Channel %1 tool management: Unload manual tool %3 from buffer location %2"
17216 "Channel %1 unload manual tool from toolholder %4 and load manual tool %3 %2"

11420	LEN_PROTOCOL_FILE			N01	PGA	
-	Size of protocol files (kB)			DWORD	PowerOn	
-						
-	-	1	1	1000000	7/2	M

Description: Blocks from the part program can be stored in a file with the WRITE command. The length of the log file is limited. If this maximum length is exceeded, the WRITE command produces an error.

11450	SEARCH_RUN_MODE			EXP, N01	K1,TE3,N4,H2,Z1	
-	Parameterization for search run			DWORD	PowerOn	
-						
-	-	0	0	0x3F	7/2	M

Description: The behavior during the action blocks after search run can be affected by the following bits:

Bit 0 = 0:

Machining is stopped after loading of the last action block after search run, the NC/PLC interface signal DB21-30 DBX32.6 (last action block active) and alarm 10208 is output.

Bit 0 = 1:

Machining is stopped with the loading of the last action block after search run, and the NC/PLC interface signal DB21-30 DBX32.6 (last action block active) is set. Alarm 10208 is not output until the PLC requests it by setting the NC/PLC interface signal DB21-30 DBX1.6 (PLC action finished).

Usage:

Starting an ASUB from the PLC after search run.

The message to the operator that another NC start is required in order to continue with the program is not to be displayed until after the end of the ASUB.

Bit1 = 1

Automatic ASUB start after output of the action blocks (see also MD11620 $MN_PROG_EVENT_NAME). Alarm 10208 is not output until the ASUB has finished.

Bit2 = 0:

Spindle: The auxiliary functions are output in the action blocks

Bit2 = 1:

The output of the auxiliary functions in the action blocks is suppressed. The spindle programming collected by search run can be output at a later point in time (e.g. in an ASUB).

The program data for this are stored in the following system variables:

$P_SEARCH_S,
$P_SEARCH_SDIR,
$P_SEARCH_SGEAR,
$P_SEARCH_SPOS,
$P_SEARCH_SPOSMODE.

Bit 3 = 1:

The cascaded search run is disabled (default setting: release).

Cascaded search run means that the search run is restarted immediately after finding a search target.

Bit 4:Reserved

Bit 5 = 0:

During block search on a nibbling block the 1st nibbling stroke is not executed.

Bit 5 = 1:

During block search on a nibbling block a punching stroke is triggered at block start (1st nibbling stroke).

11460	OSCILL_MODE_MASK			N09	P5	
-	Mode mask for asynchronous oscillation			DWORD	PowerOn	
-						
-	-	0x0	0	0xFFFF	7/2	M

Description: Bit 0

Value 1

In the case of block search, the oscillation movement is started immediately after NC start, i.e. during approach to approach position, provided it has been activated in the program section being processed.

Value 0

(default value)

The oscillation movement is not started until the approach position is reached.

11470	REPOS_MODE_MASK			EXP, N01	K1	
-	Repositioning properties			DWORD	PowerOn	
-						
-	-	0x8	0	0xFFFF	7/2	M

Description: This bit mask can be used to set the behavior of the control during repositioning.

Bit no. Meaning when bit set

----

0 (LSB)

The dwell time is continued in the residual block from where it was interrupted. (If the bit is not set, the dwell time is repeated completely).

1 Reserved

2 When the bit is set, the repositioning of individual axes can be prevented or delayed via the VDI interface.

3 When the bit is set, positioning axes are repositioned in the approach block during search run via program test.

4 As 3, but after every Repos, not only during search run.

5 When the bit is set, changed feeds and spindle speeds already become valid in the residual block, otherwise not until the following block.

6 When the bit is set, neutral axes and positioning spindles are repositioned after SERUPRO as command axes in the approach block.

7 The bit changes the behavior of the VDI-AXIN interface signal "Repos Delay". The level of "Repos Delay" is read if REPOSA is interpreted. Axes that are neither geo nor orientation axes are then excluded from the REPOS, that is REPOS does NOT move these axes.

11480	PLC_OB1_TRACE_DEPTH			EXP, N03, N09	-	
-	Buffer depth of PLC trace data at OB1			DWORD	PowerOn	
-						
-	-	2	2	8	2/2	M

Description: Buffer depth of PLC trace data at OB1.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB1" are collected once per complete PLC scan, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the total number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

A good value to start with is one more than MD10074 $MN_PLC_IPO_TIME_RATIO.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

This single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from one another). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11481	PLC_OB35_TRACE_DEPTH			EXP, N03, N09	-	
-	Buffer depth of PLC trace data at OB35			DWORD	PowerOn	
-						
-	-	2	2	8	2/2	M

Description: Buffer depth of PLC trace data at OB35.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB35" are collected every time the PLC timer interrupts, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

A good value to start with is one more than the number of PLC timer interrupts expected to occur every IPO cycle.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

The single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from each other). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11482	PLC_OB40_TRACE_DEPTH			EXP, N03, N09	-	
-	Buffer depth of PLC trace data at OB40			DWORD	PowerOn	
-						
-	-	2	2	8	2/2	M

Description: Buffer depth of PLC trace data at OB40.

Multiple values of PLC data are buffered, between the time of collection in the PLC and the time of inspection in NCK. Variables traced at "OB40" are collected just when the PLC receives the special, programmably initiated OB40 interrupt from NCK, but can only be inspected once per IPO cycle.

The buffer size must accomodate at least one more value than the number of buffered values to be inspected. This is to prevent NCK from inspecting a value that the PLC is in the process of collecting.

If the OB40 interrupt is issued less frequently than once per IPO cycle, then the OB40 buffer depth should be 2. Otherwise it should be one more than the largest number of interrupts expected during any one IPO cycle.

The larger the buffer depth, the fewer PLC variables that can be traced, because there is a single, small, fixed pool of data slots for sending data samples from the PLC to NCK (64 data slots). Every PLC variable being traced is allocated as many data slots from the pool as the value of the buffer depth.

The single pool of data slots is shared by data collected at OB1, OB35, and OB40 (even though the buffer depths of OB1, OB35, and OB40 can be configured to be different from each other). It is also shared by all concurrent users of trace, even though the users might have no knowledge of one another.

11500	PREVENT_SYNACT_LOCK			N01, N09, -	S5,FBSY	
-	Protected synchronized actions			DWORD	PowerOn	
-						
-	2	0,0	0	255	7/2	M

Description: First and last IDs of a protected synchronized action area.

Synchronized actions with ID numbers in the protected area can no longer be

- overwritten
- disabled (CANCEL)
- locked (LOCK)

once they have been defined. Furthermore, protected synchronized actions cannot be locked by the PLC (LOCK). They are shown at the interface to the PLC as non-lockable.

Note:

The protection should be suspended while creating the synchronized actions to be protected, as otherwise a Power On will be necessary after every change in order to be able to redefine the logic. There is no area of protected synchronized actions with 0.0. The function is disabled. The values are read as absolute values, and over and under values can be given in any order.

11510	IPO_MAX_LOAD		N01, N05	-	
%	Max. permitted IPO load		DOUBLE	PowerOn	
-					
-	-	0.00	0.0	100.0	7/2	M

Description: Enable utilization analysis via synchronized actions.

This MD11510 $MN_IPO_MAX_LOAD sets the IPO computing time (in % of the IPO cycle) after which the variable $AN_IPO_LOAD_LIMIT is to be set to TRUE. The variable is reset to FALSE if the value falls below this after having once exceeded it.

This diagnostics function is disabled if the machine data is 0.

11550	STOP_MODE_MASK			N01	V1	
-	Defines the stop behavior.			DWORD	PowerOn	
-						
-	-	0	0	0x1	7/2	M

Description: This MD describes the stop behavior of the NCK under certain conditions:

Bit no. Meaning

Bit 0 == 0 :=

No stop if G codes G331/G332 are active and a path motion or G4 has also been programmed.

Bit 0 == 1 :=

Same behavior as until SW version 6.4, i.e. a stop is possible during G331/G332.

Bits 1.....15

Not assigned

11600	BAG_MASK			N01	K1,Z1	
-	Defines the mode group behavior			DWORD	PowerOn	
-						
-	-	0	0	0x3	7/2	M

Description: This MD describes the effect of the VDI signals on the channels of a mode group in respect of ASUBs and interrupt routines.

```
Bit no.  Hexadec.   Meaning when bit set
         value
Bit0:    0x0        Normal response to mode group signals in all
channels of the mode group (as SW 3)
                    All channels switch into a program operating
mode on interrupt.
Bit0:    0x1       No response to other mode group VDI signale in
the channel in which an
                    interrupt handling (ASUB) is running. (BAG-
RESET, BAG-STOP. individual types
                    A and B, mode selection)
Bit1:    0x1       There is an operating mode changeover only in
those channels
                    which have received an interrupt request.
                    (Only when bit 0 is set!)
```

11602	ASUP_START_MASK			N01, -	K1,M3,TE3,TE7	
-	Ignore stop conditions for ASUB			DWORD	PowerOn	
-						
-	-	0	0	0xf	7/2	M

Description: This machine data defines which stop reasons are to be ignored on an ASUB start. The ASUB is started or the following stop reasons are ignored:

Bit 0 :

STOP reason: STOP key, M0 or M01

An ASUB is started immediately if NCK is in RESET status (or JOG mode) (no ASUB can be started in RESET/JOG without this bit).

Bit 1 :

Start allowed even if not all axes have been referenced yet.

Bit 2:

Start allowed even if a read-in disable is active;in other words, the blocks of the ASUB program are loaded and executed immediately. This disables machine data IGNORE_INHIBIT_ASUP. The NCK behavior corresponds to the machine data content of IGNORE_INHIBIT_ASUP== FFFFFFFF.

If the bit is not set:

The ASUB is selected internally but is not processed until the read-in disable is canceled.

The assignment of the machine data IGNORE_INHIBIT_ASUP is evaluated.

If IGNORE_INHIBIT_ASUP = 0 also applies, then an ASUB is triggered internally immediately but the blocks of the ASUB program are not loaded until the read-in disable is canceled.

The path is decelerated immediately when the ASUB is triggered (except with option BLSYNC).

The read-in disable is set once more in the ASUB program.

Bit 3:

Notice:

The following function can always be activated in single-channel systems. Multi-channel systems require bit1 in MD11600 $MN_BAG_MASK in addition. The function is active o_n_l_y for those ASUBs that were activated from the Abort program status (Reset channel status). The function is not active in multi-channel systems without MD11600 $MN_BAG_MASK bit1.

If an ASUB is started automatically from JOG, the user may stop in the middle of the ASUB program. JOG mode is displayed continuously for the user. With bit 3 set, the user may jog in this situation. This is not possible without bit 3. In this case mode change is locked with alarm 16927. By pressing the Start key, the user can continue the ASUB program. As long as the ASUB program is running, the user is naturally not able to jog. After ASUB program end the user may jog again.

Bits 4 to 15:Reserved

Related to:

MD11604 $MN_ASUP_START_PRIO_LEVEL

11604	ASUP_START_PRIO_LEVEL			N01, -	K1,TE3,TE7	
-	Priorities from which 'ASUP_START_MASK' is effective			DWORD	PowerOn	
-						
-	-	0	0	128	7/2	M

Description: This machine data defines the ASUB priority from which MD11602 $MN_ASUP_START_MASK is to be applied. MD11602 $MN_ASUP_START_MASK is applied from the level specified here up to the highest ASUB priority level 1.

Related to:

MD11602 $MN_ASUP_START_MASK

11610	ASUP_EDITABLE			N01	K1	
-	Activation of a user-specific ASUB program			DWORD	PowerOn	
-						
-	-	0	0	0x7	7/2	M

Description: This MD determines whether user-specific routine: _N_ASUP_SPF stored in directory _N_CUS_DIR/ _N_CMA_DIR is to be used to process RET and REPOS. The user ASUB is searched for first in _N_CUS_DIR.

Value: Meaning:

0 Routine _N_ASUP_SPF is not activated for either RET or REPOS.

Bit0 = 1User-specific routine _N_ASUP_SPF is executed for RET, the routine supplied by the system is executed for REPOS.

Bit1 = 1User-specific routine _N_ASUP_SPF is executed for REPOS, the routine supplied by the system is executed for RET

Bit0= + bit1 = 3User-specific routine _N_ASUP_SPF is executed for both RET and REPOS

Bit2 = 1User ASUB _N_ASUP_SPF is searched for first in _N_CMA_DIR

Related to:

MD11612 $MN_ASUP_EDIT_PROTECTION_LEVEL

References:

/IAD/ "Installation and Setup Guide"

11612	ASUP_EDIT_PROTECTION_LEVEL			N01	K1	
-	Protection level of the user-specific ASUB program			DWORD	PowerOn	
-						
-	-	2	0	7	7/2	M

Description: Protection level of the user-specific ASUB program for RET and/or REPOS

The data is active only if MD11610 $MN_ASUP_EDITABLE is set to a value other than 0.

This machine data defines the protection level of the program _N_ASU_CUS.

MD irrelevant for:

MD11610 $MN_ASUP_EDITABLE set to 0

Related to:

MD11610 $MN_ASUP_EDITABLE

11620	PROG_EVENT_NAME			EXP, N12	K1	
-	Program name for PROG_EVENT			STRING	PowerOn	
-						
-	-		-	-	7/2	M

Description:

```
Name of the user program called by the "event-driven program
calls" and "automatic ASUB start after block search" functions
(MD11450 $MN_SEARCH_RUN_MODE, bit 1). _N_PROG_EVENT_SPF is the
default setting.
The default setting is activated if MD11620 $MN_PROG_EVENT_NAME
includes a blank string.
If the machine data does not contain a blank string, then the syn-
tax of the string is checked as in the case of a subprogram iden-
tifier. This means that the first two characters must be letters
(not numbers) or underscores. If this is not the case, alarm 4010
is output during ramp-up.
The program must be located in a cycle directory. When it is
called, the search runs through the cycle directories in accor-
dance with the setting of $MN_PROG_EVENT_PATH.
The prefix (_N_) and the suffix (_SPF) of the program name are
added automatically if they have not been specified.
```

11622	PROG_EVENT_PATH			N01	-	
-	Call path for PROG_EVENT			BYTE	PowerOn	
-						
-	-	3	0	3	7/2	M

Description:

```
Path on which the user program set with $MN_PROG_EVENT_NAME is
called in response to an event-driven program call configured with
$MC_PROG_EVENT_MASK:
0:   /_N_CMA_DIR
1:   /_N_CUS_DIR
2:   /_N_CST_DIR
3:          Search path in the sequence /_N_CUS_DIR, /_N_CMA_DIR,
and  /_N_CST_DIR
```

11640	ENABLE_CHAN_AX_GAP			N01, N11	K2	
-	Allow channel axis gaps in AXCONF_MACHAX_USED			DWORD	PowerOn	
-						
-	-	0x0	0	0x1	2/2	M

Description:

```
Bit0 = 1
Machine data allows configuration of channel axis gaps in the
MD20070 $MC_AXCONF_MACHAX_USED.
Permits following MD assignment:
$AXCONF_MACHAX_USED[0] = 1     ; 1st  MA is 1st axis in channel
$AXCONF_MACHAX_USED[1] = 2     ; 2nd MA is 2nd axis in channel
$AXCONF_MACHAX_USED[2] = 0     ; Channel axis gap
$AXCONF_MACHAX_USED[3] = 3     ; 3rd MA is 3rd axis in channel
$AXCONF_MACHAX_USED[4] = 0
C A U T I O N:
(BIT0 set with MD20070 $MC_AXCONF_MACHAX_USED):
   If a geo axis is placed in a channel axis gap with MD20050
   $MC_AXCONF_GEOAX_ASSIGN_TAB[1]= 3, the control responds as with
   MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[1]= 0. This eliminates the
   geo axis!
Transformation machine data must not be assigned a channel axis
number specified as a gap.
BIT1 - BIT31:  not used.
Related to:
   MD20080 $MC_AXCONF_CHANAX_NAME_TAB,
   MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB,
   MD20060 $MC_AXCONF_GEOAX_NAME_TAB
   MD20070 $MC_AXCONF_MACHAX_USED
   MD24... $MC_TRAFO_AXES_IN_...
   MD24... $MC_TRAFO_GEOAX_ASSIGN_TAB_...
```

11660	NUM_EG			N09	M3	
-	Number of possible 'electronic gear units'			BYTE	PowerOn	
-						
-	-	0	-	-	1/1	M

Description:

```
The size of memory space specified here is reserved in DRAM for
implementing the function "Electronic Gear". The number of EG axis
groupings stated here is the maximum number that can be defined
simultaneously with EGDEF.
```

11717	D_NO_FCT_CYCLE_NAME			EXP, N12, N07	K1	
-	Subroutine name for D function replacement			STRING	PowerOn	
-						
-	-		-	-	7/2	M

Description: Cycle name for replacement routine of the D function.

If a D function is programmed in a part program block, then, depending on machine data MD10717 $MN_T_NO_FCT_CYCLE_NAME, MD10719 $MN_T_NO_FCT_CYCLE_MODE and MD10718 $MN_M_NO_FCT_CYCLE_PAR, the MD subprogram defined in MD11717 $MN_D_NO_FCT_CYCLE_NAME is called.

The programmed D number can be polled in the cycle via system variable $C_D / $C_D_PROG.

MD11717 $MN_D_NO_FCT_CYCLE_NAME is only active in Siemens mode (G290).

No more than one M/T/D function replacement can be active per part program line.

A modal subprogram call must not be programmed in the block with the D function replacement. Furthermore, neither subprogram return nor part program end are allowed.

In the event of a conflict alarm 14016 is output.

11750	NCK_LEAD_FUNCTION_MASK			N09	-	
-	Functions for master value coupling			DWORD	NEW CONF	
-						
-	-	0x00	0	0x10	1/1	M

Description: Special functions of the master value coupling are set with this MD.

The MD is bit-coded, the following bits are assigned:

Bits 0-3:

reserved

Bit 4 == 0:

the following axis of a master value coupling decelerates independently on NC or mode group stop or channel-specific feed disable

Bit 4 == 1:

the following axis of a master value coupling does not decelerate independently on NC or mode group stop or channel-specific feed disable

Bits 5-31:

reserved

11752	NCK_TRAIL_FUNCTION_MASK			N09	-	
-	Functions for coupled motion			DWORD	NEW CONF	
-						
-	-	0x200	0	0x210	1/1	M

Description: Special functions for coupled motions are set with this MD.

The MD is bit-coded; the following bits are assigned:

Bits 0-3:

reserved

Bit 4 = 0:

the following axis of a coupled axis grouping activated by a synchronized action decelerates independently on NC or mode group stop or channel-specific feed disable

Bit 4 = 1:

the following axis of a coupled axis grouping activated by a synchronized action does not decelerate independently on NC or mode group stop or channel-specific feed disable

Bit 5-31:

reserved

11754	COUPLE_CYCLE_MASK			EXP, N09	-	
-	Replacement of coupling language commands by machining cycles			DWORD	PowerOn	
-						
-	-	0x7F	0	0x7F	1/1	M

Description: This machine data defines which predefined procedures for axis-spindle coupling are replaced by machining cycles.

This MD is bit-coded; the following bits are assigned:

Bit 0 == 0:

The predefined procedures EGDEL, EGOFC, EGOFS, EGON, EGONSYN, and EGONSYNE are executed

Bit 0 == 1:

The predefined procedures EGDEL, EGOFC, EGOFS, EGON, EGONSYN, and EGONSYNE are replaced by calling machining cycles

Bit 1 == 0:

The predefined procedures LEADON and LEADOF are executed

Bit 1 == 1:

The predefined procedures LEADON and LEADOF are replaced by calling machining cycles

Bit 2 == 0:

The predefined procedures TRAILON and TRAILOF are executed

Bit 2 == 1:

The predefined procedures TRAILON and TRAILOF are replaced by calling machining cycles

Bit 3 == 0:

The predefined procedures COUPDEF, COUPDEL, COUPOF, COUPOFS, COUPON, COUPONC, and COUPRES are executed

Bit 3 ==1:

The predefined procedures COUPDEF, COUPDEL, COUPOF, COUPOFS, COUPON, COUPONC, and COUPRES are replaced by calling machining cycles

Bit 4 == 0:

The predefined procedures LEADON and LEADOF are executed in synchronized actions

Bit 4 == 1:

The predefined procedures LEADON and LEADOF are replaced in synchronized actions by calling machining cycles as technology cycles

Bit 5 == 0:

The predefined procedures TRAILON and TRAILOF are executed in synchronized actions

Bit 5 == 1:

The predefined procedures TRAILON and TRAILOF are replaced in synchronized actions by calling machining cycles as technology cycles

Bit 6 == 0:

NCU link: Synchronism signals for classic couplings

Bit 6 == 1:

NCU link: Synchronism signals for generic coupling

11756	NCK_EG_FUNCTION_MASK			N09	-	
-	Functions for Electronic Gear			DWORD	NEW CONF	
-						
-	-	0x0	0	0x2F	1/1	M

Description:

```
This MD is used to set special functions of Electronic Gear (EG).
The MD is bit-coded, the following bits are occupied:
Bit 0 - 4:
   reserved
Bit 5 = 0:
   Positions indicated in EGONSYN and EGONSYNE are evaluated
   according to setting G700 or G710 inch or metric that is valid
   in the currently machined part program block.
Bit 5 = 1
   Positions indicated in EGONSYN and EGONSYNE are evaluated in
   the basic system involved.
Bit 6 - 31:
   reserved
```

1.3.2 Override switch settings

12000	OVR_AX_IS_GRAY_CODE			EXP, N10	V1,Z1	
-	Axis feedrate override switch Gray-coded			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	M

Description:

```
1This machine data is used to adapt the axis feed override switch
to the interface coding of the PLC interface.
1:   The 5 low-order bits of the PLC interface signal DB31, ...
DBB0 (Feed override A-H) are interpreted as a Gray code. The value
which is read corresponds to a switch setting. It is used as an
index for selecting the correct override factor from the table of
MD12010 $MN_OVR_FACTOR_AX_SPEED [n].
0:   The feed override byte of the PLC interface is interpreted as
a binary representation of the override value in percent (limit
200 percent).
Related to:
   NC/PLC interface signal DB31, ... DBB0 (Feed override A-H),
   (axis-specific)
   MD12010 $MN_OVR_FACTOR_AX_SPEED [n]
   (Evaluation of the axis feed override switch)
```

12010	OVR_FACTOR_AX_SPEED			EXP, N10	V1,Z1	
-	Evaluation of axis feedrate override switch			DOUBLE	PowerOn	
-						
-	31	0.00,0.01,0.02,0.04,0.06,0.08,0.10...	0.00	2.00	7/2	M

Description: Evaluation of the axis velocity override switch with gray-coded interface.

Not relevant with:

MD12000 $MN_OVR_AX_IS_GRAY_CODE = 0

Related to:

NC/PLC interface signal DB31, ... DBB0 (Feed override A-H), (axis-specific)

12020	OVR_FEED_IS_GRAY_CODE			EXP, N10	V1,Z1	
-	Path feedrate override switch Gray-coded			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	M

Description: This machine data is used to adapt the path feed override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the NC/PLC interface signal DB31, ... DBB0 (Feed override A-H) are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD12030 $MN_OVR_FACTOR_FEEDRATE [n].

0: The feed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

NC/PLC interface signal DB31, ... DBB0 (Feed override A-H)

MD12030 $MN_OVR_FACTOR_FEEDRATE [n]

(Evaluation of the path feed override switch)

12030	OVR_FACTOR_FEEDRATE			EXP, N10	V1,B1,Z1	
-	Evaluation of path feedrate override switch			DOUBLE	PowerOn	
-						
-	31	0.00,0.01,0.02,0.04,0.06,0.08,0.10...	0.00	2.00	7/2	M

Description: Evaluation of the feedrate override switch with gray-coded interface.

Special function of the 31st value for the velocity control:

The setting of the 31st override value defines the dynamic reserves which take the velocity control to be an excessive increase in the path feed. The setting should correspond to the highest override factor actually used.

The function of the 31st value is thus identical to the effect of MD12100 $MN_OVR_FACTOR_LIMIT_BIN when using the binary-coded interface.

Not relevant with:

MD12020 $MN_OVR_FEED_IS_GRAY_CODE = 0

Related to:

NC/PLC interface signal DB31, ... DBB0 (Feed override A-H)

12040	OVR_RAPID_IS_GRAY_CODE			EXP, N10	V1,Z1	
-	Rapid traverse override switch Gray-coded			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	M

Description: This machine data is used to adapt the rapid traverse override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the PLC interface signal DB21-30 DBB5 (Rapid traverse override A-H) are interpreted as a Gray code. The value which is read corresponds to a switch setting.

It is used as an index for selecting the correct override factor from the table of MD12050 $MN_OVR_FACTOR_RAPID_TRA[n].

0: The rapid traverse override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

NC/PLC interface signal DB21-30 DBB5 (Rapid traverse override A-H)

MD12050 $MN_OVR_FACTOR_RAPID_TRA[n]

(Evaluation of the rapid traverse override switch)

12050	OVR_FACTOR_RAPID_TRA			EXP, N10	V1,Z1	
-	Evaluation of rapid traverse override switch			DOUBLE	PowerOn	
-						
-	31	0.00,0.01,0.02,0.04,0.06,0.08,0.10...	0.00	1.00	7/2	M

Description: Evaluation of the rapid traverse override switch with gray-coded interface.

Not relevant with:

MD12040 $MN_OVR_RAPID_IS_GRAY_CODE = 0

Related to:

NC/PLC interface signal DB21-30 DBB5 (Rapid traverse override A-H)

12060	OVR_SPIND_IS_GRAY_CODE			EXP, N10	V1,Z1	
-	Spindle override switch Gray-coded			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	M

Description: This machine data is used to adapt the spindle speed override switch to the interface coding of the PLC interface.

1: The 5 low-order bits of the "spindle speed override" PLC interface signal are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD12070 $MN_OVR_FACTOR_SPIND_ SPEED [n].

0: The spindle speed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent).

Related to:

NC/PLC interface signal DB31, ... DBB19 (Spindle speed override)

MD12070 $MN_OVR_FACTOR_SPIND_SPEED[n]

(Evaluation of the spindle speed override switch)

12070	OVR_FACTOR_SPIND_SPEED			EXP, N10	V1,Z1	
-	Evaluation of spindle override switch			DOUBLE	PowerOn	
-						
-	31	0.5,0.55,0.60,0.65,0.70, 0.75,0.80...	0.00	2.00	7/2	M

Description: Evaluation of the spindle-specific override switch with Gray-coded interface.

Special function of the 31st value for the velocity control:

The setting of the 31st override value defines the dynamic reserves which take the velocity control to be an excessive increase in the spindle feed. The setting should correspond to the highest override factor actually used.

The function of the 31st value is thus identical to the effect of MD12100 $MN_OVR_FACTOR_LIMIT_BIN when using the binary-coded interface.

Not relevant for:

MD12060 $MN_OVR_SPIND_IS_GRAY_CODE = 0

Related to:

NC/PLC interface signal DB31, ... DBB19 (Spindle speed override)

12080	OVR_REFERENCE_IS_PROG_FEED			N10, N09	V1	
-	Override reference speed			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	M

Description: The entry in this MD specifies whether the spindle override given by the IS refers to the speed limited by MD/SD or to the programmed speed.

1: Spindle override acts with reference to the programmed speed

(programmed speed _ spindle override 100%)

0: Spindle override acts on the speed limited by MD or SD

(speed limited by MD/SD _ spindle override 100%)

Related machine data:

A speed limitation is effected by the following MDs or SDs:

MD35100 $MA_SPIND_VELO_LIMIT Maximum spindle speed

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT Maximum speed of gear stage

MD35160 $MA_SPIND_EXTERN_VELO_LIMIT Spindle speed limitation by PLC

SD43220 $SA_SPIND_MAX_VELO_G26 Maximum spindle speed

SD43230 $SA_SPIND_MAX_VELO_LIMS Spindle speed limitation with G96

12082	OVR_REFERENCE_IS_MIN_FEED			N10, N09	V1	
-	Specification of the reference of the path override			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: The reference speed for the path feed override specified via the machine control panel can be set differently from the standard.

0: Standard:

The override is relative to the programmed feed.

1: Special case:

The override is relative to the programmed feed or to the path feed limit, depending on which resulting value is lower. In this way, even for a great feed reduction (due to the permissible axis dynamics), the effect of the override value (in the range 0 to 100%) is always visible.

12090	OVR_FUNCTION_MASK			N01, N10, N09	-	
-	Selection of override specifications			DWORD	Reset	
-						
-	-	0	0	0x01	7/2	M

Description: The functionality of the override switches can be affected by the bits.

Bit 0: = 0,

Standard: Spindle override active with G331/G332

= 1,

Path override is active instead of spindle override with G331/ G332

(Tapping without compensating chuck)

12100	OVR_FACTOR_LIMIT_BIN			EXP, N10	V1,B1,Z1	
-	Limitation for binary-coded override switch			DOUBLE	PowerOn	
-						
-	-	1.2	0.0	2.0	7/2	M

Description: This machine data can be used as an additional limit for the override factor when using the binary-coded interface for path, axis and spindle feeds.

In this case, the maximum values

- 200% for channel-specific feed override
- 100% for channel-specific rapid traverse override
- 200% for axis-specific feed override
- 200% for spindle override

are replaced with the limit value entered in MD: OVR_FACTOR_LIMIT_BIN when this value is lower.

Example: OVR_FACTOR_LIMIT_BIN = 1.20

--> maximum override factor for

- channel-specific feed override =120%
- channel-specific rapid traverse override =100%
- axis-specific feed override =120%
- spindle override =120%

This value also defines the dynamic reserves maintained by the speed control for increasing the path and spindle feedrates.

References:

/FB/, B1, "Continuous Path Mode, Exact Stop and Look Ahead"

12200	RUN_OVERRIDE_0			N01, N09	FBMA,V1,Z1	
-	Traversing response with override 0			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: = 0

Override 0 is active and means deceleration (JOG mode, safety function).

Bits 0 and 1 in MD32084 $MA_HANDWH_STOP_COND for hand wheels and in MD20624 $MC_HANDWH_CHAN_STOP_COND for machine axes define whether the pulses are collected for geometry axes and contour handwheel.

= 1

Traversing with handwheels and in JOG mode with fixed feedrates is also possible with a 0 % override.

Related to:

MD32084 $MA_HANDWH_STOP_COND

MD20624 $MC_HANDWH_CHAN_STOP_COND

12202	PERMANENT_FEED			N01, N09	Z1,V1	
mm/min	Fixed feedrates for linear axes			DOUBLE	Reset	
-						
-	4	0.,0.,0.,0.	-	-	7/2	M

Description: In AUTOMATIC mode:

After activating a fixed feedrate via an interface signal, traversing is done with a fixed feedrate instead of the programmed feedrate.

Note:

The fixed feedrate is also evaluated in continuous-path mode in order to optimize the overhead for the Look Ahead calculation. Unnecessarily high values should therefore be avoided. Enter zero if a fixed feedrate is not wanted

In JOG mode:

After activating a fixed feedrate via an interface signal, and traversing the linear axis with a traversing key, traversing proceeds in the selected direction with the fixed feedrate.

n = 0, 1, 2, 3 mean fixed feedrates 1, 2, 3, 4. The values must be entered in ascending order.

Special cases, errors, ...

The maximum velocity defined by MD32000 $MA_MAX_AX_VELO is active. An override setting of 100 % is assumed. MD12200 $MN_RUN_OVERRIDE_0 is active if the override is 0.

Related to:

MD12200 $MN_RUN_OVERRIDE_0

12204	PERMANENT_ROT_AX_FEED			N01, N09	V1	
rev/min	Fixed feedrates for rotary axes			DOUBLE	Reset	
-						
-	4	0.,0.,0.,0.	-	-	7/2	M

Description: Fixed feedrate values:

In AUTOMATIC mode:

After activating a fixed feedrate via an interface signal, traversing is done with a fixed feedrate instead of the programmed feedrate.

Note: PERMANENT_ROT_AX_FEED is used instead of PERMANENT_FEED for the path motion if all synchronously traversed axes in the current block are rotary axes. PERMANENT_FEED applies if linear and rotary axes are to be synchronously traversed together.

The fixed feedrate is also evaluated in continuous-path mode in order to optimize the overhead for the Look Ahead calculation. Unnecessarily high values should therefore be avoided. Enter zero if a fixed feedrate is not wanted

In JOG mode:

After activating a fixed feedrate via an interface signal, and traversing the rotary axis with a traversing key, traversing proceeds in the selected direction with the fixed feedrate.

n = 0, 1, 2, 3 mean fixed feedrates 1, 2, 3, 4.

Special cases, errors, ...

The maximum velocity defined by MD32000 $MA_MAX_AX_VELO is active. An override setting of 100 % is assumed. MD12200 $MN_RUN_OVERRIDE_0 is active if the override is 0.

Related to:

MD12200 $MN_RUN_OVERRIDE_0

12205	PERMANENT_SPINDLE_FEED			N01, N09	FBMA	
rev/min	Fixed feedrates for spindles			DOUBLE	Reset	
-						
-	4	0.,0.,0.,0.	-	-	7/2	M

Description: Fixed feedrate values:

JOG: A spindle is traversed with a fixed feedrate by activating the traversing keys and activating the appropriate signals in the PLC interface.

The override is not active.

Depending upon MD12200 $MN_RUN_OVERRIDE_0, traversing also takes place with override 0.

The value defined by MD32000 $MA_MAX_AX_VELO is taken as the upper limit. If the fixed feedrate has a larger value, the aforementioned limiting value applies.

12300	CENTRAL_LUBRICATION			N01, N09	-	
-	Central lubrication active			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: When a settable axial path has been exceeded, the axial VDI signals request a lubrication pulse from the PLC (compare MD33050 $MA_LUBRICATION_DIST). These axial pulses act (by default) independently of each other.

If the machine construction requires a central lubrication, i.e. the lubrication pulse of any axis is acting on all axes, the corresponding path monitoring of all axes must be restarted after lubrication pulse output. This start synchronization of the monitoring is executed via MD12300 $MN_CENTRAL_LUBRICATION=TRUE.

12510	NCU_LINKNO			N01	B3	
-	NCU number in an NCU cluster			DWORD	PowerOn	
-						
-	-	1	1	16	7/2	M

Description: Number or name for identifying an NCU within an NCU grouping.

In an NCU grouping (NCU cluster), the NCUs are connected to one another by a link bus.

Related to:

MD18780 $MN_MM_NCU_LINK_MASK

12520	LINK_TERMINATION			N01	B3	
-	NCU numbers for which bus termination resistances are activated			BYTE	PowerOn	
LINK						
-	2	0,1	0	15	3/2	M

Description: LINK_TERMINATION defines with which NCUs the bus termination resistances for the timing circuit must be switched in through the link module.

Related to:

MD18780 $MN_MM_NCU_LINK_MASK

12540	LINK_BAUDRATE_SWITCH			N01	B3	
-	Link bus baud rate			DWORD	PowerOn	
LINK						
-	-	9	0	9	3/2	M

Description: The assigned baud rate for the link communication is defined by the values entered:

Set value	Rate	
0	9,600	kBd
1	19,200	kBd
2	45,450	kBd
3	93,750	kBd
4	187,000	kBd
5	500,000	kBd
6	1,500	MBd
7	3,000	MBd
8	6,000	MBd
9	12,000	MBd

Not relevant for:

Systems without link modules

Related to:

MD18780 $MN_MM_NCU_LINK_MASK

12550	LINK_RETRY_CTR			N01	B3	
-	maximum number of message frame transmission retries			DWORD	PowerOn	
LINK						
-	-	4	1	15	3/2	M

Description: Maximum retry limit in cases of error.

Not relevant for:

Systems without link modules

Related to:

MD18780 $MN_MM_NCU_LINK_MASK

12551	TIMEOUT_LINK_COMMUNICATION			EXP	-	
s	Wait time at start of link communication			DOUBLE	PowerOn	
-						
-	6	84.0,60.0, 9.0,60.0,0.0,0.0	0.0	1000.0	0/0	S

Description: Configuration data is exchanged between the individual NCUs during NCK ramp-up. For this purpose, the NCUs involved in data replication must be synchronized in time. The machine data specifies timeouts for data exchange. In the case of Solutionline this is achieved via Profinet communication. During ramp-up this is standard Ethernet communication; IRT communication takes over subsequently. The significance of the individual elements is as follows:

Element 0: Timeout for the first synchronization for data replication during ramp-up

Element 1: Timeout for synchronization for isochronous transition to cyclic operation

Element 2: Timeout for a non-real-time telegram during ramp-up (Solutionline only)

Element 3: Timeout until the Profinet software switches to the 'Operate' state (Solutionline only)

12552	LINK_LIFECYCLE_MAX_LOOP			EXP	-	
-	Maximum number of loops for synchronization of the link life cycle.			DWORD	PowerOn	
-						
-	-	5000	-	-	0/0	S

Description: During NCK ramp-up, the NCK switches to the cyclic plane at a certain point in time (in other words, the IPO and servo tasks start to work). If these points in time deviate too significantly in the NCK link grouping, alarm 280003 will be output. This wait time can be increased in IPO clock steps by increasing this machine data.

12701	AXCT_AXCONF_ASSIGN_TAB1		N01	B3	
-	Assignment of an axis container location		STRING	PowerOn	
CTDE					
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Structure of entries:
NCm_AXn             with NCU number m: 1..16
                    and machine axis address n: 1... 31
Example:
NC2_AX1           ; The axis is on the NCU2 and is the
                  ; 1st machine axis there.
AX5               ; local axis 5 only with one NCU
                  ; the axis container mechanism is only used by
                  ; several channels of one NCU.
The reference to an axis container location of a channel is
defined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and
MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.
The actually assigned axis at a specific time is dependent upon
the  container rotation status. All channels that access an axis
container use the same axis entries stored there. If channels of
various NCUs access this container, then inter-NCU consistency
must be ensured.
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9 $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed via NCU-link.
Related to:
  MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12702	AXCT_AXCONF_ASSIGN_TAB2			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Structure of entries:
NCm_AXn               with NCU number m: 1..16
                      and machine axis address n: 1... 31
Example:
NC2_AX1             ; The axis is on the NCU2 and is the
                    ; 1st machine axis there.
AX5                 ; local axis 5 only with one NCU
                    ; the axis container mechanism is only used by
                    ; several channels of one NCU.
The reference to an axis container location of a channel is
defined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and
MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.
The actually assigned axis at a specific time is dependent upon
the  container rotation status. All channels that access an axis
container use the same axis entries stored there. If channels of
various NCUs access this container, then inter-NCU consistency
must be ensured.
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9
$MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed via NCU-link.
Related to:
  MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12703	AXCT_AXCONF_ASSIGN_TAB3			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn            with NCU number m: 1..16
                   and machine axis address n: 1... 31
Example:
NC2_AX1 ; The axis is on the NCU2 and is the
                  ; 1st machine axis there
AX5               ; local axis 5, with only one NCU
                  ; the axis container mechanism is only used by
                  ; several channels of one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in
MD20070 $MC_AXCONF_MACHAX_USED and MD10002
$MN_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs.
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
  MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12704	AXCT_AXCONF_ASSIGN_TAB4			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.  Method of writing entries:
NCm_AXn             with NCU number m: 1..16
                    and machine axis address n: 1... 31
Example:
NC2_AX1 ; The axis is on the NCU2 and is the
                  ; 1st machine axis there
AX5               ; local axis 5, with only one NCU
                  ; the axis container mechanism is only used by
                  ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and
MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
  MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12705	AXCT_AXCONF_ASSIGN_TAB5			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
```

Example:

```
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels of one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9
$MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB

12706	AXCT_AXCONF_ASSIGN_TAB6			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn              with NCU number m: 1..16
                     and machine axis address n: 1... 31
```

Example:

```
NC2_AX1            ; The axis is on the NCU2 and is the
                   ; 1st machine axis there
AX5                ; local axis 5, with only one NCU
                   ; the axis container mechanism is only used by
                   ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB

12707	AXCT_AXCONF_ASSIGN_TAB7			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
```

Example:

```
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB

12708	AXCT_AXCONF_ASSIGN_TAB8			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn            with NCU number m: 1..16
                   and machine axis address n: 1... 31
Example:
NC2_AX1          ; The axis is on the NCU2 and is the
                 ; 1st machine axis there
AX5              ; local axis 5, with only one NCU
                 ; the axis container mechanism is only used by
                 ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and
MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
  MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12709	AXCT_AXCONF_ASSIGN_TAB9			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn         with NCU number m: 1..16
                and machine axis address n: 1... 31
Example:
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and
MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
   MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12710	AXCT_AXCONF_ASSIGN_TAB10			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn        with NCU number m: 1..16
               and machine axis address n: 1... 31
Example:
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and
MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
   MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12711	AXCT_AXCONF_ASSIGN_TAB11			N01	B3
-	Assignment of an axis container location			STRING	PowerOn
CTDE					
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn         with NCU number m: 1..16
                and machine axis address n: 1... 31
Example:
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and
MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
   MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12712	AXCT_AXCONF_ASSIGN_TAB12			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
```

Example:

```
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB

12713	AXCT_AXCONF_ASSIGN_TAB13			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
Example:
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
The reference to an axis container location of a channel is deter-
mined by the definitions in
MD20070 $MC_AXCONF_MACHAX_USED and MD10002
$MN_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the
container rotation status. All channels that access an axis con-
tainer use the same axis entries stored there. If channels from
various NCUs access this container, ensure that there is consis-
tency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.
Related to:
   MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB
```

12714	AXCT_AXCONF_ASSIGN_TAB14			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
```

Example:

```
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB

12715	AXCT_AXCONF_ASSIGN_TAB15			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description:

```
Assignment of an axis container location (slot s) to a machine
axis or link axis. A maximum of 32 locations can be assigned axes
in an axis container.
Method of writing entries:
NCm_AXn           with NCU number m: 1..16
                  and machine axis address n: 1... 31
Example:
NC2_AX1         ; The axis is on the NCU2 and is the
                ; 1st machine axis there
AX5             ; local axis 5, with only one NCU
                ; the axis container mechanism is only used by
                ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

```
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB

12716	AXCT_AXCONF_ASSIGN_TAB16			N01	B3	
-	Assignment of an axis container location			STRING	PowerOn	
CTDE						
-	32		-	-	3/2	M

Description: Assignment of an axis container location (slot s) to a machine axis or link axis. A maximum of 32 locations can be assigned axes in an axis container.

Method of writing entries:

```
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
```

Example:

```
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
```

The reference to an axis container location of a channel is determined by the definitions in MD20070 $MC_AXCONF_MACHAX_USED and MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

The axis actually assigned at a given time is dependent upon the container rotation status. All channels that access an axis container use the same axis entries stored there. If channels from various NCUs access this container, ensure that there is consistency between the NCUs!

Example:

```
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
```

This machine data is distributed over the NCU-link.

Related to:

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB

12750	AXCT_NAME_TAB			N01	B3	
-	Axis container identifier			STRING	PowerOn	
CTDE						
-	16	CT1,CT2,CT3,CT4,CT5,CT6...	-	-	1/1	M

Description: List of axis container identifiers

In addition to the channel identifier of an axis, the axis container identifier, which can be defined by the user here, can also be used as an axis container name for e.g. a rotation of an axis container (AXCTSWE(CT1)).

12970	PLC_DIG_IN_LOGIC_ADDRESS			N10	-	
-	Logical start address of the digital PLC input address			DWORD	PowerOn	
-						
-	-	0	0	1023	0/0	S

Description: Logical start address of the digital input addresses of the PLC

Related to:

MD12971 $MN_PLC_DIG_IN_NUM

12971	PLC_DIG_IN_NUM			N10	-	
-	Number of digital input addresses			DWORD	PowerOn	
-						
-	-	64	1	1023	0/0	S

Description: Number of digital input addresses as from the start address
Related to:
MD12970 $MN_PLC_DIG_IN_LOGIC_ADDRESS

12974	PLC_DIG_OUT_LOGIC_ADDRESS			N10	-	
-	Logical start address of the digital PLC output addresses			DWORD	PowerOn	
-						
-	-	0	0	1023	0/0	S

Description: Logical start address of the digital output addresses of the PLC
Related to:
MD12975 $MN_PLC_DIG_OUT_NUM

12975	PLC_DIG_OUT_NUM			N10	-	
-	Number of digital output addresses			DWORD	PowerOn	
-						
-	-	48	1	1023	0/0	S

Description: Number of digital output addresses as from the start address

12978	PLC_ANA_IN_LOGIC_ADDRESS			N10	-	
-	Logical start address of the analog PLC input addresses			DWORD	PowerOn	
-						
-	-	0	0	1023	0/0	S

Description: Logical start address of the analog input addresses of the PLC
Related to:
MD12979 $MN_PLC_ANA_IN_NUM

12979	PLC_ANA_IN_NUM			N10	-	
-	Number of analog input addresses			DWORD	PowerOn	
-						
-	-	0	0	1023	0/0	S

Description: Number of analog input addresses as from the start address
Related to:
MD12978 $MN_PLC_ANA_IN_LOGIC_ADDRESS

12982	PLC_ANA_OUT_LOGIC_ADDRESS			N10	-	
-	Logical start address of the analog PLC output addresses			DWORD	PowerOn	
-						
-	-	0	0	1023	0/0	S

Description: Logical start address of the analog output addresses of the PLC
Related to:
MD12983 $MN_PLC_ANA_OUT_NUM

12983	PLC_ANA_OUT_NUM			N10	-	
-	Number of analog output addresses			DWORD	PowerOn	
-						
-	-	0	0	1023	0/0	S

Description: Number of analog output addresses as from the start address
Related to:
MD12982 $MN_PLC_ANA_OUT_LOGIC_ADDRESS

12986	PLC_DEACT_IMAGE_LADDR_IN			N10	-	
-	Deactivation of I/O connection to the PLC image			DWORD	PowerOn	
-						
-	8	-1,-1,-1,-1,-1,-1,-1,-1	-1	8191	-1/1	M

Description: The PLC input/output image of the stations with these logical addresses
is not connected to the real I/Os

12987	PLC_DEACT_IMAGE_LADDR_OUT			N10	-	
-	Deactivation of I/O connection to the PLC image			DWORD	PowerOn	
-						
-	8	-1,-1,-1,-1,-1,-1,-1,-1	-1	8191	-1/1	M

Description: The PLC input/output image of the stations with these logical addresses
is not connected to the real I/Os

13050	DRIVE_LOGIC_ADDRESS			N04, N10	G2	
-	Logical drive addresses			DWORD	PowerOn	
-						
-	31	4100,4140,4180,4220,4260,4300,4340...	258	8191	7/2	M

Description: For PROFIdrive only:

Logical I/O addresses of the PROFIdrive drives on the PROFIBUS/PROFINET. An address is assigned to a drive.

This MD is the link to the description of the PROFIBUS/PROFINET configuration in SDB.

The MD value is the address index of the logical I/O drive address assigned with HW-Config (SIMATIC Manager S7).

Example:

DRIVE_LOGIC_ADDRESS[1] = 272 (The start address 272 is assigned to drive 1.)

The SDB defines the logical I/O address of the drives on the PROFIBUS/PROFINET. An address is assigned to a drive or to a slave.

The address index is used for actual-value and setpoint-value assignment

(MD30220 $MA_ENC_MODULE_NR[n], MD30110 $MA_CTRLOUT_MODULE_NR[n]).

Note:

The same drive (I/O address) must be assigned to the MD30220 $MA_ENC_MODULE_NR[0] and MD30110 $MA_CTRLOUT_MODULE_NR[0]

of a machine axis.

Each drive or slave must be assigned to a single logical address index.

The index [n] of the machine data has the following coding: [Drive index]:

Drive 1 -->n-=0

Drive 2 -->n-=1,

13060	DRIVE_TELEGRAM_TYPE			N04, N10	G2	
-	Standard message frame type for PROFIdrive			DWORD	PowerOn	
-						
-	31	116,116,116,116,116,116,116,116...	-	-	7/2	M

Description:

```
For PROFIdrive only:
Standard telegram type for PROFIdrive axes:
          0 = No standard type, user-defined
              (telegram type 103 is then used internally in the
  NCK,
              whereby other process data can be added.)
      1...  6 = PROFIdrive type
    101...107 = 611U type
            116 = 611U type 106 plus trace data
            118 = 611U type as 116, but use of encoders 2+3
           136 = 611U type as 116 plus torque feedforward control
    201...203 = internal type
Notes: Alarm 26015 is issued with reference to this machine data
if the telegram configuration exhibits inconsistencies, i.e. if
the telegram type selected on the NCK does not match the telegram
type set on the drive (see parameter P922) and the process data
configuration does not match (see parameters P923, P915, P916).
The check for telegram configuration errors can be disabled using
MD DRIVE_FUNCTION_MASK bit 15.
```

13070	DRIVE_FUNCTION_MASK			N04, N10	G2	
-	PROFIdrive expansion functions			DWORD	PowerOn	
-						
-	31	2,2,2,2,2,2,2,2,2,2,2,2,2 ,2,2,2,2,2,2,2,2,2,2,2,2,2, 2...	-	-	7/2	M

Description: For PROFIdrive only:

Bit-coded mask for skipping the scope of available functions for PROFIdrive axes expected by the NCK.

Meaning of set bits:

Bit 0:Deactivation of axial drive alarm display

Note: the effect of this bit may be hidden, depending on the value in MD13140 $MN_PROFIBUS_ALARM_ACCESS.

Bit 1:Deactivation of 611U description file intermediate storage in the NCK

Bit 2:Deactivation of axial encoder driver parameter accesses

Bit 3:Deactivation of axial output driver parameter accesses

Bit 4:Reserved, free (previously activation of DSC bits)

Bit 5:Deactivation of the 611U-specific drive parking (STW2.7/ STA2.7)

Bit 6:Deactivation of the 611U-specific travel to fixed stop (STW2.8/STA2.8)

Bit 7:Deactivation of the 611U-specific motor switching int. (STW2.9 to 2.11)

Bit 8:Deactivation of the 611U-specific ramp block (STW1.11+13)

Bit 9:Deactivation of the 611U-specific function generator bits (STW1.8/STA1.13)

Bit 10:Deactivation of the control of the holding brake (STW1.12 / STA2.5)

Bit 11:Deactivation of the effect of OFF2/OFF3 on DB31, ... DBX93.5 (Drive Ready)

Bit 12:Deactivation of the error/warning class SINAMICS (STA1.11 to STA1.12)

Bit 13:Drive parking simulation (STA2.7 = STW2.7)

Bit 14:Selection of non-cyclical communication 0 = DPT 1 = DPV1

Bit 15: Deactivation of the consistency check of the PROFIdrive message frame configuration

Configuration of bits 5 - 10, which is new for SW 6.3 and higher, allows adaptation of certain control or status bits that are not standardized in the PROFIdrive profile. The bits may have a different significance and effect in the default setting of third-party drives.

13080	DRIVE_TYPE_DP		EXP	G2	
-	PROFIBUS/PROFINET drive type		BYTE	PowerOn	
-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	4	7/2	M

Description: For PROFIdrive only (for SIMODRIVE611D MD13040 $MN_DRIVE_TYPE applies instead):

MD is relevant to PROFIdrive drives at the PROFIBUS/PROFINET:

Drive type:

0: No drive or drive type unknown (default), software-internally treated as:

1: FDD drive (SRM: Synchronous rotary drive)

2: MSD drive (ARM: Asynchronous rotary drive)

3: Linear drive

4: Analog drive (no automatic entry)

Note:

In general, the drive type is entered automatically with Siemens drives as soon as the drives start operating.

With non-Siemens drives (at least with linear drives) the value must be entered manually if automatic drive recognition is not possible.

13110	PROFIBUS_TRACE_ADDRESS			EXP	-	
-	PROFIBUS/PROFINET trace of I/O slots			DWORD	NEW CONF	
-						
-	14	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0 ,0	-	-	2/2	M

Description: For PROFIBUS/PROFINET only:

Logical I/O address that is to be recorded.

13111	PROFIBUS_TRACE_TYPE			EXP	-	
-	PROFIBUS/PROFINET trace settings			DWORD	NEW CONF	
-						
-	-	0	0	3	2/2	M

Description: For PROFIBUS/PROFINET only:

0: Recording to the part program memory /_N_MPF_DIR/_N_SIEMDPTRC_MPF

1: Recording to mass storage /user/sinumerik/data/temp/siemdptrc.trc

2: Recording to the part program memory with runtime measurement

3: Recording of cyclic PN-NCULINK communication

13112	PROFIBUS_TRACE_FILE_SIZE			EXP	-	
-	Maximum trace file size in kbytes			DWORD	NEW CONF	
-						
-	-	40	-	-	2/2	M

Description: For PROFIBUS/PROFINET only:

0: Trace without file size limitation

>0: Trace with file size limitation

13113	PROFIBUS_TRACE_START			EXP	-	
-	Activation of PROFIBUS/PROFINET trace			DWORD	Immediately	
-						
-	-	0	0	1	2/2	M

Description:

```
For PROFIBUS/PROFINET only:
0: Trace off
1: Trace on
MD13112 $MN_PROFIBUS_TRACE_FILE_SIZE > 0: Trace is automatically
disabled when the file size is reached.
```

13114	PROFIBUS_TRACE_START_EVENT			EXP	-	
-	Trigger conditions for PROFIBUS/PROFINET trace			DWORD	NEW CONF	
-						
-	14	0,0,0,0,0,0,0,0,0,0,0,0,0,0	0x00000000	0x111fffff	2/2	M

Description:

```
For PROFIBUS/PROFINET only:
The trigger frequency is configured bit-by-bit
Bits  0-15: 0x0001-0xffff: bit mask
Bits 16-23: 0x01-0x14: process data number (a maximum of 20 words
are permissible)
Bits 24-27:0x01: status change 0->1
           0x00: status change 1->0
Bits 28-31:0x10: send slot
           0x00: receive slot
When MD13113=1 and MD13114=0x0 Recording starts immediately
When MD13113=1 and MD13114=0x1 Recording starts on control power
on
When MD13113=1 and MD13114=0x2 Recording starts on loss of the
sign of life
```

13120	CONTROL_UNIT_LOGIC_ADDRESS			N04, N10	-	
-	Logical address of SINAMICS CU			DWORD	PowerOn	
-						
710-6a2c	9	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M
710-31a10c	9	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M
710-31a10c6	9	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M
720-6a2c	13	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M
720-31a10c	13	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M
720-31a10c6	13	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M
730-6a2c	15	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M
730-31a10c	15	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M
730-31a10c6	15	6500,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	7/2	M

Description: For PROFIBUS/PROFINET, SINAMICS:

Logical I/O address of a SINAMICS-CU (Control Unit) on the PROFIBUS/PROFINET.

The cyclic DP communication with SINAMICS-CU is activated by taking over the associated slot address from the STEP7 project. The onboard I/Os cannot be accessed until after configuration.

13140	PROFIBUS_ALARM_ACCESS			N04, N10	-	
-	Alarm response of PROFIBUS/PROFINET drives on power up			DWORD	Immediately	
-						
-	-	1	0	2	2/7	M

Description:

```
For PROFIBUS/PROFINET only:
Specifies the time of activation for evaluation/transmission of
PROFIBUS/PROFINET node alarms or warnings
(fine diagnostics messages) on the NCK.
Affects drive alarms or warnings 380500, 380501
(or alarms 200000ff etc. created from these in the HMI)
as well as drive safety alarms 27900.
Meaning of the MD values:
0 = alarms/warnings are evaluated immediately
1 = alarms/warnings are not evaluated
2 = alarms are evaluated only after power up, i.e.
    as soon as HMI has set value 2 active again (NCK automatically
    resets the MD value to 1 at every power up; HMI must
    explicitely articulate its readiness for message processing
    by setting value 2)
Note: the MD restricts the range or effectiveness
         of MD13150 $MN_SINAMICS_ALARM_MASK
Default: the display default behavior of the mentioned drive
         alarms changes with the introduction of this MD.
         Now the alarms are not transported and displayed
         by default.
         The previous default behavior can be restored
         with MD13140 $MN_PROFIBUS_ALARM_ACCESS=0.
```

13150	SINAMICS_ALARM_MASK			N04, N05	-	
-	Activate fault and warning buffer output for Sinamics			DWORD	Immediately	
-						
-	-	0x0909	-	-	7/2	M

Description:

```
For PROFIBUS/PROFINET only, especially SINAMICS:
Relevant to SINAMICS diagnostics:
Note: the effect of this MD may be hidden independently of
         the value of $MN_PROFIBUS_ALARM_ACCESS.
Mask for displaying the SINAMICS DOS fault and warning buffers
Bit set:Alarms in this DO group are output
Bit not set:Alarms in this DO group are not output
Bit  Hex. Meaning
   value
=================================================================
===================
0:   0x1 Output faults of the Control Units
1:   0x2 Reserved
2:   0x4 Output faults of the Drive Controls
3:   0x8 Output faults of the Line Modules
4:   0x10 Output faults of the Terminal Boards
5:   0x20 Output faults of the Terminal Modules
8:   0x100 Output warnings of the Control Units
9:   0x200 Output warnings of the Communication Objects
10:  0x400 Output warnings of the Drive Controls
11:  0x800 Output warnings of the Line Modules
12:  0x1000 Ouptut warnings of the Terminal Boards
13:  0x2000 Output warnings of the Terminal Modules
```

13200	MEAS_PROBE_LOW_ACTIVE			N10, N09	M5	
-	Polarity reversal of sensor			BOOLEAN	PowerOn	
-						
-	2	FALSE,FALSE	-	-	7/2	M

Description:

```
This MD defines the electrical polarity of each connected sensor.
Value 0:
   (Default setting)
   Non-deflected state        0 V
   Deflected state           24 V
Value 1:
   Non-deflected state       24 V
   Deflected state            0 V
```

The programmed edges of the sensor are independent of the electrical polarity, and are to be regarded as purely mechanical. The programming of a positive edge always means the transition from the non-deflected into the deflected state. The programming of a negative edge always means the transition from the deflected into the non-deflected state.

13210	MEAS_TYPE			N10, N09	M5	
-	Meas. type with decentralized drives			BYTE	PowerOn	
-						
-	-	0	0	1	7/2	M

Description:

```
For PROFIdrive only:
This MD sets the measuring function of decentralized drives.
The MD currently only functions for PROFIdrive drives.
MEAS_TYPE = 0 defines:
A probe is used that is connected centrally to the NC.
However, as the encoders only provide actual position values in
cycles, the actual measuring position is found by interpolation.
MEAS_TYPE = 1 defines:
The probe must be wired decentralized to ALL drives.
The measuring functionality of the drive is then used,
saving the actual encoder values in the hardware at the time of
the measuring edge.
This method is more accurate than that with MEAS_TYPE = 0, but it
requires a more complex wiring and drives that support this mea-
suring functionality (e.g. 611U).
```

13211	MEAS_CENTRAL_SOURCE			N10, N09	-	
-	Data source central measurement with PROFIBUS/PROFINET drives			BYTE	PowerOn	
-						
-	-	3	1	3	0/0	S

Description:

```
For PROFIBUS/PROFINET only:
This MD is used to set the method used to obtain the time stamps
for central
measurement with PROFIdrive drives.
The following applies if MEAS_CENTRAL_SOURCE = 1:
  NRK accesses are used to access the onboard measuring registers.
  For this purpose, the appropriate hardware which allows this
must be
  available, e.g. 840Di with MCI extension board.
The following applies if MEAS_CENTRAL_SOURCE = 2:
  The SINAMICS DO1 telegram is used (telegram type 391),
  variant "Cyclic measurement" without
  handshake.
  For this purpose, an integrated SINAMICS must be available, e.g.
NCU 710.
  (Not available until supported by SINAMICS).
The following applies if MEAS_CENTRAL_SOURCE = 3:
  The SINAMICS DO1 telegram is used (telegram type 391),
  in the variant with handshake. This procedure is
  fault-tolerant, however, allows a measuring edge only every 4
PROFIBUS/PROFINET
  cycles, i.e. it is considerably slower.
  For this purpose, an integrated SINAMICS must be available, e.g.
NCU 710.
  This MD is only relevant, if MD13210 $MN_MEAS_TYPE == 0.
```

13220	MEAS_PROBE_DELAY_TIME			N10, N09	FBA/IAD	
s	Delay time between probe deflection and recognition			DOUBLE	PowerOn	
-						
-	2	0.0,0.0	0	0.1	7/2	M

Description: For probes with e.g. radio transmission, the probe deflection can be detected in the NC only with delay.

With this MD, the transmission link delay between the probe deflection and its detection is set in the control.

The measured value is corrected internally by the control by the distance that corresponds to the traversing motion during this time before measuring (modeling).

It is practicable to set values only up to a maximum of 15 position controller cycles.

Anyhow, the modeling could not work with the expected accuracy with values greater than that. In this case, the input value is therefore limited internally by the software to 15 position controller cycles (without any further feedback).

13230	MEAS_PROBE_SOURCE			N10, N09	-	
-	Probe simulation			BYTE	PowerOn	
-						
-	-	0	0	9	7/2	M

Description: Simulation of the probe only works when all axes are simulated.

Value = 0: the probe is triggered on the programmed end position.

Value = 1-8: the probe is triggered via digital output with the number=value.

Value = 9: reserved

13231	MEAS_PROBE_OFFSET			N10, N09	-	
mm/inch, degrees	Probe offset			DOUBLE	Immediately	
-						
-	-	0.1	-	-	7/7	U

Description: The switching position of the probe is offset by the value.

The offset is only active with the simulated probes and MD 13230=0.

13300	PROFISAFE_IN_FILTER			N01, N06, -	-	
-	Useful F data filter IN			DWORD	PowerOn	
-						
-	16	0xFFFFFFFF,0xFFFFFFFF,0xFFFFFFFF...	-	-	7/2	M

Description:

```
Filter between F user data and $INSE variables
Machine data $MN_PROFISAFE_IN_FILTER defines which F user data
bits of the PROFIsafe module are accepted from the F user data
interface of the PROFIsafe module into the NCK for further pro-
cessing.
The filtered F user data bits are compressed internally in the NCK
to form a contiguous bit field.
Machine data $MN_PROFISAFE_IN_ASSIGN then also defines the $INSE
variables to which the filtered F user data bits are transferred.
Example:
Note:
   Only 16 bits are shown for the sake of simplicity.
Parameterization:
   $MN_PROFISAFE_IN_FILTER = 1010100101000100
   $MN_PROFISAFE_IN_ASSIGN = 011006
 n = 16        11         6         1
      |x|x|x|x|x|1|1|1|0|0|1|x|x|x|x|x|
   $INSE[n], x = irrelevant
      |0|0|0|0|0|0|0|0|0|0|1|1|1|0|0|1|
   NCK-internal image of F user data
      |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
   $MN_PROFISAFE_IN_FILTER
      |1|0|1|0|1|0|0|0|0|0|0|0|0|1|0|0|
   Exemplary value present at F user data interface of the
   PROFIsafe module
```

13301	PROFISAFE_OUT_FILTER			N01, N06, -	-	
-	Useful F data filter OUT			DWORD	PowerOn	
-						
-	16	0xFFFFFFFF,0xFFFFFFFF,0xFFFFFFFF...	-	-	7/2	M

Description: Filter between $OUTSE variables and F user data

Machine data $MN_PROFISAFE_OUT_ASSIGN defines which $OUTSE[n] variables are transferred to the F user data bits of the PROFIsafe module.

Machine data $MN_PROFISAFE_OUT_FILTER defines the F user data bit to which the relevant $OUTSE[n] variable is transferred.

Example:

Note: Only 16 bits are shown for the sake of simplicity.

Parameterization:

```
   $MN_PROFISAFE_OUT_FILTER = 1010100101000100
   $MN_PROFISAFE_OUT_ASSIGN = 011006
n = 16       11       6       1
    |x|x|x|x|x|1|1|1|1|1|1|x|x|x|x|x|
   Exemplary value present in the $OUTSE variables, x = irrelevant
    |0|0|0|0|0|0|0|0|0|0|1|1|1|1|1|1|
   NCK-internal image of F user data
    |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
   $MN_PROFISAFE_OUT_FILTER
    |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
   F user data of the PROFIsafe module
```

13302	PROFISAFE_IN_ENABLE_MASK			N01, N06, -	-	
-	Enable mask for connections to PROFIsafe input modules.			DWORD	PowerOn	
-						
-	-	0x0	0x0	0xFFFF	7/2	M

Description: The enable mask is used to enable the machine data blocks for the connections to PROFIsafe input modules.

A machine data block comprises the following data:

- $MN_PROFISAFE_IN_ADDRESS[n]
- $MN_PROFISAFE_IN_ASSIGN[n]
- $MN_PROFISAFE_IN_FILTER[n]
- $MN_PROFISAFE_IN_SUBS[n]

Bit n = 0

The machine data block [n] is checked for consistency but not activated.

The PROFIsafe connection [n] or the slot [n] is not active.

Bit n = 1

The machine data block [n] is active.

The PROFIsafe connection [n] or the slot [n] is active.

13303	PROFISAFE_OUT_ENABLE_MASK		N01, N06, -	-	
-	Enable mask for connections to PROFIsafe output modules.		DWORD	PowerOn	
-					
-	-	0x0	0x0	0xFFFF	7/2	M

Description: The enable mask is used to enable the machine data blocks for the connections to PROFIsafe output modules.

A machine data blocks comprises the following data:

- $MN_PROFISAFE_OUT_ADDRESS[n]
- $MN_PROFISAFE_OUT_ASSIGN[n]
- $MN_PROFISAFE_OUT_FILTER[n]

Bit n = 0

The machine data block [n] is checked for consistency but not activated.

The PROFIsafe connection [n] or the slot [n] is not active.

Bit n = 1

The machine data block [n] is active.

The PROFIsafe connection [n] or the slot [n] is active.

13304	PROFISAFE_IN_SUBS_ENAB_MASK			N01, N06, -	-	
-	Activation of substitute value output for PROFIsafe input modules			DWORD	PowerOn	
-						
-	-	0x0	0x0	0xFFFF	7/2	M

Description: The enable mask is used to enable subsitute value output for connections to PROFIsafe input modules.

Bit n = 0

The PROFIsafe input module's process data is transferred to the SPL input data for the connection parameterized in machine data block [n].

The PROFIsafe connection [n] or the slot [n] is active.

Bit n = 1

The substitute values from $MN_PROFISAFE_IN_SUBS are transferred to the SPL input data for the connection parameterized in machine data block [n].

The PROFIsafe connection [n] or the slot [n] is passive.

13305	PROFISAFE_IN_SUBS			N01, N06, -	-	
-	Substitute values for passive connections to PROFIsafe input modules			DWORD	PowerOn	
-						
-	16	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0x0	0xFFFFFFFF	7/2	M

Description: For passive connections to PROFIsafe input modules, the substitute values parameterized in the machine data are transferred to the SPL inputs ($A_INSE) parameterized via $MN_PROFISAFE_IN_ASSIGN[n].

If the SPL inputs parameterized with $MN_PROFISAFE_IN_ASSIGN[n] overlap the SPL inputs of an active slot, the control will modify the passive slot's substitute values in order to prevent duplicate assignment of the SPL inputs. Here, the states of the signals from the active slots have priority.

13310	SAFE_SPL_START_TIMEOUT			N01, N05, -	FBSI	
s	Delay in display of alarm 27097			DOUBLE	PowerOn	
-						
-	-	20.	1.	60.	7/2	M

Description: After powerup of the control, alarm 27097 is displayed after the time if the SPL start is not carried out.

13312	SAFE_SPL_USER_DATA			N01, N06, -	FBSI	
-	User data			DWORD	PowerOn	
SFCO						
-	4	0x0,0x0,0x0,0x0	-	-	7/2	M

Description: User data for storing user-specific information. These data are monitored for changes by the data cross-check between NCK and PLC. Changes to these data are detected when included in the checksums, and reported by alarm 27071. The data must agree with the corresponding PLC data (DB18 DBD256,260,264,268). Deviations between NCK and PLC trigger the programmed stop (Stop D or Stop E) and are displayed via alarm 27090.

13316	SAFE_GLOB_CFG_CHANGE_DATE			EXP, N01, N06, -	FBSI	
-	Date/time of last change of SI-NCK MD			STRING	PowerOn	
-						
-	7		-	-	7/RO	S

Description: Display data for safety functions:

Date and time of the last configuration change to safety-related NCK machine data.

Changes to the machine data included in the calculation of the checksums SAFE_GLOB_ACT_CHECKSUM are recorded.

13317	SAFE_GLOB_PREV_CONFIG			EXP, N01, N06, -	FBSI	
-	Data of previous safety configuration			DWORD	PowerOn	
-						
-	11	0,0,0,0,0,0,0,0,0,0,0	-	-	0/RO	S

Description: Intermediate buffer for storing previous safety configuration data

Index 0: Status flag for change history

Index 1: Previous value of option data

Index 2: Previous value of set checksum SAFE_GLOB_DES_CHECKSUM[0]

Index 3: Last value of option data before standard data were loaded

Index 4: Last value of set checksum SAFE_GLOB_DES_CHECKSUM[0] before standard data were loaded.

Index 5: Previous value of set checksum SAFE_GLOB_DES_CHECKSUM[1]

Index 6: Last value of set checksum SAFE_GLOB_DES_CHECKSUM[1] before standard data were loaded

Index 7: Previous value of set checksum SAFE_GLOB_DES_CHECKSUM[2]

Index 8: Last value of set checksum SAFE_GLOB_DES_CHECKSUM[2] before standard data were loaded

Index 9: Previous value of set checksum SAFE_GLOB_DES_CHECKSUM[3]

Index 10: Last value of set checksum SAFE_GLOB_DES_CHECKSUM[3] before standard data were loaded

13318	SAFE_GLOB_ACT_CHECKSUM			EXP, N01, N06, -	FBSI	
-	Actual checksum NCK			DWORD	PowerOn	
-						
-	4	0,0,0,0	-	-	7/RO	S

Description: In this data, the actual checksum calculated after POWER ON or on RESET overwrites the current values of the safety-relevant machine data.

Assignment of the field indices:

Index 0: General safety parameterization, parameterization of the SPL-I/O link

Index 1: SPL user data

Index 2: Enable for I/O link (PROFIsafe and F_SEND/F_RECV)

Index 3: PROFIsafe parameter from the S7 configuration

13319	SAFE_GLOB_DES_CHECKSUM			EXP, N01, N06, -	FBSI	
-	Desired (expected) checksum			DWORD	PowerOn	
-						
-	4	0,0,0,0	-	-	7/1	M

Description: In this data, the set checksum stored at the time of the last machine acceptance overwrites the current values of the safety relevant machine data.

Assignment of the field indices:

Index 0: General safety parameterization, parameterization of the SPL-I/O link

Index 1: SPL user data

Index 2: Enable for I/O link (PROFIsafe and F_SEND/F_RECV)

Index 3: PROFIsafe parameter from the S7 configuration

13320	SAFE_SRDP_IPO_TIME_RATIO			N01, N06, -	FBSI	
-	Factor F_DP communication cycle			DWORD	PowerOn	
SFCO						
-	-	10	1	65535	7/2	M

Description: Ratio between interpolator cycle and F_DP cycle, in which the F_DP communication is performed. In the resulting time interval the NCK triggers OB40 on the PLC in order to perform the F_DP communication.

The value for the communication cycle resulting from this MD and the set IPO cycle must not exceed 250ms.

13322	INFO_SAFE_SRDP_CYCLE_TIME			N01, N06, N05, -	FBSI	
s	Maximum F_DP communication cycle			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/RO	S

Description: Display data: shows the maximum time interval, in which the F_DP communication is performed. The value results from the interpolator cycle and MD $MN_SAFE_SRDP_IPO_TIME_RATIO. If the value of the set communication cycle is exceeded, this is displayed here as well. This is only a display data. The value cannot be changed.

13330	SAFE_SDP_ENABLE_MASK			N01, N06, -	FBSI	
-	Enable screen F_SENDDP communication relationships			DWORD	PowerOn	
-						
-	-	0x0	0x0	0xFFF	7/2	M

Description: Enable screen for the individual F_SENDDP communication relationships

13331	SAFE_SDP_ID			N01, N06, -	FBSI	
-	ID for F_SENDDP communication relationship			DWORD	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	-32768	32767	7/2	M

Description: Any network unique value as ID for F_SENDDP communication relationship.

SIMATIC module parameter: DP_DP_ID

13332	SAFE_SDP_NAME			N01, N06, -	FBSI	
-	Name of SPL connection			STRING	PowerOn	
-						
-	12		-	-	7/2	M

Description: A name can be assigned to each SPL connection.

If a name was assigned, this name will be displayed in the alarm text instead of DP_DP_ID.

13333	SAFE_SDP_CONNECTION_NR			N01, N06, -	FBSI	
-	Number of SPL connection			BYTE	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2	M

Description: This machine data is used to set the number of the SPL connection that is parameterized with this data record.

The number of the SPL connection is at the same time also the index for access to the system variables of the user interface of this SPL connection.

This applies to the following system variables:

- $A_FSDP_ERR_REAC
- $A_FSDP_ERROR
- $A_FSDP_SUBS_ON
- $A_FSDP_DIAG

Example: $MN_SAFE_SDP_CONNECTION_NR[2] = 3 means that the control and status information of the SPL connection that is parameterized via data record 2 can be found in the system variables with field index 3.

13334	SAFE_SDP_LADDR			N01, N06, -	FBSI	
-	Basic address of the input/output data range F_SENDDP			DWORD	PowerOn	
-						
-	12	288,288,288,288,288,288,288,288,288...	288	32767	7/2	M

Description: The start address of the input and output data range - parameterized in SIMATIC STEP 7 - through which F_SENDDP of this communication relationship communicates.

SIMATIC module parameter: LADDR

13335	SAFE_SDP_TIMEOUT			N01, N06, -	FBSI	
s	Monitoring time F_SENDDP			DOUBLE	PowerOn	
-						
-	12	0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5...	0.0	60.0	7/2	M

Description: The monitoring time is the time in which F_SENDDP must have sent a new F telegram to F_RECVDP or in which F_RECVDP must have acknowledged a new F telegram. When the monitoring time is exceeded, F_RECVDP outputs replacement values to the SPL.

SIMATIC module parameter: TIMEOUT

13336	SAFE_SDP_ASSIGN			N01, N06, -	FBSI	
-	Output assignment.$A_OUTSE to F_SENDDP user data			DWORD	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2	M

Description: The SPL signals $A_OUTSE to be transmitted can only be selected area by area.

Format: 00 aaa bbb (decimal) with

aaa = area limit 1, SPL signal $A_OUTSE[aaa]

bbb = area limit 2, SPL signal $A_OUTSE[bbb]

Example: $MN_SAFE_SDP_ASSIGN[0] = 001 004 or alternatively 004 001

The SPL signals $A_OUTSE[1] to $A_OUTSE[4] are transmitted to the F_SENDDP user data selected via MD SAFE_SDP_FILTER[0].

13337	SAFE_SDP_FILTER			N01, N06, -	FBSI	
-	F user data filter between $A_OUTSE and F_SENDDP			DWORD	PowerOn	
-						
-	12	0xFFFF,0xFFFF,0xFFFF,0xFFFF,0xFFFF...	0x0	0xFFFF	7/2	M

Description: The SPL signals selected via MD $MN_SAFE_SDP_ASSIGN are transmitted to the F_SENDDP user data signals in the order of the FILTER bits set to 1. The lowest-value SPL signal to the bit position of the F_SENDDP user data of the lowest-value filter bit set to 1, etc. for all SPL signals selected.

Bit x = 1: an SPL signal is transmitted to bit position x of the F_SENDDP user data.

Bit x = 0: no SPL signal is transmitted to bit position x of the F_SENDDP user data.

13338	SAFE_SDP_ERR_REAC			N01, N06, -	FBSI	
-	Fault reaction			DWORD	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2	M

Description: In the case of a communication error the fault reaction defined here is triggered. This value is valid as long as no other value is specified from the SPL via system variable $A_FSDP_ERR_REAC.

Meaning of the values:

- 0 = alarm 27350 + stop D/E
- 1 = alarm 27350
- 2 = alarm 27351 (displayed only; self-extinguishing)
- 3 = no system reaction

13340	SAFE_RDP_ENABLE_MASK			N01, N06, -	FBSI	
-	Enable screen F_RECVDP communication relationships			DWORD	PowerOn	
-						
-	-	0x0	0x0	0xFFF	7/2	M

Description: Enable screen for the individual F_RECVDP communication relationships

13341	SAFE_RDP_ID			N01, N06, -	FBSI	
-	ID for F_RECVDP communication relationships			DWORD	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	-32768	32767	7/2	M

Description: Any network unique value as ID for F_RECVDP communication relationships.

SIMATIC module parameter: DP_DP_ID

13342	SAFE_RDP_NAME			N01, N06, -	FBSI	
-	Name of SPL connection			STRING	PowerOn	
-						
-	12		-	-	7/2	M

Description: A name can be assigned to each SPL connection.

If a name was assigned, this name will be displayed in the alarm text instead of DP_DP_ID.

13343	SAFE_RDP_CONNECTION_NR			N01, N06, -	FBSI	
-	Assignment SPL connection to system variables			BYTE	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2	M

Description: This machine data is used to set the number of the SPL connection that is parameterized with this data record.

The number of the SPL connection is at the same time also the index for access to the system variables of the user interface of this SPL connection.

This applies to the following system variables:

- $A_FRDP_SUBS
- $A_FRDP_ERR_REAC
- $A_FRDP_ERROR
- $A_FRDP_SUBS_ON
- $A_FRDP_ACK_REQ
- $A_FRDP_DIAG
- $A_FRDP_SENDMODE

Example: $MN_SAFE_RDP_CONNECTION_NR[2] = 3 means that the control and status information of the SPL connection that is parameterized via data record 2 can be found in the system variables with field index 3.

13344	SAFE_RDP_LADDR			N01, N06, -	FBSI	
-	Basic address of the input/output data range F_RECVDP			DWORD	PowerOn	
-						
-	12	288,288,288,288,288,288,288,288,288...	288	32767	7/2	M

Description: The start address of the input and output data range - parameterized in SIMATIC STEP 7 - through which F_RECVDP of this communication relationship communicates.

SIMATIC module parameter: LADDR

13345	SAFE_RDP_TIMEOUT			N01, N06, -	FBSI	
s	Monitoring time F_RECVDP			DOUBLE	PowerOn	
-						
-	12	0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5...	0.0	60.0	7/2	M

Description: The monitoring time is the time in which F_SENDDP must have sent a new F telegram to F_RECVDP or in which F_RECVDP must have acknowledged a new F telegram. When the monitoring time is exceeded, F_RECVDP outputs replacement values to the SPL.

SIMATIC module parameter: TIMEOUT

13346	SAFE_RDP_ASSIGN			N01, N06, -	FBSI	
-	Input assignment. F_RECVDP user data to $A_INSE			DWORD	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2	M

Description: The SPL signals $A_INSE to be supplied can only be selected area by area.

Format: 00 aaa bbb (decimal) with

aaa = area limit 1, SPL signal $A_INSE[aaa]

bbb = area limit 2, SPL signal $A_INSE[bbb]

Example: $MN_SAFE_RDP_ASSIGN[0] = 001 004 or alternatively 004 001

The SPL signals $A_INSE[1] to $A_INSE[4] are transmitted to the F_RECVDP user data selected via MD SAFE_RDP_FILTER[0].

13347	SAFE_RDP_FILTER			N01, N06, -	FBSI	
-	F user data filter between F_RECVDP and $A_INSE			DWORD	PowerOn	
-						
-	12	0xFFFF,0xFFFF,0xFFFF,0xFFFF,0xFFFF...	0x0	0xFFFF	7/2	M

Description: The F_RECVDP user data signals the filter bits of which are set to 1 are transmitted to the SPL signals via MD $MN_SAFE_RDP_ASSIGN. The lowest-value F_RECVDP user data signal to the lowest-value selected SPL signal etc. for all F_RECVDP user data selected.

Bit x = 1: the F_RECVDP user data signal of bit position x is transmitted as SPL signal.

Bit x = 0: the F_RECVDP user data signal of bit position x is not transmitted as SPL signal.

13348	SAFE_RDP_ERR_REAC			N01, N06, -	FBSI	
-	Fault reaction			DWORD	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2	M

Description: In the case of a communication error, the fault reaction defined here is triggered. This value is valid as long as no other value is specified from the SPL via system variable $A_FRDP_ERR_REAC.

Meaning of the values:

- 0 = alarm 27350 + stop D/E
- 1 = alarm 27350
- 2 = alarm 27351 (displayed only; self-clearing)
- 3 = no system reaction

13349	SAFE_RDP_SUBS			N01, N06, -	FBSI	
-	Replacement values in case of error			DWORD	PowerOn	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0	0	0xFFFF	7/2	M

Description: In the case of a communication error, the replacement values defined here are activated in the system variables $A_INSE assigned to this SPL connection.

This value is valid as long as no other value is specified from the SPL via system variable $A_FRDP_SUBS.

14000	ENC_SSI_BAUD_RATE			N01, N10, EXP, N09	-	
-	Baud rate for SSI absolute value encoder			BYTE	PowerOn	
-						
-	-	0	0	4	-1/7	U

Description: Baud rate for SSI_Absolute_value_encoder

Value 0: 250 kHz

Value 1: 250 kHz

Value 2: 400 kHz

Value 3: 500 kHz

Value 4: 1 MHz

14504	MAXNUM_USER_DATA_INT			N03	P3	
-	Number of user data (INT)			DWORD	PowerOn	
-						
-	-	0	0	256	7/2	M

Description: Number of NC/PLC user data of type INT

14506	MAXNUM_USER_DATA_HEX			N03	P3	
-	Number of user data (HEX)			DWORD	PowerOn	
-						
-	-	0	0	256	7/2	M

Description: Number of NC/PLC user data (HEX)

14508	MAXNUM_USER_DATA_FLOAT			N03	P3	
-	Number of user data (FLOAT)			DWORD	PowerOn	
-						
-	-	0	0	32	7/2	M

Description: Number of NC/PLC user data of type FLOAT

14510	USER_DATA_INT			N03	P3	
-	User data (INT)			DWORD	PowerOn	
-						
-	256	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-32768	32767	7/2	I

Description: User data is stored in the NCK-PLC interface, and can be read by the PLC user from the DB20 during the runup.

14512	USER_DATA_HEX			N03	P3	
-	User data (HEX)			DWORD	PowerOn	
-						
-	256	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	0x0FF	7/2	I

Description: User data is stored in the NCK-PLC interface and can be read by the PLC user from the DB20 during the PLC runup.

14514	USER_DATA_FLOAT			N03	P3	
-	User data (FLOAT)			DOUBLE	PowerOn	
-						
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-3.40e38	3.40e38	7/2	I

Description: User data is stored in the NCK-PLC interface, and can be read by the PLC user from the DB20 during the runup.

14516	USER_DATA_PLC_ALARM			N03	A2,P3	
-	User data (HEX)			BYTE	PowerOn	
-						
-	248	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	0/0	S

Description: User data is stored in the NCK-PLC interface and can be evaluated by the PLC basic system (currently for software PLC 2xx).

15700	LANG_SUB_NAME			N01	K1	
-	Name for substitution subroutine			STRING	PowerOn	
-						
-	-		-	-	7/2	M

Description: Name of the user program called on the basis of a substitution configured by MD30465 $MA_AXIS_LANG_SUB_MASK.

The user program is called with the path configured by MD15702 $MN_LANG_SUB_PATH.

15702	LANG_SUB_PATH			N01	K1	
-	Call path for substitution subroutine			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	M

Description: Path with which the user program set by MD15700 $MN_LANG_SUB_NAME is called on the basis of a substitution configured by MD30465 $MA_AXIS_LANG_SUB_MASK:

0: /_N_CMA_DIR (default)

1: /_N_CUS_DIR

2: /_N_CST_DIR

17200	GMMC_INFO_NO_UNIT			EXP	K1	
-	Global HMI information (without physical unit)			DOUBLE	PowerOn	
-						
-	16	3.,4.,3.,1.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	0/7	S

Description: The HMI stores the global display machine data

- $MM_DISPLAY_RESOLTION
- $MM_DISPLAY_RESOLTION_INCH
- $MM_SPIND_DISPLAY_RESOLUTION
- $MM_MA_COORDINATE_SYSTEM

in the NCK machine data from MD17200 $MN_GMMC_INFO_NO_UNIT[0] to MD17200 $MN_GMMC_INFO_NO_UNIT[3]. This enables these display machine data to be accessed from the NCK.

17201	GMMC_INFO_NO_UNIT_STATUS			EXP	K1	
-	Global HMI status info (without physical unit)			BYTE	PowerOn	
-						
-	16	1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0	-	-	0/7	S

Description: Value 0: input not assigned

Value 1: input assigned

17400	OEM_GLOBAL_INFO			A01, A11	-	
-	OEM version information			STRING	PowerOn	
-						
-	5		-	-	7/2	M

Description: A version information freely available to the user

(is indicated in the version screen)

17500	MAXNUM_REPLACEMENT_TOOLS			N09	FBW	
-	Maximal number of replacement tools.			DWORD	PowerOn	
-						
-	-	0	0	32	7/2	M

Description: Only relevant if the tool management function is active.

Only relevant if the tool management (TMMA) function or the tool monitoring function (TMMO) is active.

0: The number of replacement tools is not monitored.

1: Exactly one replacement tool may be assigned to an identifier.

The data does not influence the memory requirement. It is solely for monitoring purposes.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK,

MD20310 $MC_TOOL_MANAGEMENT_MASK

17510	TOOL_UNLOAD_MASK			N09	FBW	
-	Behavior of tool data when unloading			DWORD	PowerOn	
-						
-	-	0	0	0xF	7/2	M

Description: When unloading a tool, certain tool data can be set to store fixed values.

Bit no.Bit valueHEXMeaning

0 0Tool status 'active' remains unchanged.

1 0x1Tool status 'active' is deleted ($TC_TP8, Bit 0).

1 0Tool status 'was in use' remains unchanged.

1 0x2Tool status 'was in use' is deleted ($TC_TP8, Bit 7).

2 0Tool parameter $TC_TP10 remains unchanged.

1 0x4Tool parameter $TC_TP10 is set to zero. That is, the tool replacement change strategy is reset.

3 0Tool parameter $TC_TP11 remains unchanged.

1 0x8Tool parameter $TC_TP11 is set to zero. That is, the assignment to the tool subgroup is resolved.

17515	TOOL_RESETMON_MASK			N09	-	
-	Tool data behavior with RESETMON			DWORD	PowerOn	
-						
-	-	0x14	0	0x49F	7/2	M

Description: The 5th parameter of the RESETMON command defines which tool status is to be reset. If the 5th parameter is omitted, it is replaced by the value in this MD. With the PI service "_N_TRESMON", work is always done with this value.

In that case, the bits are always assigned as the bits in the tool status $TC_TP8[x].

Bit no.: 0 Bit value: 0 hex value: -

Meaning: Tool status "active" remains unchanged

Bit no.: 0 Bit value: 1 hex value: 'H1'

Meaning: Tool status "active" is deleted

Bit no.: 1 Bit value: 0 hex value: -

Meaning: Tool status "released" remains unchanged

Bit no.: 1 Bit value: 1 hex value: 'H2'

Meaning: Tool status "released" is set

Bit no.: 2 Bit value: 0 hex value: -

Meaning: Tool status "locked" remains unchanged

Bit no.: 2 Bit value: 1 hex value: 'H4'

Meaning: Tool status "locked" is deleted, if this is permitted by the monitoring data and the 4th parameter is set correspondingly.

Bit no.: 3 Bit value: 0 hex value: -

Meaning: Tool status "measure" remains unchanged

Bit no.: 3 Bit value: 1 hex value: 'H8'

Meaning: Tool status "measure" is set.

Bit no.: 4 Bit value: 0 hex value: -

Meaning: Tool status "prewarning limit" remains unchanged

Bit no.: 4 Bit value: 1 hex value: 'H10'

Meaning: Tool status "prewarning limit" is deleted, if this is permitted by the monitoring data and the 4th parameter is set.

Bit no.: 5 Not permitted (tool status "tool is being changed")

Bit no.: 6 Not permitted (tool status "tool is fixed-location-coded")

Bit no.: 7 Bit value: 0 hex value: -

Meaning: Tool status "was in use" remains unchanged

Bit no.: 7 Bit value: 1 hex value: 'H80'

Meaning: Tool status "was in use" is deleted

Bit no.: 8 Bit value: 0 Not permitted (tool status "is in retract")

Bit no.: 9 Bit value: 0 hex value: -

Meaning: Tool status "locked is ignored" remains unchanged

Bit no.: 9 Bit value: 1 hex value: 'H200'

Meaning: Tool status "locked is ignored" is deleted

Bit no.: 10 Bit value: 0 hex value: -

Meaning: Tool status "to unload" remains unchanged

Bit no.: 10 Bit value: 1 hex value: 'H400'

Meaning: Tool status "to unload" is deleted

Bit no.: 11 Not permitted (tool status "to load")

```
Bit no.: 12 Bit value: 0 Not permitted (tool status "master tool")
Bit no.: 13 Not permitted (reserved)
The default setting corresponds to the previous behavior.
Impermissible bits are filtered and not displayed in the limit
mask.
Bits not defined here are ignored when writing the machine data.
```

17520	TOOL_DEFAULT_DATA_MASK			N09	FBW	
-	Create new tool: default settings			DWORD	PowerOn	
-						
-	-	0	0	0x1F	7/2	M

Description: When defining a tool for the first time, certain data of the tool can be set to fixed default values. This can prevent simple applications from dealing with data which do not necessarily have to be assigned individual values.

Bit no.: 0 Bit value: 0 Hex value: -

Meaning: Default value of tool status ($TC_TP8), bit1=0 = 'not released'

Bit no.: 0 Bit value: 1 Hex value: 'H1'

Meaning: Default value of tool status ($TC_TP8), bit1=1 = 'released'

Bit no.: 1 Bit value: 0 Hex value: -

Meaning: Default value of tool status ($TC_TP8), bit6=0 = 'not fixed-location-coded'

Bit no.: 1 Bit value: 1 Hex value: 'H2'

Meaning: Default value of tool status ($TC_TP8), bit6=1 = 'fixed-location-coded'

Bit no.: 2 Bit value: 0 Hex value: -

Meaning: The tool is only accepted in the tool group when the explicit write command is used for the tool name. Only then can it be loaded via programming.

Bit no.: 2 Bit value: 1 Hex value: 'H4'

Meaning: The tool is automatically accepted in the tool group corresponding to the tool name when it is defined for the first time. The tool can then be changed using the default name ("t" = t-No.).

The term 'tool name' ($TC_TP2) can be hidden from the user. (This only makes sense if you do not use replacement tools or if the tool name is not written explicitly, as this may give rise to data consistency problems.)

Bit no.: 3 Bit value: 0 Only with TMMG: Default value of location type ($TC_TP7) = 9999 =not defined

Bit no.: 3 Bit value: 1 Hex value: 'H8'

Meaning: Only with TMMG: Default value of location type ($TC_TP7) = 1 and consequently the default value of magazine location type ($TC_MPP2) = 1. This means that all magazine locations can accept all tools.

Bit no.: 4 Bit value: 0 Hex value: -

Meaning: Only with TMMG + active consider adjacent location: With SET/RESET of the magazine location status 'disabled', the magazine location status 'Overlapping allowed' remains unchanged.

Bit no.: 4 Bit value: 1 Hex value: 'H10'

Meaning: Only with TMMG + active consider adjacent location: With SET/RESET of the magazine location status 'disabled' the magazine location status 'Overlapping allowed' occurs automatically with SET/RESET.

17530	TOOL_DATA_CHANGE_COUNTER			EXP, N01	FBW	
-	Mark tool data change for HMI			DWORD	PowerOn	
-						
-	-	0x1F	0	0x1F	7/2	M

Description: HMI display support. This data enables individual data to be explicitly taken into account or not taken into account in the OPI variables (block C/S) toolCounter, toolCounterC, toolCounterM.

Bit no.: 0 Bit value: 0 Hex value: -

Meaning: Changes to the values of the tool status ($TC_TP8) are not taken into account in toolCounterC

Bit no.: 0 Bit value: 1 Hex value: 'H1'

Meaning: Changes to the values of the tool status ($TC_TP8) are taken into account in toolCounterC

Bit no.: 1 Bit value: 0 Hex value: -

Meaning: Changes to the values of the remaining number of tools ($TC_MOP4) are not taken into account in toolCounterC

Bit no.: 1 Bit value: 1 Hex value: 'H2'

Meaning: Changes to the values of the remaining number of tools ($TC_MOP4) are taken into account in toolCounterC

Bit no.: 2 Bit value: 0 Hex value: -

Meaning: Changes to the values of the tool data are not taken into account in the tool data update service

Bit no.: 2 Bit value: 1 Hex value: 'H4'

Meaning: Changes to the values of the tool data are taken into account in the tool data update service

Bit no.: 3 Bit value: 0 Hex value: -

Meaning: Changes to the values of the magazine data are not taken into account in the tool data update service

Bit no.: 3 Bit value: 1 Hex value: 'H8'

Meaning: Changes to the values of the magazine data are taken into account in the tool data update service.

Bit no.: 4 Bit value: 0 Hex value: -

Meaning: Changes to the values of the ISO tool offset data are not taken into account in the tool data update service

Bit no.: 4 Bit value: 1 Hex value: 'H10' Meaning: Changes to the values of the ISO tool offset data are taken into account in the tool data update service

The statements "Changes to the values of the tool status" and "Changes to the values of the remaining number of tools" refer not only to value changes effected by internal processes in the NC but also to value changes produced by writing the corresponding system variables.

17540	TOOLTYPES_ALLOWED		N09	-	
-	Permitted tool types		DWORD	PowerOn	
-					
-	-	0x3FF	0	0x3FF	7/2	M

Description: Definition of the tool types permitted in NCK (see $TC_DP1) with the tool offset selection. That is, tools of any type may be loaded in the NCK; but only the tools types defined here may be defined in the offset defining tool. A bit value = 1 means that the named tool type range is permitted for the offset selection. A bit value = 0 means that the named tool type range is rejected with an offset-capable alarm in the case of an attempted offset selection of a cutting edge of this type. The special value = 0, 9999 for the tool type means "undefined". Tool offsets with this tool type value generally cannot be selected.

Bit no.: 0 value 0x1 means: Tool types 1 to 99 permitted

Bit no.: 1 value 0x2 means: Tool types 100 to 199 permitted (milling tools)

Bit no.: 2 value 0x4 means: Tool types 200 to 299 permitted (drilling tools)

Bit no.: 3 value 0x8 means: Tool types 300 to 399 permitted

Bit no.: 4 value 0x10 means: Tool types 400 to 499 permitted (grinding tools)

Bit no.: 5 value 0x20 means: Tool types 500 to 599 permitted (turning tools)

Bit no.: 6 value 0x40 means: Tool types 600 to 699 permitted

Bit no.: 7 value 0x80 means: Tool types 700 to 799 permitte

Bit no.: 8 value 0x100 means: Tool types 800 to 899 permitted

Bit no.: 9 value 0x200 means: Tool types 900 to 999 permitted

Related to:

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

17600	DEPTH_OF_LOGFILE_OPT			EXP, N01	-	
-	Depth of log memory optimization in REORG			DWORD	Reset	
-						
-	-	5	0	300	3/3	M

Description: The depth of memory optimization in the REORG log file

(=search depth to determine if a parameter to be written is already included in the REORG log file).

The value of the machine data can be increased if alarm 15110 occurs during program execution and if this alarm is to be avoided.

(Alternatively, the size of the REORG log file can be increased with MD28000 $MC_MM_REORG_LOG_FILE_MEM, provided that the operator has the access rights required. This procedure should generally be preferred.)

Value

0 = No optimization,

That is each write operation creates an input into the REORG log file. Writing a variable value is therefore very time-efficient, but requires more memory.

0< n <= Maximum value

When a new variable value is written, the n previously entered write operations (but maximally up to the previous indicatable block) are checked to determine if the parameter now to be written has already been written in the past. If this is the case, a new entry is not made in the REORG log file.

If this is not the case, an entry is made. A variable value can therefore be written in a very memory-efficient way, but requires more time.

Example:

MD17600 $MN_DEPTH_OF_LOGFILE_OPT is assumed to be 5 and the following would be a typical program sequence:

```
x10     ; Executable NC block
r1=1    ; The first write command since x10
        ; -> Save old value in log file. 1st entry
r2=1    ; Determine that r2 is not yet included
        ; -> Save old value in log file. 2nd entry
r3=1    ; Determine that r3 is not yet included
        ; -> Save old value in log file. 3rd entry
r4=1    ; Determine that r4 is not yet included
        ; -> Save old value in log file. 4th entry
r5=1    ; Determine that r5 is not yet included
        ; -> Save old value in log file. 5th entry
r6=1    ; Determine that r6 is not yet included
        ; -> Save old value in log file. 6th entry
r2=1    ; Determine that r2 is already included
        ; (5th oldest entry) -> no renewed saving
r3=1    ; Determine that r3 is already included
        ; (4th oldest entry) -> no renewed saving
r1=2    ; As MD17600 $MN_DEPTH_OF_LOGFILE_OPT = 5 it is not
detected that
        ; r1 is already included
```

```
        ; (6th oldest entry) -> save old value in log file.
        ; 7th entry
x20     ; Executable NC block
r1=3    ; The first write command since x20
        ; -> Save old value in log file. 1st entry
r1=4    ; Determine that r1 is already included
        ; (Only one entry) -> no renewed saving
```

The setting of the MD is particularly useful if a small number of verious parameters

are written frequently (e.g. in a loop) and if alarm 15110 occurs for this reason.

17610	DEPTH_OF_LOGFILE_OPT_PF			EXP, N01	-	
-	Depth of the PowerFail log memory optimization			DWORD	Reset	
-						
-	3	10,0,0	0	300	1/1	M

Description: Depth of the memory optimization in the PowerFail log file (=search depth, to find out

whether a parameter to be written is already included in the PowerFail log file).

It is possible to increase the value of the machine data if

alarm 15120 occurs during program processing and if you wish to avoid it.

(Alternatively, you can increase the size of the PowerFail log file itself

by means of MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM, if you have the necessary access right

and if the required memory is available.

Value

0 = same effect as value 1.

Writing of a variable value is therefore very time-efficient at the cost of the required memory.

0< n <= Maximum value

= Writing of a new variable value leads, prior to saving of the new variable value in the PowerFail log file, to the last n writeoperations which have been being checked to see whether

the new parameter to be written has already been written once.

If yes, the new value is not entered again in the PowerFail log file, but the old value is overwritten with the new one.

If no, the new value is entered.

At the cost of the required time, writing of a variable value can therefore be designed very memory-efficiently.

Changing of the data can shorten/increase the time requirement of the present application.

Changing of the data can fill the available log buffers faster/more slowly.

Frequent occuring of alarm 15120 -> Increase values for index=0,1,2.

The value indicating the index to be changed can be deducted from the parameter of alarm 15120:

if it is the value for MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM[0], then increase the value for index 0;

or increase MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM[0] itself.

Index Meaning

0 Search depth in preprocessing buffer

1 Search depth in buffer for data changes within the range of tool change

2 Search depth in buffer for data changes of main processing (especially synchronized actions)

17900	VDI_FUNCTION_MASK			EXP, N09	H1	
-	Setting to VDI signals			DWORD	PowerOn	
-						
-	-	0x0	0	0x1	7/2	M

Description: Settings for VDI signals:

Bit 0 == 0:

The VDI signals motion command + / motion command - are already issued if there is a travel request (default).

Bit 0 == 1:

The VDI signals motion command + / motion command - are issued only if the axis actually moves.

1.3.3 System specific memory settings

18000	VDI_UPDATE_IN_ONE_IPO_CYCLE			EXP, N01	P3	
-	PLC interface update			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	0/0	S

Description: 1: Complete reading/writing of the VDI interface in one IPO cycle

0: Complete reading/writing of the VDI interface in two IPO cycles

18030	HW_SERIAL_NUMBER			N05	-	
-	Hardware series number			STRING	PowerOn	
-						
-	1		-	-	7/RO	M

Description: During power on of the control, a unique hardware serial number is stored in this MD:

- For Powerline series modules this is the serial number of the NCU module
- For Solutionline series modules this is the serial number of the CF card, or the unique number of the MCI module in the case of PC-based systems

This data cannot be written.

18040	VERSION_INFO	N05	IAD
-	Version and possibly data of the PCMCIA card, not FM-NC	STRING	PowerOn
-			

Description: Version identifiers of the system software

The identifiers of the PCMCIA card (assigned by the configuration management) and the 'system_date_time' from the NCK are stored in this MD during control power on. A unique assignment can always be made with this data from the MD block (startup file or INITIAL_INI) to a software release.

18050	INFO_FREE_MEM_DYNAMIC			N01, N02, N05	S7	
-	Display data of free dynamic memory			DWORD	PowerOn	
-						
-	-	1048576	-	-	7/RO	M

Description: The data is used for

a) the manufacturer's presetting of the memory size [bytes] available to the user for each channel after cold restart.

b) Displaying the available dynamic memory [bytes]

The data cannot be written.

The contents of the data state how much unbuffered memory is available per channel for increasing the unbuffered user data storage area via MD.

One should check whether the available memory is sufficient before increasing, for example, the number of LUDs, number of functional parameters, or the size of the IPO buffer.

If necessary, proceed step by step:

- increase by 1, note (old) value
- NCK startup (= 'warm start' or NCK reset), read off new value
- memory requirement = new value - old value

On the first NCK startup or cold restart of the control (=deletion of user data), MD18210 $MN_MM_USER_MEM_DYNAMIC is set by the NCK software so that at least the preset value results for MD18050 $MN_INFO_FREE_MEM_DYNAMIC.

That is, the value is automatically increased if the initial value of MD18210 $MN_MM_USER_MEM_DYNAMIC is too low.

The following also applies to multichannel systems:

- The preset value applies to each possible channel. That is, if there are ten possible channels, MD18210 $MN_MM_USER_MEM_DYNAMIC is set by the NCK SW so that at least the 'preset value* ten' results for MD18050 $MN_INFO_FREE_MEM_DYNAMIC.
- On activation of a channel, MD18210 $MN_MM_USER_MEM_DYNAMIC is increased if necessary so that the memory free at the time of activation continues to be free (provided that the memory structure permits this) after the channel has become active.
- The activation of the maximum possible number of axes is ensured by increasing the data MD18210 $MN_MM_USER_MEM_DYNAMIC if necessary so that memory free at the time of activation continues to be free (provided that the memory structure permits this) after the axis has become active.

'If necessary' in the previous sentences means that the adjustment is automatic if the channel/axis could not be activated with the current values of MD18210 $MN_MM_USER_MEM_DYNAMIC/ $MN_INFO_FREE_MEM_DYNAMIC.

18060	INFO_FREE_MEM_STATIC			N01, N02, N05	S7	
-	Display data of free static memory			DWORD	PowerOn	
-						
-	-	2097152	-	-	7/RO	M

Description: The following applies to powerline control models:

Output of the buffered memory available in the passive file system [bytes].

The data cannot be written.

The preset value states the minimum number of bytes available to the user when the NCK starts up with a cold restart.

The contents of the data state how much battery-backed memory is available for the passive file system at the time of startup.

After a non-buffered startup, the maximum memory available in the file system can be read.

If MDs that affect the requirement for buffered memory (e.g. MM_NUM_GUD_VALUES_MEM, MD38000 $MA_MM_ENC_COMP_MAX_POINTS) are changed then this changes the amount of memory available for the passive file system, as the amount of memory allocated to the passive file system consists of MD18230 $MN_MM_USER_MEM_BUFFERED minus all other buffered user data.

(See also the document on MD18350 $MN_MM_USER_FILE_MEM_MINIMUM)

At the first NCK startup or cold restart of the control (=deletion of user data) MD18230 $MN_MM_USER_MEM_BUFFERED is set by the NCK software so that at least the default value results for MD18060 $MN_INFO_FREE_MEM_STATIC.

That is MD18230 $MN_MM_USER_MEM_BUFFERED is automatically increased if its initial value is too low.

The following applies to solution line control models:

The data reserves the available memory for the data that are not the passive file system.

(MD18350 $MN_MM_USER_FILE_MEM_MINIMUM[0] dimensions the passive file system.)

Machine data for setting the active file system (tools, GUDs, ...) can be increased until this memory has all been allocated.

18070	INFO_FREE_MEM_DPR			EXP, N01, N02, N05	S7	
-	Display data of free memory in DUAL PORT RAM			DWORD	PowerOn	
-						
-	-	0	-	-	7/RO	M

Description: Output of the available memory in the Dual Port RAM (Bytes).

The data cannot be written.

18072	INFO_FREE_MEM_CC_MD			EXP, N01, N05	-	
-	Display of free memory in CC-MD memory			DWORD	PowerOn	
-						
-	-	0	-	-	0/RO	S

Description: Output of the available memory for compile cycle MDs (bytes).

The data cannot be written.

18074	MM_TOOL_MANAGEMENT_TRACE_SZ			N02, N09	/FBW/, "Description of Functions, Tool Management"	
-	Max. size of the tool management diagnostic ring buffers			DWORD	PowerOn	
-						
-	2	25,25	4	500	7/2	M

Description: The number of entries in the tool management diagnostic ring buffers.

Index 0 = IPO trace buffer size.

Index 1 = Prep trace buffer size.

There are separate IPO trace buffers in each channel, and a Prep trace buffer in channel 1 only.

The buffers are allocated only if bit 0 (0x0001) is ON at warm start, in both MD18080 $MN_MM_TOOL_MANAGEMENT_MASK and per-channel MD20310 $MC_TOOL_MANAGEMENT_MASK.

Trace data is written to the buffers when bit 13 (0x2000) is ON in per-channel MD20310 $MC_TOOL_MANAGEMENT_MASK.

18075	MM_NUM_TOOLHOLDERS			N02, N09	/FBW/, "Description of Functions, Tool Management"	
-	Max. number of tool holders per TOA			DWORD	PowerOn	
-						
-	-	16	1	128	7/2	M

Description: Max. number of definable tool holders per TO range.

The address extension e of commands Te=t, Me=6 (*) is the number of the tool holder.

t=T number/tool name - depending on the function activated in the NCK.

(*) if: MD22550 $MC_TOOL_CHANGE_MODE=1 and MD22560 $MC_TOOL_CHANGE_M_CODE=6 applies

Normally the tool holder of milling machines is a spindle.

Also see MD20090 $MC_SPIND_DEF_MASTER_SPIND.

For turning machines the tool holder normally is not a spindle axis.

Also see MD20124 $MC_TOOL_MANAGEMENT_TOOLHOLDER.

In this case it should reasonably apply that MD18075 $MN_MM_NUM_TOOLHOLDERS is larger or equal to MD20090 $MC_SPIND_DEF_MASTER_SPIND/MD20124 $MC_TOOL_MANAGEMENT_TOOLHOLDER.

If bit 0 = 1 in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK and MD20310 $MC_TOOL_MANAGEMENT_MASK is set (=magazine management (TOOLMAN))

it will apply for reasonable values that MD18075 $MN_MM_NUM_TOOLHOLDERS is smaller or equal to MD18076 $MN_MM_NUM_LOCS_WITH_DISTANCE.

A maximum of MD18075 $MN_MM_NUM_TOOLHOLDERS intermediate memory locations of the type spindle

($TC_MPP1[9998,x]=2) can then be defined.

Example: TOOLMAN inactive

MD20090 $MC_SPIND_DEF_MASTER_SPIND shall be =3, MD18075 $MN_MM_NUM_TOOLHOLDERS shall be =3.

Then T1=t, T2=t, T3=t, T=t can be programmed.

Example: TOOLMAN active, milling machine with Me=6 as tool change command

MD18075 $MN_MM_NUM_TOOLHOLDERS shall be = 14, MD18076 $MN_MM_NUM_LOCS_WITH_DISTANCE=20,

10 channels shall be active, all channels have TOOLMAN active and have the same tool and magazine data

(=one TO range for all channels). MD20090 $MC_SPIND_DEF_MASTER_SPIND=1,.....10 for the channels.

Then up to 14 locations of the kind 'tool holder'/'spindle' can be defined in the intermediate magazine memory.

Additional 6 grippers or others can be defined.

These 20 locations max. can be linked to magazines.

In the channels T1=t, ... T14=t and Tt, or M1=6,....M14=6 and M6 can be programmed.

The PLC version used can limit the maximum number of tool holders.

18076	MM_NUM_LOCS_WITH_DISTANCE		N02, N09	/FBW/, "Description of Functions, Tool Management"	
-	Max. number of magazine locations per TOA with remote connection		DWORD	PowerOn	
-					
-	-	32	1	128	7/2	M

Description: This machine data is reasonable, if the magazine management function, TOOLMAN, is active

- See MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, MD20310 $MC_TOOL_MANAGEMENT_MASK; for each bit 0 = 1.

Max. number of magazine locations (spindles, load locations,...) per TOA, that can

have a remote connection to a magazine, defined by $TC_MDPx[n,m].

Example: TOOLMAN shall be active: MD18076 $MN_MM_NUM_LOCS_WITH_DISTANCE shall be = 5 and MD18077 $MN_MM_NUM_DIST_REL_PER_MAGLOC = 2.

Two TO units shall be defined with three tool holders/spindles and two load locations each.

Furthermore, two grippers each shall be defined in each TO unit.

This means that a total of 14 locations shall be defined in the intermediate memory magazine/load magazine for the distances and assignments.

4 magazines shall be defined for TO unit 1, 6 magazines for TO unit 2.

With the value set to MD18076 $MN_MM_NUM_LOCS_WITH_DISTANCE = 5 each tool holder and each load location

of the two TO units with up to two magazines (MD18077 $MN_MM_NUM_DIST_REL_PER_MAGLOC = 2) per remote relationship

can be connected; (see $TC_MDP1 and $TC_MDP2) and for each tool holder max. two more grippers

(MD18077 $MN_MM_NUM_DIST_REL_PER_MAGLOC = 2) can be assigned; (see $TC_MLSR).

One tool holder / one spindle location can subsequently have two tables - one distance table for magazines and

one assignment table for grippers and similar locations.

18077	MM_NUM_DIST_REL_PER_MAGLOC			N02, N09	/FBW/, "Description of Functions, Tool Management"	
-	Max. no. of magazines in the distance table of a magazine loc.			DWORD	PowerOn	
-						
-	-	SLMDMAXLINKEDMAGAZINES	0	32	7/2	M

Description:

This machine data will only be active, if the magazine management, TOOLMAN function is active.

- See MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, MD20310 $MC_TOOL_MANAGEMENT_MASK.

Two sizes are defined with this magazine data:

1.) Max. number of magazines in the distance table of a magazine location (spindle, load location, ...)

2.) Max. number of locations (gripper, ...) in the connection table of a spindle/tool holder location.

Example: MD18077 $MN_MM_NUM_DIST_REL_PER_MAGLOC shall be = 3.

Two TO units shall be defined with two tool holder/spindles each and one load location each.

Furthermore four grippers shall be defined in each TO unit.

4 magazines shall be defined for TO unit 1; 6 magazines shall be defined for TO unit 2.

Then, each tool holder can define max. three distances for the magazines (see $TC_MDP2)

and additionally a max. of three relationships to the grippers ($TC_MLSR).

18078	MM_MAX_NUM_OF_HIERARCHIES			N02, N09	/FBW/, "Description of Functions, Tool Management"	
-	The maximum number of hierarchies for magazine location types			DWORD	PowerOn	
-						
-	-	8	0	32	7/2	M

Description:

The machine data only has effect if the function 'tool magazine management', TMMG, is activated - see MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, MD20310 $MC_TOOL_MANAGEMENT_MASK.

The maximum number of hierarchies for magazine location types.

In variable $TC_MPTH[n,m], the allowed range of n is from 0 to ($MN_MM_MAX_NUM_OF_HIERARCHIES - 1).

(The maximum of index m is given by MD18079 $MN_MM_MAX_HIERARCHY_ENTRIES.)

Value = 0 means that the function 'magazine location type hierchies' is not available.

18079	MM_MAX_HIERARCHY_ENTRIES			N02, N09	/FBW/, "Description of Functions, Tool Management"	
-	The max. number of entries in a mag. location type hierarchy.			DWORD	PowerOn	
-						
-	-	8	1	32	7/2	M

Description: The machine data is only effective if the function 'tool magazine management', TMMG, is activated - see MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, MD20310 $MC_TOOL_MANAGEMENT_MASK - and if MD18078 $MN_MM_MAX_NUM_OF_HIERARCHIES is greater than zero.

The maximum number of entries in a magazine location type hierarchy.

The permissible range of the index m of system parameter $TC_MPTH[n,m] is from 0 to 'MD18079 $MN_MM_MAX_HIERARCHY_ENTRIES - 1'.

(The maximum of index n is given by MD18078 $MN_MM_MAX_NUM_OF_HIERARCHIES.)

18080	MM_TOOL_MANAGEMENT_MASK			N02, N09	K1,W1	
-	Step-by-step memory reservation for tool management (SRAM)			DWORD	PowerOn	
-						
-	-	0x0	0	0xFFFF	7/1	S

Description: Activating the TM memory with "0" means:

The set TM data does not take up any memory space, TM is not available.

Bit 0=1: Memory for TM-specific data is provided, the MDs which reserve memory space have to be set accordingly (MD18086 $MN_MM_NUM_MAGAZINE_LOCATION, MD18084 $MN_MM_NUM_MAGAZINE)

Bit 1=1: Memory for monitoring data (WZMO) is provided

Bit 2=1: Memory for user data (CC data) is provided

Bit 3=1: Memory to consider adjacent location is provided

Bit 4=1: Memory and function enable for PI service _N_TSEARC = "Complex search for tools in magazines" is provided.

Bit 5=1: Wear monitoring active

Bit 6=1: Wear grouping available

Bit 7=1: Reserve memory for adapters for magazine locations

Bit 8=1: Memory for application and/or setup offsets

Bit 9=1: Tools associated with a revolver no longer leave their revolver location on tool change (display).

Bit 10=1:The multitool function is available
(other MDs can be used to modify the configuration).

Bit 10=0:The multitool function is not available
(the functional scope configured with other MDs is ineffective).

This broken down approach to memory reservation means that memory usage can be optimized in line with the functions used.

Example:

Default memory reservation for TM:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK = 3 (bit 0 + 1=1) means that TM and tool monitoring data are provided

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK = 1 means tool management without tool monitoring function data

18082	MM_NUM_TOOL			N02, N09	FBW,S7	
-	Number of tools the NCK can manage (SRAM)			DWORD	PowerOn	
-						
-	-	30	0	1500	7/2	M

Description: The NC cannot manage more tools than the number entered in the MD. A tool has at least one cutting edge.

Buffered user memory is used.

The maximum possible number of tools is equal to the number of cutting edges. The MD must also be set when TOOLMAN is not used.

The buffered data are lost when the machine data is changed.

Related to:

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

18084	MM_NUM_MAGAZINE			N02, N09	FBW	
-	Number of magazines the NCK can manage (SRAM)			DWORD	PowerOn	
-						
-	-	3	0	32	7/2	M

Description: Tool management (TOOLMAN and TMMG) - only when MD TOOLMAN and option TOOLMAN are set:

Number of magazines which the NCK can manage (active and background magazines).

This MD reserves the buffered memory for the magazines.

Important: One loading and one buffer magazine are set up in in the tool management for each TOA unit. These magazines have to be taken into account here.

Value = 0 -The tool management cannot be activated because no data can be created.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD20310 $MC_TOOL_MANAGEMENT_MASK

18086	MM_NUM_MAGAZINE_LOCATION			N02, N09	FBW	
-	Number of magazine locations the NCK can manage (SRAM)			DWORD	PowerOn	
-						
-	-	30	0	600	7/2	M

Description: TMMG - only when MD TOOLMAN and TOOLMAN option are set:

Number of magazine locations which the NCK can manage.

This machine data reserves the buffered memory for the magazine lcations.

Important: The number of all buffers and loading points also has to be included in the calculation here.

Value = 0: Tool management cannot be activated because no data can be created.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD20310 $MC_TOOL_MANAGEMENT_MASK

18088	MM_NUM_TOOL_CARRIER			N02, N09	W1	
-	Maximum number of definable tool holders			DWORD	PowerOn	
-						
-	-	0	0	600	7/2	M

Description: Maximum number of definable toolholders for orientable tools in the TO area. The value is divided by the number of active TO units. The integer result states how many toolholders can be defined for each TO unit. The data for defining a toolholder are set with the system variables $TC_CARR1, ... $TC_CARR14.

The data are stored in battery-backed memory.

Application example(s):

-

18090	MM_NUM_CC_MAGAZINE_PARAM			N02, N09	FBW	
-	Number of magazine data generated and evaluated by the CC (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description: Number of magazine data (of type Integer) which are available to the user or the compile cycle.

This machine data increases the buffered memory requirement by sizeof(int)*max. number of magazines.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD18084 $MN_MM_NUM_MAGAZINE

18091	MM_TYPE_CC_MAGAZINE_PARAM			N02, N09	-	
-	Type of OEM magazine data (SRAM)			DWORD	PowerOn	
-						
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2	M

Description: Work may only be done with the default setting.

Individual types can be assigned to the parameters in this way. Array index n can take values from 0 to that of MD18090 $MN_MM_NUM_CC_MAGAZINE_PARAM.

The possible values of the MD = 1, 2, 3, 4, 5 and 6 stand for the NC language types: BOOL, CHAR, INT, REAL, STRING and AXIS. The type FRAME cannot be defined here. The type STRING can have a max. length of 31 characters. Example:

MD18090 $MN_MM_NUM_CC_MAGAZINE_PARAM=1

MD18091 $MN_MM_TYPE_CC_MAGAZINE_PARAM=5

Parameter $TC_MAPC1 = "UserMagazine" can then be programmed.

Buffered work memory is used. A value change may but need not necessarily lead to a reconfiguration of the buffered memory.

Related to:

MD18090 $MN_MM_NUM_CC_MAGAZINE_PARAM

MD18084 $MN_MM_NUM_MAGAZINE

18092	MM_NUM_CC_MAGLOC_PARAM			N02, N09	FBW	
-	Number of OEM magazine location data			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description: Number of magazine location data parameters (of type Integer) which are available to the user or the compile cycle.

This machine data increases the buffered memory requirement by sizeof(int)*max. number of magazines.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD18086 $MN_MM_NUM_MAGAZINE_LOCATION

18093	MM_TYPE_CC_MAGLOC_PARAM			N02, N09	-	
-	Type of OEM magazine location data (SRAM)			DWORD	PowerOn	
-						
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2	M

Description: Work may only be done with the default setting.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD18090 $MN_MM_NUM_CC_MAGAZINE_PARAM.

The possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL and

6 AXIS

The type STRING is explicitly not possible here. The value 5 is treated like 2. The type FRAME cannot be defined here.

Example:

MD18090 $MN_MM_NUM_CC_MAGAZINE_PARAM=1

MD18091 $MN_MM_TYPE_CC_MAGAZINE_PARAM=2

"UserMagazineLocation" can then be programmed for the parameter $TC_MPPC1.

Buffered working memory is used. A value change can - but need not - lead to reconfiguration of the buffered memory.

Related to:

MD18092 $MN_MM_NUM_CC_MAGLOG_PARAM

18094	MM_NUM_CC_TDA_PARAM			N02, N09	H2	
-	Number of OEM tool data (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description: Number of tool-specific data (of type Integer) which can be created per tool, and which are available to the user or the compile cycle.

This machine data increases the buffered memory requirement by sizeof(double)*max. number of tools.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD18082 $MN_MM_NUM_TOOL

18095	MM_TYPE_CC_TDA_PARAM		N02, N09	-	
-	Type of OEM tool data (SRAM)		DWORD	PowerOn	
-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2	M

Description: Work may only be done with the default setting.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD18094 $MN_MM_NUM_CC_TDA_PARAM.

The possible values of the MD = 1, 2, 3, 4, 5 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL,

5 STRING and

6 AXIS.

The type FRAME cannot be defined here. The type STRING can be up to 31 characters long.

Example:

MD18094 $MN_MM_NUM_CC_TDA_PARAM=1

MD18095 $MN_MM_TYPE_CC_TDA_PARAM=5

"UserCuttingEdge" can then be programmed for parameter $TC_TPC1.

Buffered working memory is used. A value change can - but need not - lead to reconfiguration of the buffered memory.

Related to:

MD18094 $MN_MM_NUM_CC_TDA_PARAM

MD18082 $MN_MM_NUM_TOOL

18096	MM_NUM_CC_TOA_PARAM			N02, N09	G2	
-	Number of data per tool edge for compile cycles (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description: Number of TOA data (of type Real) which can be created per tool, and which are available to the user or the compile cycle.

This MD increases the buffered memory requirement by sizeof(double)*max. number of cutting edges.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

18097	MM_TYPE_CC_TOA_PARAM			N02, N09	-	
-	Type of OEM data per cutting edge (SRAM)			DWORD	PowerOn	
-						
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2	M

Description:

Work may only be done with the default setting.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD18096 $MN_MM_NUM_CC_TOA_PARAM.

The possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL and

6 AXIS.

The type STRING is explicitly not possible here. The value 5 is treated like value 2).

The type FRAME cannot be defined here.

Example:

MD18096 $MN_MM_NUM_CC_TOA_PARAM=1

MD18097 $MN_MM_TYPE_CC_TOA_PARAM=2

"A" can then be programmed for parameter $TC_DPC1.

Buffered working memory is used. A value change can - but need not - lead to reconfiguration of the buffered memory.

Related to:

MD18096 $MN_MM_NUM_CC_TOA_PARAM

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

18098	MM_NUM_CC_MON_PARAM			N02, N09	FBW	
-	Number of monitoring data per tool for compile cycles			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description:

Number of monitoring data (of type Integer) which can be created per tool, and which are available to the user or the compile cycle.

This MD increases the buffered memory requirement by sizeof(int)*max. number of cutting edges.

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

18099	MM_TYPE_CC_MON_PARAM			N02, N09	FBW	
-	Type of OEM monitor data (SRAM)			DWORD	PowerOn	
-						
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2	M

Description: Work may only be done with the default setting.

Individual types can be assigned to the parameters in this way. The array index n can accept values from 0 to the value of MD18098 $MN_MM_NUM_CC_MON_PARAM.

Possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types

1 BOOL,

2 CHAR,

3 INT,

4 REAL and

6 AXIS.

The FRAME type cannot be defined here.

(The type STRING is explicitly not possible here. The value 5 is treated like value 2.)

Example:

MD18098 $MN_MM_NUM_CC_MON_PARAM=1

MD18099 $MN_MM_TYPE_CC_MON_PARAM=2

"UserCuttingEdge" can then be programmed for the parameter $TC_MOPC1.

Buffered working memory is used. A value change can - but need not - lead to reconfiguration of the buffered memory.

Related to:

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

MD18098 $MN_MM_NUM_CC_MON_PARAM

18100	MM_NUM_CUTTING_EDGES_IN_TOA			N02, N09	W1	
-	Tool offsets in the TO range (SRAM)			DWORD	PowerOn	
-						
-	-	30	0	1500	7/2	M

Description: Defines the number of tool cutting edges in a TO area. This machine data reserves approximately 250 bytes of battery-backed memory per TOA block for each tool cutting edge, irrespective of the tool type.

Tools with cutting edges of type 400-499 (= grinding tools) also occupy the location of a cutting edge.

Example:

Defining 10 grinding tools each of which has one cutting edge. Then at least:

MD18082 $MN_MM_NUM_TOOL = 10

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA = 20 must apply.

See also MD18082 $MN_MM_NUM_TOOL

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

18102	MM_TYPE_OF_CUTTING_EDGE			N02, N09	W1	
-	Type of D No. programming (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	1	7/2	M

Description: This MD activates the 'flat D number management'.

The type of D programming can be determined by individual values:

- direct or
- indirect programming.

The default value is zero. This means that the NCK manages the T and D numbers.

The NCK only accepts a value > 0 if bit 0 is not set in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK. That means the tool managment function cannot be active at the same time.

Value: Meaning

0: No 'flat D number management' active

1: D numbers are programmed directly and absolutely

Values 2, 3 have not yet been released

18104	MM_NUM_TOOL_ADAPTER			N02, N09	W1	
-	Tool adapters in TO area (SRAM)			DWORD	PowerOn	
-						
-	-	-1	-1	600	7/2	M

Description: Number of tool adapters in the TO area.

The function can only be used if there are magazine locations in the NCK.

The tool management function must be active.

Bit 7 (=0x80) also has be set in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK for the setting to become active.

Adapter data blocks and the cutting edge-specific basic/adapter dimensions are mutually exclusive. This means that if adapter data are defined, then the parameters $TC_DP21, $TC_DP22, $TC_DP23 and their values are generally not available in the NCK.

-1:

An adapter is automatically assigned to each magazine location.

This means that internally the same number of adapters are provided as magazine locations are provided by MD18086 $MN_MM_NUM_MAGAZINE_LOCATION.

0:

No adapter data definitions possible. The cutting edge-specific parameters $TC_DP21, $TC_DP22, $TC_DP23 are available provided that adapters are used outside the active TMMG.

> 0:

-

See the machine data:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK,

MD20310 $MC_TOOL_MANAGEMENT_MASK,

MD18084 $MN_MM_NUM_MAGAZINE,

MD18086 $MN_MM_NUM_MAGAZINE_LOCATION

18105	MM_MAX_CUTTING_EDGE_NO			N02, N09	W1	
-	maximum value of D number			DWORD	PowerOn	
-						
-	-	9	1	32000	7/2	M

Description:

Maximum value of the D number.

This does not affect the maximum number of D numbers per cutting edge.

The monitoring of the D number assignment associated with this value is only active when the D numbers are redefined. This means that existing data blocks are not subsequently checked if the MD is changed.

The following settings are advantageus:

MD18105 $MN_MM_MAX_CUTTING_EDGE_NO is equal to

MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL.

If MD18105 $MN_MM_MAX_CUTTING_EDGE_NO is selected > MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL, then the difference between offset number D and cutting-edge number CE should be known.

See also language commands CHKDNO, CHKDM, GETDNO, SETDNO, DZERO.

The machine data is not evaluated with the function "flat D number", and therefore has no significance there.

The MD can affect the memory requirement:

If the relation between the two, above-mentioned MDs changes from "less than or equal to" to "greater than" or vice versa, then this affects the non-buffered memory requirement.

Related to:

MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL

18106	MM_MAX_CUTTING_EDGE_PERTOOL			N02, N09	W1	
-	maximum number of D numbers per tool			DWORD	PowerOn	
-						
-	-	9	1	12	7/2	M

Description: Maximum number of cutting edges (D offsets) per tool (per T number).

This enables more safety to be achieved in the data definition. The value can be set to 1 if only tools with one cutting edge are used. This prevents more than one cutting edge being assigned to a tool in the data definition.

The following settings are advantageus: MD18105 $MN_MM_MAX_CUTTING_EDGE_NO is equal to MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL. If MD18105 $MN_MM_MAX_CUTTING_EDGE_NO is selected > MD18106 $MN_MM_MAX_CUTTING_EDGE_PER_TOOL, then the difference between offset number D and cutting-edge number CE should be known.

See also language commands CHKDNO, CHKDM, GETDNO, SETDNO, DZERO.

The machine data is not evaluated with the function "flat D number", and therefore has no significance there.

The data can affect the memory requirement.

The MD can affect the memory requirement.

If the relation between the two, above-mentioned MDs changes from "less than or equal to" to "greater than" or vice versa, then this affects the non-buffered memory requirement.

Related to:

MD19105 $MN_MM_MAX_CUTTING_EDGE_NO

18108	MM_NUM_SUMCORR			N02, N09	W1	
-	Resulting offsets in TO area (SRAM)			DWORD	PowerOn	
-						
-	-	-1	-1	9000	7/2	M

Description: Total number of resulting offsets in the NCK.

The value = -1 means that the number of resulting offsets is equal to the number of cutting edges multiplied by the number of resulting offsets per cutting edge.

A value > 0 and < "number of cutting edges multiplied by the number of resulting offsets per cutting edge" means that a maximum "number of resulting offsets per cutting edge" can be defined per cutting edge but do not have to be. This means that buffered memory can be used economically. Only those cutting edges for which expliicit data have been defined have a resulting offset data block.

Buffered memory is reserved. The memory requirement for a resulting offset doubles if "setup offset active" has also been configured, see MD18112 $MN_MM_KIND_OF_SUMCORR.

See also:

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA,

MD18110 $MN_MM_MAX_SUMCORR_PER_CUTTEDGE

18110	MM_MAX_SUMCORR_PER_CUTTEDGE			N02, N09	S7	
-	Max. number of additive offsets per edge (SRAM)			DWORD	PowerOn	
-						
-	-	1	1	6	7/2	M

Description:

```
Maximum number of resulting offsets per cutting edge.
If MD18108 $MN_MM_NUM_SUMCORR > 0 then:
The data is not memory defining, but is only used for monitoring.
If MD18108 $MN_MM_NUM_SUMCORR = -1 then:
The data is memory defining.
See also
MD18108 $MN_MM_NUM_SUMCORR,
MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA.
```

18112	MM_KIND_OF_SUMCORR			N02, N09	W1	
-	Properties of resulting offsets in TO area (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	0x1F	7/2	M

Description: Properties of the resulting offsets in NCK.

Bit 0=0 "Resulting offsets fine" are backed up when the tool data are backed up.

Bit 0=1 "Resulting offsets fine" are backed up when the tool data are backed up.

Bit 1=0 Set-up offsets are backed up when the tool data are backed up.

Bit 1=1 Set-up offsets are not backed up when the tool data are backed up.

Bit 2=0 If work is done with the function tool management (TOOL-MAN) and/or tool monitoring (TMMO), existing "resulting offsets fine/setup offsets" are not affected when the tool status is set to "active".

Bit 2 =1 Existing resulting offsets are set to zero when the tool status is set to "active".

Bit 3=0 If work is done with the function "TOOLMAN" +"adapter", the "resulting offsets fine"/setup offsets are transformed.

Bit 3=1 No transformation of the "resulting offsets fine"/setup offsets

Bit 4=0 No set-up offset data blocks

Bit 4=1 Set-up offset data blocks are additionally created. Whereby the resulting offset is composed of the sum of the set-up offset + "resulting offset fine"

Changing the status of bits 0, 1, 2, 3 does not change the memory structure.

Changing the status of bit 4 triggers restructuring of the buff-ered memory after the next PowerOn.

See also

MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

MD18108 $MN_MM_NUM_SUMCORR

MD18110 $MN_MM_MAX_SUMCORR_PER_CUTTEDGE

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK,

MD20310 $MC_TOOL_MANAGEMENT_MASK,

MD18086 $MN_MM_NUM_MAGAZINE_LOCATION,

MD18104 $MN_MM_NUM_TOOL_ADAPTER

18114	MM_ENABLE_TOOL_ORIENT			N02, N09	W1, F2	
-	Assign tool cutting edge orientation			DWORD	PowerOn	
-						
-	-	0	0	3	7/2	M

Description: The function allows an orientation deviating from the default value to be assigned to each tool cutting edge.

Value = 0:

The tool orientation function is inactive.

Value = 1:

The system parameter $TC_DPV[n, m] is assigned to each tool cutting edge D=m of the tool T=n, with the aid of which one of 6 possible tool orientations in positive or negative coordinate direction can be defined.

Value = 2:

Not only the system parameter $TC_DPV[n, m] but also the additional three system parameters $TC_DPV3[n, m], $TC_DPV4[n, m] and $TC_DPV5[n, m] are assigned to each tool cutting edge D=m of the tool T=n, with the aid of which any spatial tool orientation can be defined

T, D are the NC addresses T and D with which the tool change or the tool selection and the offset selection are programmed.

Value = 3:

Not only the system parameters $TC_DPV[n, m] and $TC_DPV3 - $TC_DPV5 but also the additional three system parameters $TC_DPVN3[n, m], $TC_DPVN4[n, m] and $TC_DPVN5[n, m] are assigned to each tool cutting edge D=m of the tool T=n, with the aid of which a vector (normal vector) can be defined that is preferably perpendicular to the tool orientation. The normal vector may be modified so that it lies in the plane formed by the orientation and the programmed normal vector but perpendicular to the orientation

The orientation and the possibly modified normal vector together define a complete orientation coordinate system. The machine data affects the requirement for battery-backed memory.

18116	MM_NUM_TOOL_ENV			N02, N09	W1	
-	Number of tool environments in the TO area (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	600	7/2	M

Description: Total number of tool environments in the NCK.

Battery-backed memory is reserved.

18118	MM_NUM_GUD_MODULES			N02	S7	
-	Number of GUD files in active file system (SRAM)			DWORD	PowerOn	
-						
-	-	7	1	9	7/2	M

Description: A GUD block corresponds to a file in which user-defined data can be stored. 9 GUD blocks are available of which 3 are already assigned to specific users/applications.

UGUD_DEF_USER (block for user)

SGUD_DEF_USER (block for SIEMENS)

MGUD_DEF_USER (block for machine manufacturer)

Special cases:

The number of GUD modules is determined by the GUD module with the highest number entered.

Example:

If the following GUD modules are defined,

UGUD

MGUD

GUD5

GUD8

then the machine data must be set to a value of 8, signifying a memory requirement of 8 x 120 bytes = 960 bytes.

It is therefore advisable to selected the "lowest" possible GUD module. If GUD modules UGUD and MGUD have not been assigned elsewhere, then they may be used for this purpose.

Related to:

MD18150 $MN_MM_GUD_VALUES_MEM

(Memory space for user variables)

18120	MM_NUM_GUD_NAMES_NCK			N02	S7	
-	Number of global user variable names (SRAM)			DWORD	PowerOn	
-						
-	-	50	0	32000	7/2	M

Description: Defines the number of user variables for NCK global user data (GUD). Approximately 80 bytes of memory per variable are reserved in the SRAM for the names of the variables. The additional memory required for the value of the variable depends on the data type of the variable. The number of available NCK global user data is exhausted on reaching the limit value set in MD18120 $MN_MM_NUM_GUD_NAMES_NCK or MD18150 $MN_MM_GUD_VALUES_MEM (memory space for user variables).

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD18150 $MN_MM_GUD_VALUES_MEM

(Memory space for user variables)

18130	MM_NUM_GUD_NAMES_CHAN			N02	S7	
-	Number of channel-specific user variable names (SRAM)			DWORD	PowerOn	
-						
-	-	350	350	32000	7/2	M

Description: Defines the number of user variable names for channel-specific global user data (GUD). Approximately 80 bytes of memory are reserved in the SRAM for each variable name. The additional memory required for the value of the variable is equal to the size of the data type of the variable multiplied by the number of channels. This means that each channel has its own memory available for the variable values. The number of available channel-specific global user data is exhausted on reaching the limit value set in MD18130 $MN_MM_NUM_GUD_NAMES_CHAN or MD18150 $MN_MM_GUD_VALUES_MEM (memory space for user variables).

The name created with the DEF statement is valid for all channels.

The memory requirement for the variable value is equal to the size of the data type multiplied by the number of channels.

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD18150 $MN_MM_GUD_VALUES_MEM

(Memory space for user variables)

18150	MM_GUD_VALUES_MEM			N02	A2	
-	Memory location for global user variable values (SRAM)			DWORD	PowerOn	
-						
-	-	128	128	32000	7/2	M

Description: The specified value reserves memory space for the variable values of the global user data (GUD). The dimensioning of the memory depends to a large extent on the data types used for the variables.

Overview of the memory requirements of the data types:

Data type	Memory requirement
REAL	8 bytes
INT	4 bytes
BOOL	1 byte
CHAR	1 byte
STRING	1 byte per character, 100 characters permitted per string
AXIS	4 bytes
FRAME	up to 1KB depending on control model

The total memory required by a channel or axis-specific global user variable is the memory requirement of the variables multiplied by the number of channels or axes. The number of global user variables available is given when the limit defined in MD18120 $MN_MM_NUM_GUD_NAMES_NCK, MD18130 $MN_MM_NUM_GUD_NAMES_CHAN, MD18140 $MN_MM_NUM_GUD_NAMES_AXIS or MD18150 $MN_MM_GUD_VALUES_MEM is reached.

Buffered user memory is used.

Special cases:

The buffered data are lost if this machine data is altered!

Related to:
MD18118 $MN_MM_NUM_GUD_MODULES
(Number of GUD blocks)
MD18120 $MN_MM_NUM_GUD_NAMES_NCK
(Number of global user variables)
MD18130 $MN_MM_NUM_GUD_NAMES_CHAN
(Number of channel-specific user variables)

18160	MM_NUM_USER_MACROS		N02	S7	
-	Number of macros (DRAM)		DWORD	PowerOn	
-					
-	-	60	60	32000	7/2	M

Description: Defines the number of macros that can be stored in the files _N_SMAC_DEF, _N_MMAC_DEF und _N_UMAC_DEF. Each of these files which is opened occupies at least one kbyte memory space for the file code in the part program memory. Another kbyte of memory is reserved for the file when the one kbyte file code limit is exceeded.

The dynamic user memory is used. For the stated number of macros, approximately 375 bytes are reserved per macro for management tasks.

18170	MM_NUM_MAX_FUNC_NAMES			N02	V2,A2	
-	Number of miscellaneous functions (cycles, DRAM)			DWORD	PowerOn	
-						
-	-	350	350	32000	7/2	M

Description: The data limits the maximum number of special functions over and above the predefined functions (such as sine, cosine, etc.) which can be used in

- cycle programs
- compile cycle software.

The function names are entered in the global NCK dictionary and must not conflict with the names that already exist.

The SIEMENS cycle package contains special functions that are taken into account by the default setting of the MD.

The data are stored in unbuffered memory. Approximately 150 bytes are required for each special function for management purposes.

Related to:
MD18180 $MN_MM_NUM_MAX_FUNC_PARAM
(Number. of additional parameters)

18180	MM_NUM_MAX_FUNC_PARAM			N02	V2	
-	Number of additional parameters for cycles according to MD 18170			DWORD	PowerOn	
-						
-	-	5000	5000	32000	7/2	M

Description: Defines the maximum number of parameters required for the special functions in

- cycle programs
- compile cycle software.

50 parameters are required for the special functions of the SIEMENS cycle package, software version 1.

The data are stored in unbuffered memory. 72 bytes of memory are reserved for each parameter.

Related to:

MD18170 $MN_MM_NUM_MAX_FUNC_NAMES

(Number of special functions)

18190	MM_NUM_PROTECT_AREA_NCK			N12, N02, N06, N09	A3	
-	Number of files for machine-related protection zones (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	7/2	M

Description:

This machine data defines how many blocks are created for the protection zones available in the NCK.

Buffered memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

References:

/FB/, A3, "Axis Monitoring, Protection Zones"

18200	MM_NUM_CCS_MAGAZINE_PARAM			N02, N09	FBW	
-	Number of Siemens OEM magazine data (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description:

Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'), is set for TMMG (and option is set):

User or OEM data in the tool management (TMMG).

Number of Siemens OEM magazine data (standard format IN_Int).

See also: MD18090 $MN_MM_NUM_CC_MAGAZINE_PARAM, MD18084 $MN_MM_NUM_MAGAZINE

Buffered user memory is used

18201	MM_TYPE_CCS_MAGAZINE_PARAM			N02, N09	FBW	
-	Type of Siemens OEM magazine data (SRAM)			DWORD	PowerOn	
-						
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2	M

Description:

```
Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and
bit 2=1 ('H4'), is set for TMMG (and option is set):
User or OEM data in the tool management.
Type of magazine-specific Siemens user data configured by MD18200
$MN_MM_NUM_CCS_MAGAZINE_PARAM.
Each parameter can be assigned its own type. The permissible types
are:
Type                              Value of the machine data
(See types
of the NC language)
-----------------------------------------------------------------
BOOL                                  1
CHAR                                  2
INT                                   3
REAL                                  4
STRING                                5 (permits identifier up to
31 characters long)
AXIS                                  6
FRAME                                 not defined
See also: MD18200 $MN_MM_NUM_CCS_MAGAZINE_PARAM, MD18084
$MN_MM_NUM_MAGAZINE
Buffered user memory is used
```

18202	MM_NUM_CCS_MAGLOC_PARAM			N02, N09	FBW	
-	No. of Siemens OEM magazine location data (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description:

```
Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and
bit 2=1 ('H4'), is set for TMMG (and option is set):
User or OEM data in the tool management.
Number of Siemens OEM magazine location data (standard format
IN_Int).
See also: MD18092 $MN_MM_NUM_CC_MAGLOC_PARAM, MD18086
$MN_MM_NUM_MAGAZINE_LOCATION
Buffered user memory is used
```

18203	MM_TYPE_CCS_MAGLOC_PARAM		N02, N09	FBW	
-	Type of Siemens OEM magazine location data (SRAM)		DWORD	PowerOn	
-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2	M

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'), is set for TMMG (and option is set)

User or OEM data in the tool management.

Type of magazine-specific Siemens user data configured by MD18202 $MN_MM_NUM_CCS_MAGLOC_PARAM.

Each parameter can be assigned its own type. The permissible types are:

Type Value of the machine data

(See types of the NC language)

BOOL 1

CHAR 2

INT 3

REAL 4

- (STRING is explicitly impossible here; value 5 is treated like value 2)

AXIS 6

FRAME not defined

See also: MD18202 $MN_MM_NUM_CCS_MAGLOC_PARAM, MM_NUM_MAGLOC

Buffered user memory is used

18204	MM_NUM_CCS_TDA_PARAM			N02, N09	FBW	
-	Number of Siemens OEM tool data (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:

User or OEM data of the tools.

Number of Siemens OEM TDA (=tool-specific) data (standard format Int).

See also: MD18094 $MN_MM_NUM_CC_TDA_PARAM, MD18082 $MN_MM_NUM_TOOL

Buffered user memory is used

18205	MM_TYPE_CCS_TDA_PARAM			N02, N09	FBW	
-	Type of Siemens OEM tool data (SRAM)			DWORD	PowerOn	
-						
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2	M

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:

User or OEM data in the tool management.

Type of tool-specific Siemens user data configured by MD18204 $MN_MM_NUM_CCS_TDA_PARAM.

Each parameter can be assigned its own type. The permissible types are

```
Type                              Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                1
CHAR                                2
INT                                 3
REAL                                4
STRING                              5 (permits identifiers up to 31 characters long)
AXIS                                6
FRAME                               not defined
```

See also: MD18204 $MN_MM_NUM_CCS_TDA_PARAM, MD18082 $MN_MM_NUM_TOOL

Buffered user memory is used

18206	MM_NUM_CCS_TOA_PARAM			N02, N09	FBW	
-	No. of Siemens OEM data per cutting edge (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:

User or OEM data of the tools.

Number of Siemens OEM TOA data (standard format IN_Real).

See also: MD18096 $MN_MM_NUM_CC_TOA_PARAM, MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

Buffered user memory is used

18207	MM_TYPE_CCS_TOA_PARAM		N02, N09	FBW	
-	Type of Siemens OEM data per cutting edge (SRAM)		DWORD	PowerOn	
-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2	M

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:

User or OEM data in the tool management.

Type of cutting-edge-specific Siemens user data configured by MD18206 $MN_MM_NUM_CCS_TOA_PARAM.

Each parameter can be assigned its own type. The permissible types are

```
Type                                   Value of the machine data
(See types of the NC language)
-----------------------------------------------------------------
BOOL                                    1
CHAR                                    2
INT                                     3
REAL                                    4
```

- (STRING is explicitly impossible here; value 5 is treated like value 2)

```
AXIS                                    6
FRAME                                   not defined
```

See also: MD18206 $MN_MM_NUM_CCS_TOA_PARAM, MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

Buffered user memory is used

18208	MM_NUM_CCS_MON_PARAM			N02, N09	FBW	
-	No. of Siemens OEM monitor data (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	10	2/2	M

Description: Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 0 = 1 or bit 1 = 1 and bit 2=1 ('H4'), is set:

User or OEM data in the tool management.

Number of Siemens OEM monitoring data; standard format IN_Int).

See also: MD18098 $MN_MM_NUM_CC_MON_PARAM, MD18100 $MN_MM_NUM_CUTTING_EDGES_IN_TOA

Buffered user memory is used

18209	MM_TYPE_CCS_MON_PARAM			N02, N09	FBW	
-	Type of Siemens OEM monitor data (SRAM)			DWORD	PowerOn	
-						
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2	M

Description:

```
Only when MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 0 = 1 or bit 1
= 1 and bit 2=1 ('H4'), is set:
User or OEM data in the tool management.
Type of monitoring-specific Siemens user data configured by
MD18208 $MN_MM_NUM_CCS_MON_PARAM.
Each parameter can be assigned its own type. The permissible types
are
Type                                Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                 1
CHAR                                 2
INT                                  3
REAL                                 4
•        (STRING is explicitly impossible here; value 5 is treated
    like value 2)
AXIS                                 6
FRAME                                not defined
See also: MD18208 $MN_MM_NUM_CCS_MON_PARAM, MD18100
$MN_MM_NUM_CUTTING_EDGES_IN_TOA
Buffered user memory is used
```

18210	MM_USER_MEM_DYNAMIC			EXP, N02	S7	
-	User memory in DRAM [KB]			DWORD	PowerOn	
-						
-	-	9000	0	98304	7/2	M

Description: The DRAM in the NC is used jointly by the system and the user.

MD18210 $MN_MM_USER_MEM_DYNAMIC defines the size of the DRAM available to the user. The input limits depend upon the hardware and software configurations of the CNC.

There are various types of user data in this memory area, for example.

- Local user data
- IPO block buffers
- User macros
- Diagnostics functions such as trace recording of times,.....
- Tool management trace
- Communication with 1-n HMIs; Value of n: See MD10134 $MN_MM_NUM_MMC_UNITS.
- Reorg Log file (required for internal purposes of the NC program sequence)
- ...

Each additionally active channel occupies a substantial amount of memory here.

Each activated axis requires part of this memory.

Exactly how much that is depends largely on the control model and the software version.

The settable values depend on the hardware and software configurations.

The value of NCK is automatically set after unbuffered startup of the NCK or deletion of the memory. The value is then such that the free memory defined in MD18050 $MN_INFO_FREE_MEM_DYNAMIC is available to the user.

(See the description of MD18050 $MN_INFO_FREE_MEM_DYNAMIC).

If the value is set too high (in the sense that the memory required is

more than that available on the memory module), the NCK responds at the next NCK reset/power on by automatically reducing the machine data value to the maximum possible value that the hardware permits.

Message alarm 6030 advises of this process. This corresponds to a legal response of the NCK and is not an incorrect response.

The essential significance of the machine data is not to release the entire memory to the user because the memory is shared between the system and the user. A part of the physically existing memory is reserved for future develoments of the NCK.

The maximum amount of memory available on the hardware can be found by selecting a value for the data that is so large that, after the subsequent restart, message alarm 6030 indicates the maximum available memory. Applications that use the maximum available memory will in all probability have memory problems with a software conversion to a newer NCK version.

Upper and lower limits are not necessary. The software rejects values outside the permissible range and then automatically sets suitable values.

(See also message alarm 6030.)

The data in the dynamic memory are not battery-backed.

Note:

During power on, the system software compares the sum of all requests for dynamic memory with the value in MD18210 $MN_MM_USER_MEM_DYNAMIC. Alarm 6000 "Memory allocated with standard machine data" is output if the memory required exceeds the memory capacity set with the MD. Alarm 6030 "User memory limit has been adapted" is output if the control detects during the power on that the memory capacity required by MD18210 $MN_MM_USER_MEM_DYNAMIC is larger than the physical memory.

Related to:

The available dynamic memory can be taken from MD18050 $MN_INFO_FREE_MEM_DYNAMIC (display data of the free dynamic memory).

18220	MM_USER_MEM_DPR			EXP, N02	-	
-	User memory in DUAL PORT RAM (DPR)			DWORD	PowerOn	
-						
-	-	0	-	-	0/0	S

Description: The functionality is not available in previous software versions.

18230	MM_USER_MEM_BUFFERED			N02	S7
-	User memory in SRAM			DWORD	PowerOn
-					
710-6a2c	-	0	0	15500	7/1	M
710-31a10c	-	0	0	15500	7/1	M
710-31a10c6	-	0	0	15500	7/1	M
720-6a2c	-	0	0	22200	7/1	M
720-31a10c	-	0	0	22200	7/1	M
720-31a10c6	-	0	0	22200	7/1	M
730-6a2c	-	0	0	22200	7/1	M
730-31a10c	-	0	0	22200	7/1	M
730-31a10c6	-	0	0	22200	7/1	M

Description: Battery-backed user memory (in kbyte).

Various types of user data are stored in this memory area.

For example:

- NC part programs
- R parameters
- Global user data (GUD)
- Definitions of the protection zones
- Correction tables EEC, CEC, QEC
- Tool / magazine data

...

This data is retained after control power off.

(Provided the data backup (battery,...) is in good working order and the Init switch is correctly set on the control).

This means that they are available unchanged after restart.

In the case of control models without a backup battery (e.g. 802S,...) there is, as a rule, an option of , specifically backing up the data by operation, so that they are available again after the next power on process.

The settable values depend on the hardware and software configurations.

The set values are designed for the minimum memory configuration of the particular control model.

256, 512 and 2000, 4000KB of battery-backed memory are available on the hardware.

Approximately 30KB of this physically present memory is used for internal purposes. This means that approximately 226, 482, 1970, 3970KB of user memory can be set.

After all the NCK functions have taken 'their' memory corresponding to the relevant machine data values, the rest of the memory is added to the part program memory. As a rule, the user will thus have more part program memory available than that guaranteed in the sales brochure. This 'more' may however vary from version to version.

If there are various memory configuration options for a control model then the data may have to be increased correspondingly when using the larger memory variants.

In this respect, see the meaning of MD18060 $MN_INFO_FREE_MEM_STATIC

Special cases:

The battery-backed data are lost if this machine data is altered.

18231	MM_USER_MEM_BUFFERED_TYPEOF			N02	-	
-	Technology for data buffering			DWORD	PowerOn	
-						
-	3	1,1,1	0	1	0/RO	S

Description: Type of technology used for data buffering

Value = 0 SRAM memory only

Value = 1 SRAM and flash/disk memory

If the value = 1 then see also MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM

Index 0 = Reserved

Index 1 = Definition for the buffered data of the active file system (incl. machine data).

Index 2 = Definition for the buffered data of the passive file system (part programs, cycles etc.)

This value must be consistent with the value of MD11292 $MN_DRAM_FILESYST_CONFIG.

A value of 0 means that $MN_DRAM_FILESYST_CONFIG must not have the 'H22' bits set.

A value of 1 means that $MN_DRAM_FILESYST_CONFIG must have the 'H22' bits set.

18232	MM_ACTFILESYS_LOG_FILE_MEM			N02	-	
-	System: logfile size in SRAM [KB]			DWORD	PowerOn	
-						
-	3	200,10,30	0	32000	0/0	S

Description:

Buffered log file for buffered data of the active file system (in kbytes)

Systems with slow data buffer media store changed buffered data in the internal system SRAM. When the buffer is full, all data of the active file system are made persistent. The buffer backs up the data persistence of the last persistence operation until the next power fail. After a power fail (power failure or power OFF), data that had not yet been made persistent at the time of the power fail can be restored from this buffer.

The log file serves to minimize or totally avoid data loss in the event of power fail.

1000 entries require approximately 70 kB.

A value greater than 0 is only practicable if MD18231 $MN_MM_USER_MEM_BUFFERED_TYPEOF[1] = 1.

A value equal to 0 means that the buffered data are not voltage loss safe

if MD18231 $MN_MM_USER_MEM_BUFFERED_TYPEOF[1] = 1 (typical for SINUMERIK solution line)

Example:

With MD18232 $MN_MM_ACTFILESYS_LOG_FILE_MEM[2] = 0, data changes from synchronized actions can be excluded from the power fail data backup.

An improved time response of the synchronized actions would be advantageous. This should only be set if the buffered data that are changed by the synchronized action are not safety-relevant.

Index Meaning

0 Preprocessing buffer

1 Buffer for data changes within the range of the tool change

2 Buffer for data changes of the main processing (especially synchronized actions)

See also MD17610 $MN_DEPTH_OF_LOGFILE_OPT_PF, which can be used to optimize the behavior.

18233	IS_CONTINOUS_DATA_SAVE_ON			EXP, N02	-	
-	System: Automatic saving of persistent data			BOOLEAN	PowerOn	
-						
-	3	TRUE,TRUE,TRUE	-	-	7/2	M

Description: The machine data is relevant only if MD18231 $MN_MM_USER_MEM_BUFFERED_TYPEOF = 1.

The default value should be changed only if the system is operated in an environment,

Value = 0 : Continuous saving of persistent data on disk/flash/ etc. is deactivated.

The dynamic response of the software on systems of the SolutionLine range can thus be improved.

Value = 1 : Continuous automatic saving of persistent data on disk/flash/etc. is active.

Index 0 = Reserved

Index 1 = Definition for the buffered data of the active file system (incl. machine data).

Index 2 = Definition for the buffered data of the passive file system (part programs, cycles, ...).

The default value should be changed only for diagnostic purposes or for optimizing the dynamic response.

The default value should be changed only if the system is operated in an environment,

where no spontaneous shutdown of the system / spontaneous power failure occurs.

Otherwise, persistent data can be lost.

18235	MM_INCOA_MEM_SIZE			EXP	-	
-	Size of the DRAM memory for INCOA applications [Kbyte]			DWORD	PowerOn	
-						
-	-	20480	0	25600	7/2	M

Description: On cold restart of the control system, the default value of MD18235 $MN_MM_INCOA_MEM_SIZE specifies

the DRAM memory range that is available for INCOA applications in total.

This MD can only be read. With the diagnostics function "Read current actual value" the

memory space actually occupied by the INCOA applications can be determined.

18237	MM_CYC_DATA_MEM_SIZE			EXP, N02	-	
-	Cycle/display setting data in SRAM [kB]			DWORD	PowerOn	
-						
-	-	0	0	96	7/RO	M

Description: Size of the buffered memory for 'Setting data for cycles and display' [kB]

18238	MM_CC_MD_MEM_SIZE			N02	TE01	
-	Compile cycle machine data in SRAM [kB]			DWORD	PowerOn	
-						
-	-	1	1	32000	-1/1	M

Description: Battery-backed user memory for compile cycles (in kbyte)

18240	MM_LUD_HASH_TABLE_SIZE		EXP, N02	S7	
-	Hash table size for LUD (DRAM)		DWORD	PowerOn	
-					
-	-	37	11	107	0/0	S

Description: Defines the size of the hash table for local user data (LUD). The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required for managing the blocks for local user variables with REORG, see MD28010 $MC_MM_NUM_REORG_LUD_MODULES (Number of blocks for local user variables with REORG (DRAM)).

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18242	MM_MAX_SIZE_OF_LUD_VALUE			N02	V2	
-	Maximum memory block size for LUD/GUD values			DWORD	PowerOn	
-						
-	-	920	920	SLMAXVARBYTES	0/0	S

Description: Defines the net memory array size for LUD/GUD variables. Each NC program that defines at least one LUD/GUD variable or has call parameters then occupies at least one memory array of this size.

The LUD/GUD variables of a program may occupy the complete LUD/GUD value memory set for the channel. However, then there is no memory available for other programms.

The memory for the LUD/GUD variables (that is defined for LUD by the channel-specific MD28040 $MC_MM_LUD_VALUES_MEM and for GUD by the NCK-specific MD18150 $MN_MM_GUD_VALUES_MEM) is divided into equally sized arrays of the size MD18242 $MN_MM_MAX_SIZE_OF_LUD_VALUE.

Example:

```
MM_LUD_VALUES_MEM = 12 (kbytes gross)
MM_MAX_SIZE_OF_LUD_VALUE = 660 (bytes net)
                         + 16 (bytes management data per array)
                         ---------------------------------------
                          676 (bytes gross)
```

One then obtains 12*1024 / 676 = 18 memory arrays each of 660 bytes.

This means that 12 NC programs can either each occupy one array or one NC program can define, for example, 18 variables of type Frame (whose size is approximately 660 bytes.

```
Data type           Memory requirement
REAL                       8 bytes
INT                        4 bytes
BOOL                       1 byte
CHAR                       1 byte
STRING                     1 byte per character,
                                 100 characters are possible per
string
AXIS                       4 bytes
FRAME               up to 1 kbyte (depending on control model)
```

Related to:

MD28040 $MC_MM_LUD_VALUES_MEM

(Memory size for local user variables (DRAM))

Warning:

The battery-backed data are lost when this machine data is changed!

The size of the NC language type Frame depends on the maximum number of channel axes generated by the NCK.

There are NCK systems with a maximum number of channel axes from 4 to 20. In the case of 20 axes, the type Frame then has a size of 660 bytes.

18250	MM_CHAN_HASH_TABLE_SIZE			EXP, N02	S7	
-	Hash table size for channel-specific data (DRAM)			DWORD	PowerOn	
-						
-	-	23	3	193	0/0	S

Description: Defines the size of the hash table for channel-specific names. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less dynamic memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required.

The memory required per channel in bytes is equal to the value entered multiplied by 68.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

Warning:

The battery-backed data are lost if this machine data is altered!

18260	MM_NCK_HASH_TABLE_SIZE			EXP, N02	S7	
-	Hash table size for global data (DRAM)			DWORD	PowerOn	
-						
-	-	4001	537	4327	0/0	S

Description: Defines the size of the NCK-specific names. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less dynamic memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required. The memory required in bytes is equal to the value entered multiplied by 68.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18270	MM_NUM_SUBDIR_PER_DIR			N02	S7	
-	Number of subdirectories (DRAM)			DWORD	PowerOn	
-						
-	-	MD_MAXNUM_DIR_IN_FILESYSTEM	-	-	7/RO	M

Description: Defines the maximum number of subdirectories that can be created in a directory or subdirectory of the passive file system.

This value is for information only, and cannot be changed.

See also MD18280 $MN_MM_NUM_FILES_PER_DIR (number of files per directory).

18280	MM_NUM_FILES_PER_DIR			N02	S7	
-	Number of files per directory (DRAM)			DWORD	PowerOn	
-						
-	-	MD_MAXNUM_FILES_PER_DIR	-	-	7/RO	M

Description: Defines the maximum number of files that can be created in a directory or subdirectory of the passive file system.

This value is for information only, and cannot be changed.

See also MMD18270 $MN_MM_NUM_SUBDIR_PER_DIR (number of subdirectories per directory).

18290	MM_FILE_HASH_TABLE_SIZE			EXP, N02	S7	
-	Hash table size for files of a directory (SRAM)			DWORD	PowerOn	
-						
-	-	47	3	299	0/0	S

Description: Defines the size for the files of a directory. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less memory).

The value of this machine data affects the amount of static memory required for the management of directories, see MD18310 $MN_MM_NUM_DIR_IN_FILESYSTEM (number of directories in the passive file system)

Buffered user memory is used.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

Special cases:

The battery-backed data are lost if this machine data is altered!

18300	MM_DIR_HASH_TABLE_SIZE			EXP, N02	S7	
-	Hash table size for subdirectories (SRAM)			DWORD	PowerOn	
-						
-	-	11	3	349	0/0	S

Description: Defines the size of the subdirectories of a directory. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirement (low value = less memory).

The value of this machine data affects the amount of static memory required for the management of directories, see MD18310 $MN_MM_NUM_DIR_IN_FILESYSTEM (number of directories in the passive file system).

Buffered user memory is used.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

Special cases:

The battery-backed data are lost if this machine data is altered!

18310	MM_NUM_DIR_IN_FILESYSTEM			N02	S7	
-	Number of directories in passive file system (SRAM)			DWORD	PowerOn	
-					
-	-	30	30	256	7/2	M

Description: This machine data limits the number of directories in the passive file system.

It can be used to reserve memory in the SRAM for the management of the directories. The directories and subdirectories of the passive file system set up by the system are included in this machine data. The memory required for the management of the directories can be calculated as follows:

Memory required = a (440+28 (b+c)) bytes

a = Input value of MD18310 $MN_MM_NUM_DIR_IN_FILESYSTEM

(no. of directories in passive file system)

b = Input value of MD19300 $MN_MM_DIR_HASH_TABLE_SIZE

(HASH table size for subdirectories)

c = Input value of MD18290 $MN_MM_FILE_HASH_TABLE_SIZE

(hash table size for the files of a directory)

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD18270 $MN_MM_NUM_SUBDIR_PER_DIR

(Number of subdirectories)

18320	MM_NUM_FILES_IN_FILESYSTEM			N02	S7	
-	Number of files in passive file system (SRAM)			DWORD	PowerOn	
-						
-	-	750	64	1000	7/2	M

Description: Defines the number of files available in the part program memory. This machine data is used to reserve memory in SRAM - approximately 320 bytes per file - for managing the file memory. Each file created requires a minimum of one kbyte of memory for the file code. If the one kbyte limit for the file code is exceeded another kbyte is reserved for the file.

Buffered user memory is used.

Special cases:

The battery-backed data are lost if this machine data is altered.

Related to:

MD18280 $MN_MM_NUM_FILES_PER_DIR

(Number of files in directories)

18321	MM_NUM_SYSTEM_FILES_IN_FS			N02	-	
-	Number of system files			DWORD	PowerOn	
-						
-	-	400	300	1000	1/1	M

Description: Number of temporary system files in the passive file system (see also MD18355 $MN_MM_T_FILE_MEM_SIZE);

For example: Compilations of cycles (preprocessing), system traces

18332	MM_FLASH_FILE_SYSTEM_SIZE			N01, N02	IAD	
-	Size of FFS			DWORD	PowerOn	
-						
-	-	0	0	4096	7/1	M

Description: Size of the flash file system on the PCNC (in kbyte)

Entries have to be made in steps of 128KB. Apart from 0, the smallest possible value is 512KB.

If the flash file system is used as a backup memory for the DRAM file system, then MD18332 $MN_MM_FLASH_FILE_SYSTEM_SIZE must be at least 3 times the size of the largest file in the DRAM file system larger than MD18351 $MN_MM_DRAM_FILE_MEM_SIZE.

Additional memory space is needed in the DRAM file system for log files if this has been configured by MD11295 $PROTOC_FILE_MEM.

18342	MM_CEC_MAX_POINTS			N01, N02	K3	
-	max. number of interpolation points on sag compensation (SRAM)			DWORD	PowerOn	
-						
-	62	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	2000	7/2	M

Description: The MD defines the memory space available for the compensation tables.

When MD18342 $MN_MM_CEC_MAX_POINTS = 0, no memory is set up for the table. The sag compensation function cannot then be used.

Caution!

If MD18342 $MN_MM_CEC_MAX_POINTS[t] is changed, when the system is powered up, the buffered NC user memory is automatically reset. This deletes all user data in the buffered user memory (e.g. drive and HMI machine data, tool offsets, part programs etc.).

Related to:

SD41300 $SN_CEC_TABLE_ENABLE[t]

Evaluation of the sag compensation table (t) enabled.

References:

/FB/, S7, "Memory Configuration"

18350	MM_USER_FILE_MEM_MINIMUM			EXP, N02	S7	
-	minimum part program memory (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	0	0/0	S

Description: Valid only for PowerLine control models.

Minimum user memory for files in the passive file system (in kbyte)

There are various types of user data in this memory area.

Defines the minimum remaining battery-backed memory area for the files of the passive file system (in kbyte). The settable value depends on the hardware and software configurations (memory allocation SRAM) and on MD18230 $MN_MM_USER_MEM_BUFFERED (user memory in the SRAM). During the memory allocation of the SRAM, the files of the passive file system are assigned to the end of the remaining memory.

The remaining memory must have at least the memory space stated in MD18350 $MN_MM_USER_FILE_MEM_MINIMUM available for the file system to be able to work. If this is not ensured, the control assigns the pre-assigned data to the memory during power on, as a consequence of which all the battery-backed data entered by the user is lost. Alarm 6000 "Memory allocation with standard machine data" is also output.

The available part program memory can be taken from the MD18060 $MN_INFO_FREE_MEM_STATIC (display data of the free static memory).

Special cases:

The battery-backed data are lost if this machine data is changed and the remaining memory is less than the value of MD18350 $MN_MM_USER_FILE_MEM_MINIMUM.

18351	MM_DRAM_FILE_MEM_SIZE			EXP, N02	TE7,V2,M5,S7	
-	Size of part program memory (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	32768	0/0	M

Description: Size of memory for files in the DRAM of the passive file system (in kbyte).

If the flash file system is used as a background memory for the DRAM file system then MD18332 $MN_MM_FLASH_FILE_SYSTEM_SIZE must be at least 3 times the size of the largest file in the DRAM file system and be larger than MD18351 $MN_MM_DRAM_FILE_MEM_SIZE.

18352	MM_U_FILE_MEM_SIZE			EXP, N02	S7	
-	End user memory for part programs/cycles/files			DWORD	PowerOn	
-						
710-6a2c	3	2560,0,0	0	9216	2/2	M
710-31a10c	3	2560,0,0	0	9216	2/2	M
710-31a10c6	3	2560,0,0	0	9216	2/2	M
720-6a2c	3	2560,0,0	0	15360	2/2	M
720-31a10c	3	2560,0,0	0	15360	2/2	M
720-31a10c6	3	2560,0,0	0	15360	2/2	M
730-6a2c	3	2560,0,0	0	15360	2/2	M
730-31a10c	3	2560,0,0	0	15360	2/2	M
730-31a10c6	3	2560,0,0	0	15360	2/2	M

Description: The machine data is not available or not defined for PowerLine control models.

End user memory for files in the passive file system (in kbyte).

There are various types of user data in this memory area.

E.g.: NC part programs, cycle programs of the end user, diagnostic files, ...

The settable values depend on the hardware and software configurations.

The settable size of the part program memory is, apart from the upper limit value,

determined by the MD18230 $MN_MM_USER_MEM_BUFFERED and can also

be determined by a software option.

Index 0 = Size of the battery-backed part program / cycle program memory

Index 1 = Reserved

Index 2 = Reserved

18353	MM_M_FILE_MEM_SIZE			EXP, N02	S7	
-	Memory capacity for machine manufacturer's cycles/files			DWORD	PowerOn	
-						
710-6a2c	3	512,0,0	0	9216	1/1	M
710-31a10c	3	512,0,0	0	9216	1/1	M
710-31a10c6	3	512,0,0	0	9216	1/1	M
720-6a2c	3	512,0,0	0	15360	1/1	M
720-31a10c	3	512,0,0	0	15360	1/1	M
720-31a10c6	3	512,0,0	0	15360	1/1	M
730-6a2c	3	512,0,0	0	15360	1/1	M
730-31a10c	3	512,0,0	0	15360	1/1	M
730-31a10c6	3	512,0,0	0	15360	1/1	M

Description: The machine data is not available or not defined for PowerLine control models.

Memory for machine manufacturer files in the passive file system (in kbyte).

The machine manufacturer's files are in this memory area of the passive file system.

E.g.: cycle programs

The settable values depend on the hardware and software configurations.

The settable size of the memory is, apart from the upper limit value,

determined by the MD18230 $MN_MM_USER_MEM_BUFFERED.

Index 0 = Minimum size of the battery-backed (persistent) part program / cycle program memory

Index 1 = Reserved

Index 2 = Reserved

18354	MM_S_FILE_MEM_SIZE			EXP, N02	-	
-	Memory capacity for NC manufacturer's cycles/files			DWORD	PowerOn	
-						
-	3	3072,0,100	0	3072	0/0	S

Description: The machine data is not available or not defined for PowerLine control models.

Memory for the control manufacturer's files in the passive file system (in kbyte).

The control manufacturer's files are in this memory area of the passive file system.

E.g.: cycle programs, system files

The settable values depend on the hardware and software configurations.

The settable size of the memory is, apart from the upper limit value,

for index = 0 determined by MD18230 $MN_MM_USER_MEM_BUFFERED.

For index 1 = Reserved.

For index 2 = limited by the size of the internally availble battery-backed memory (SRAM).

Index 0 = Size of the battery-backed cycle program memory

Index 1 = Reserved

Index 2 = Size of the battery-backed memory for system files

18355	MM_T_FILE_MEM_SIZE			EXP, N02	-	
-	Memory size for temporary files			DWORD	PowerOn	
-						
-	-	4096	4096	-	7/2	M

Description: The machine data is not available or not defined for PowerLine control models.

Memory for temporary files in the passive file system (in kbyte)

For example: Compilate of cycles (preprocessing), system traces

18356	MM_E_FILE_MEM_SIZE			EXP, N02	-	
-	Memory size for the clipboard of external files			DWORD	PowerOn	
-						
710-6a2c	3	512,0,0	0	9216	0/0	M
710-31a10c	3	512,0,0	0	9216	0/0	M
710-31a10c6	3	512,0,0	0	9216	0/0	M
720-6a2c	3	512,0,0	0	15360	0/0	M
720-31a10c	3	512,0,0	0	15360	0/0	M
720-31a10c6	3	512,0,0	0	15360	0/0	M
730-6a2c	3	512,0,0	0	15360	0/0	M
730-31a10c	3	512,0,0	0	15360	0/0	M
730-31a10c6	3	512,0,0	0	15360	0/0	M

Description: For PowerLine control models the machine data is not available or has not been defined.

Memory for the clipboard of external files in the passive file system (in kB)

The settable values depend on the hardware and software configuration.

The settable memory size is limited, except for the upper limit value,

for index = 0 by MD18230 $MN_MM_USER_MEM_BUFFERED.

for index = 1 reserved

for index = 2 reserved

Index 0 = size of the buffered clipboard

Index 1 = reserved

Index 2 = reserved

18360	MM_EXT_PROG_BUFFER_SIZE			N01	B1,K1	
-	FIFO buffer size for processing from external source (DRAM)			DWORD	PowerOn	
-						
-	-	50	30	1000000	7/2	M

Description: A FIFO buffer is needed on the NCK for each program level (main program or subprogram) that is processed externally (reload mode).

The size of the FIFO buffer is defined in kbyte by MD18360 $MN_MM_EXT_PROG_BUFFER_SIZE.

$MN_MM_EXTPROG_NUM sets the number of FIFO buffers which are simultaneously available.

During startup, the memory size determined by multiplying MD18360 $MN_MM_EXT_PROG_BUFFER_SIZE by $MN_MM_EXTPROG_NUM is reserved in the DRAM.

If the stated value exceeds the available memory space, alarm 4077 is output when writing the machine data.

References:

/PGA/Programming Guide Advanced, Section 2

18362	MM_EXT_PROG_NUM			N01	K1	
-	Number of program levels which can be simultaneously processed			BYTE	PowerOn	
-						
-	-	1	0	13	7/2	M

Description: Number of program levels that can simultaneously be in "Processing from external source" mode NCK-wide.

System resources are reserved for the HMI <-> NCK communication during "Processing from external source". Machine data EXT_PROG_NUM defines the number of possible program levels.

The memory space is reserved during power on by MD18360 $MN_MM_EXT_PROG_BUFFER_SIZE + MD18362 $MN_MM_EXT_PROG_NUM. If it is found during program execution that all system resources are occupied, this is reported by alarm 14600.

18370	MM_PROTOC_NUM_FILES			N02	D1,OEM	
-	Max.no. of log files in passive file system			DWORD	PowerOn	
-						
-	10	2,0,0,0,0,2,2,2,0,3	0	10	1/1	M

Description: Maximum number of log files in the passive file system.

18371	MM_PROTOC_NUM_ETPD_STD_LIST			N02	D1,OEM	
-	Number of standard data lists ETPD.			DWORD	PowerOn	
-						
-	10	25,0,0,0,0,25,25,25,0,3	0	25	1/1	M

Description: Number of standard data lists in the OPI module ETPD (user-specific)

18372	MM_PROTOC_NUM_ETPD_OEM_LIST			N02	D1,OEM	
-	Number of OEM data lists ETPD.			DWORD	PowerOn	
-						
-	10	0,0,0,0,0,0,0,0,0,0	0	20	1/1	M

Description: Number of OEM data lists in the OPI module ETPD (user-specific).

18373	MM_PROTOC_NUM_SERVO_DATA			N02	D1	
-	Number of servo data for log			DWORD	PowerOn	
-						
-	10	0,0,0,0,0,10,10,10,0,0	0	20	1/1	M

Description: Number of servo data which must be recordable at the same time (user-specific).

18374	MM_PROTOC_FILE_BUFFER_SIZE			N02	-	
-	Size of log file buffer			DWORD	PowerOn	
-						
-	10	8000,8000,8000,8000,8000,8000,8000...	5000	-	1/1	M

Description: Size of the data buffer between the IPO and preprocessing time levels of a log file [Bytes].

18375	MM_PROTOC_SESS_ENAB_USER			N02	-	
-	Users enabled for sessions			BYTE	PowerOn	
-						
-	10	0,0,0,0,0,1,1,1,0,0	0	1	1/1	M

Description: Users that are available for session management.

18390	MM_COM_COMPRESS_METHOD			EXP, N01, N02	-	
-	Supported compression methods.			DWORD	PowerOn	
-						
-	-	0x01	-	-	2/2	M

Description: Setting for the compression methods to be supported.

18391	TRACE_PATHNAME			EXP	-	
-	Path for trace generation			STRING	PowerOn	
NBUP						
-	-		-	-	1/1	M

Description: Path on which traces are saved.

The trace files are used for problem analysis by NCK development.

18392	TRACE_SAVE_OLD_FILE			EXP	-	
-	Old trace files are retained			BOOLEAN	PowerOn	
NBUP						
-	-	FALSE	-	-	1/1	M

Description: The old traces are no longer overwritten when new traces are created; instead, a version extension is added to the trace file name.

At the current time this function is executed only if files are saved on the host file system (see TRACE_PATHNAME).

The trace files are used for problem analysis by NCK development.

18400	MM_NUM_CURVE_TABS			N02, N09	M3	
-	Number of curve tables (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	M

Description: Defines the maximum number of curve tables that can be stored in the SRAM of the entire system. A curve table consists of a number of curve segments.

Related to:

MD18402 $MN_MM_NUM_CURVE_SEGMENTS

18402	MM_NUM_CURVE_SEGMENTS			N02, N09	M3,B3	
-	Number of curve segments (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	M

Description: Defines the maximum number of curve segments that can be stored in the SRAM of the entire system. The curve segments are a component of a curve table.

Related to

MD18400 $MN_MM_NUM_CURVE_TABS

18403	MM_NUM_CURVE_SEG_LIN			N02, N09	M3	
-	Number of linear curve segments (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	M

Description: Number of linear curve segments in the SRAM available throughout the NCK.

A curve table may consist of "normal" curve segments and linear segments. The number of "normal" curve segments in the SRAM is defined by MD18402 $MN_MM_NUM_CURVE_SEGMENTS, these curve segments can accommodate polynomials.

Linear curve segments can only accommodate straight lines.

These linear curve segments are stored in battery-backed memory.

18404	MM_NUM_CURVE_POLYNOMS			N02, N09	M3,B3	
-	Number of curve table polynomials (SRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	M

Description: Defines the maximum total number of polynomials for curve tables that can be stored in the SRAM of the entire system. The polynomials are a component of a curve segment. A maximum of 3 polynomials are required for a curve segment. As a rule, only 2 polynomials are used for each curve segment.

Related to

MD18400 $MN_MM_NUM_CURVE_TABS

MD18402 $MN_MM_NUM_CURVE_SEGMENTS

18406	MM_NUM_CURVE_TABS_DRAM			N02, N09	M3	
-	Number of curve tables (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	M

Description: Number of curve tables in the DRAM available throughout the NCK.

The curve tables are stored either in the buffer memory or in the dynamic memory.

This MD is used to set the number of curve tables in the dynamic memory (DRAM).

18408	MM_NUM_CURVE_SEGMENTS_DRAM			N02, N09	M3	
-	Number of curve segments (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	M

Description: Number of polynomial curve segments in the DRAM available throughout the NCK.

The curve segments are stored either in the buffer memory or in the dynamic memory.

This MD is used to set the number of segments in the dynamic memory (DRAM).

18409	MM_NUM_CURVE_SEG_LIN_DRAM			N02, N09	M3	
-	Number of linear curve segments (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	M

Description: Number of linear curve segments in the DRAM available throughout the NCK.

A curve table may consist of "normal" curve segments and linear segments. The number of "normal" curve segments in the DRAM is defined by MD18408 $MN_MM_NUM_CURVE_SEGMENTS_DRAM, these curve segments can accommodate polynomials. Linear curve segments can only accommodate straight lines.

The curve segments are stored either in the buffer memory or in the dynamic memory. This MD defines the number of curve segments in the dynamic memory (DRAM).

18410	MM_NUM_CURVE_POLYNOMS_DRAM			N02, N09	M3	
-	Number of curve table polynomials (DRAM)			DWORD	PowerOn	
-						
-	-	0	0	INT_MAX	1/1	M

Description: Number of polynomials for curve tables in the DRAM available throughout the NCK.

The polynomials for curve tables are stored in the buffer memory or in the dynamic memory.

This MD is used to set the number of polynomials for curve tables in the dynamic memory (DRAM).

18450	MM_NUM_CP_MODULES			N02, N09	-	
-	Max. number of CP modules			DWORD	PowerOn	
-						
-	-	4	0	48	1/1	M

Description: Number of CP coupling modules available within the NCK

The MD defines the max. permissible number of CP couplings and reserves the required dynamic memory (DRAM).

18452	MM_NUM_CP_MODUL_LEAD			N02, N09	-	
-	Maximum number of CP master values			DWORD	PowerOn	
-						
-	-	4	0	99	1/1	M

Description: Number of NCK-wide available CP master values.

This MD defines the max. permissible number of CP master values and reserves the required dynamic memory (DRAM).

18500	MM_EXTCOM_TASK_STACK_SIZE			EXP, N02	S7	
-	Stack size for external communications task (DRAM)			DWORD	PowerOn	
-						
-	-	30	30	60	0/0	S

Description: Defines the size (KB) of the stack for external communication. The dynamic memory area is used.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18502	MM_COM_TASK_STACK_SIZE			EXP, N02	-	
-	Stack size in KB for communication task (DRAM)			DWORD	PowerOn	
-						
-	-	20	20	40	0/0	S

Description: Size of the stacks of the communication task in kbyte.

The dynamic memory is used.

18510	MM_SERVO_TASK_STACK_SIZE			EXP, N02	S7	
-	Stack size of servo task (DRAM)			DWORD	PowerOn	
-						
-	-	20	20	40	0/0	S

Description: Defines the stack size for the SERVO task. The dynamic memory is used for this purpose.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

18512	MM_IPO_TASK_STACK_SIZE			EXP, C02	-	
-	Stack size of IPO task (DRAM)			DWORD	PowerOn	
-						
-	-	30	30	40	0/0	S

Description: Size of the IPO task stack in kbyte.

The dynamic memory is used.

18600	MM_FRAME_FINE_TRANS			N02	K2,M5	
-	Fine offset with FRAME (SRAM)			DWORD	PowerOn	
-						
-	-	1	0	1	7/2	M

Description: 0: The fine offset cannot be entered or programmed.

Disabling fine offset saves a maximum of 10KB SRAM, (depending on MD28080 $MC_MM_NUM_USER_FRAMES).

1: The fine offset is possible for settable frames, the basic frame and the programmable frame by operator input or via program.

18601	MM_NUM_GLOBAL_USER_FRAMES			N02	K2,M5	
-	Number of global predefined user frames (SRAM).			DWORD	PowerOn	
-						
-	-	0	0	100	7/2	M

Description: Number of global predefined user frames.

The value corresponds to the number of field elements for the predefined field $P_UIFR[].

If the value of the data is greater than 0, then all settable fields are only global. The MD28080 $MC_MM_NUM_USER_FRAMES is then ignored.

18602	MM_NUM_GLOBAL_BASE_FRAMES			N02	K2,M5	
-	Number of global base frames (SRAM).			DWORD	PowerOn	
-						
-	-	0	0	16	7/2	M

Description: Number of NCU basic frames.

The value corresponds to the number for the predefined field $P_NCBFR[].

18660	MM_NUM_SYNACT_GUD_REAL			N02	-	
-	Number of configurable GUD variables of type REAL			DWORD	PowerOn	
-						
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2	M

Description: The MD18660 $MN_MM_NUM_SYNACT_GUD_REAL[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type REAL. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_REAL[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_REAL[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_REAL[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type REAL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_RS[ ] -> Synact parameter of type REAL in the SGUD block
SYG_RM[ ] -> Synact parameter of type REAL in the MGUD block
SYG_RU[ ] -> Synact parameter of type REAL in the UGUD block
SYG_R4[ ] -> Synact parameter of type REAL in the GUD4 block
....
SYG_R9[ ] -> Synact parameter of type REAL in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18661	MM_NUM_SYNACT_GUD_INT			N02	-
-	Number of configurable GUD variables of type integer			DWORD	PowerOn
-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2	M

Description: The MD18661 $MN_MM_NUM_SYNACT_GUD_INT[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type INTEGER. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_INT[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_INT[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_INT[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_INT[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_INT[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type BOOL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_IS[ ] -> Synact parameter of type INT in the SGUD block
SYG_IM[ ] -> Synact parameter of type INT in the MGUD block
SYG_IU[ ] -> Synact parameter of type INT in the UGUD block
SYG_I4[ ] -> Synact parameter of type INT in the GUD4 block
....
SYG_I9[ ] -> Synact parameter of type INT in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18662	MM_NUM_SYNACT_GUD_BOOL			N02	-	
-	Number of configurable GUD variables of type Boolean			DWORD	PowerOn	
-						
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2	M

Description:

The MD18662 $MN_MM_NUM_SYNACT_GUD_BOOL[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type Boolean. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_BOOL[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_BOOL[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_BOOL[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type BOOL

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_BS[ ] -> Synact parameter of type Boolean in the SGUD block

SYG_BM[ ] -> Synact parameter of type Boolean in the MGUD block

SYG_BU[ ] -> Synact parameter of type Boolean in the UGUD block

SYG_B4[ ] -> Synact parameter of type Boolean in the GUD4 block

....

SYG_B9[ ] -> Synact parameter of type Boolean in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18663	MM_NUM_SYNACT_GUD_AXIS			N02	-	
-	Number of configurable GUD variables of type Axis			DWORD	PowerOn	
-						
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2	M

Description: The MD18663 $MN_MM_NUM_SYNACT_GUD_AXIS[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type AXIS. The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_AXIS[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_AXIS[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_AXIS[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type AXIS

Field size corresponding to <value> of the relevant machine data

Predefined names:

SYG_AS[ ] -> Synact parameter of type AXIS in the SGUD block

SYG_AM[ ] -> Synact parameter of type AXIS in the MGUD block

SYG_AU[ ] -> Synact parameter of type AXIS in the UGUD block

SYG_A4[ ] -> Synact parameter of type AXIS in the GUD4 block

....

SYG_A9[ ] -> Synact parameter of type AXIS in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18664	MM_NUM_SYNACT_GUD_CHAR			N02	-	
-	Configurable GUD variable of type Char			DWORD	PowerOn	
-						
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2	M

Description: The MD18664 $MN_MM_NUM_SYNACT_GUD_CHAR[ ]
can be used to extend individual GUD blocks by additional
channel-specific parameter areas of type CHAR.
The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_CHAR[0] = <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[1] = <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[2] = <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[3] = <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_CHAR[8] = <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type CHAR
Field size corresponding to <value> of the relevant machine data
Predefined names:
SYG_CS[ ] -> Synact parameter of type CHAR in the SGUD block
SYG_CM[ ] -> Synact parameter of type CHAR in the MGUD block
SYG_CU[ ] -> Synact parameter of type CHAR in the UGUD block
SYG_C4[ ] -> Synact parameter of type CHAR in the GUD4 block
....
SYG_C9[ ] -> Synact parameter of type CHAR in the GUD9 block
The parameters can be read and written both by the part program
and also via synchronous actions.

18665	MM_NUM_SYNACT_GUD_STRING			N02	-	
-	Configurable GUD variable of type STRING			DWORD	PowerOn	
-						
-	9	0,0,0,0,0,0,0,0,0	0	25	7/2	M

Description: The MD18665 $MN_MM_NUM_SYNACT_GUD_STRING[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type STRING.

The GUD blocks are differentiated by the field index:

$MN_MM_NUM_SYNACT_GUD_STRING[0] = <value> -> extension of the SGUD block

$MN_MM_NUM_SYNACT_GUD_STRING[1] = <value> -> extension of the MGUD block

$MN_MM_NUM_SYNACT_GUD_STRING[2] = <value> -> extension of the UGUD block

$MN_MM_NUM_SYNACT_GUD_STRING[3] = <value> -> extension of the GUD4 block

$MN_MM_NUM_SYNACT_GUD_STRING[8] = <value> -> extension of the GUD9 block

In each case, fields with the following properties are created:

Data type STRING

Field size corresponding to <value> of the relevant machine data

The maximum length of a string is 31 characters.

Predefined names:

SYG_SS[ ] -> Synact parameter of type STRING in the SGUD block
SYG_SM[ ] -> Synact parameter of type STRING in the MGUD block
SYG_SU[ ] -> Synact parameter of type STRING in the UGUD block
SYG_S4[ ] -> Synact parameter of type STRING in the GUD4 block
....
SYG_S9[ ] -> Synact parameter of type STRING in the GUD9 block

The parameters can be read and written both by the part program and also via synchronous actions.

18700	MM_SIZEOF_LINKVAR_DATA			N02	B3	
-	Size of NCU-link variable memory			DWORD	PowerOn	
LINK						
-	-	0	-	-	7/2	M

Description: Number of bytes of the NCK link memory for the variables $A_DLx.

18710	MM_NUM_AN_TIMER			N02	-	
-	Number of global time variable for synchronized actions			DWORD	PowerOn	
-						
-	-	0	0	10000	7/2	M

Description: Number of global time variables for motion-synchronous actions (DRAM)

18720	MM_SERVO_FIFO_SIZE			EXP, N01	B3	
-	Setpoint value for buffer size between IPO and position control			DWORD	PowerOn	
-						
-	-	2	2	35	3/2	M

Description: The machine data determines the size of the setpoint value buffer between interpolator and position control, and has a direct effect on the dynamic user memory requirement.

That is normally 2. If several NCUs are connected via NCU link for e.g. rotary indexing machines, the value should be set to 3 on all NCUs. This will balance the transmission rates of the setpoint values via the link.

In a master value application (e.g. line shaft), the value should be set to 4, but only on the NCU that generates the master value. For all the other NCUs, the preset value should be maintained at 2.

Note:

In control loops that are connected via interpolator, every increase of the value generates a further dead-time.

When the IPO cycles of the NCUs within an NCU group are set to different values, the link communication will only run in the slowest IPO cycle. The MD must be increased in the ratio of the NCU IPO cycle to the slowest IPO cycle in the NCU group, in order to achieve a synchronized output of the setpoint values on the drive interface. The formula for this is as follows:

MM_SERVO_FIFO_SIZE = 2 * IPO cycle ratio + 1

Example:

In an IPO cycle ratio of 4:1, the value on the fast NCU should be set to 9 instead of 3. On the slow NCU, the value must be set to 3.

18730	MM_MAXNUM_ALARM_ACTIONS			N02	-	
-	Length of the alarm action list			DWORD	PowerOn	
-						
-	-	500	100	2000	1/1	M

Description: Maximum number of alarm actions that are retained. This is the length of the alarm action list.

18780	MM_NCU_LINK_MASK			N01	B3	
-	Activation of NCU-link communication			DWORD	PowerOn	
-						
-	-	0	0	3	3/2	M

Description: Activating NCU link communication

Bit-coded activation data. That is the NCU link communication can be activated in various forms.

Bit-coded activation data:

Bit 0 = 0x1: Link communication is to be activated.

Bit 1 = 0x2: Different IPO and position-control cycles can be enabled.

(See description FAST_IPO_LINK)

Irrelevant for:

Systems without link modules

Related to:

MD30560 $MA_IS_LOCAL_LINK_AXIS,
MD12510 $MN_NCU_LINKNO,
MD12520 $MN_LINK_TERMINATION,
MD18782 $MN_MM_LINK_NUM_OF_MODULES,
MD12540 $MN_LINK_BAUDRATE_SWITCH,
MD12550 $MN_LINK_RETRY_CTR

18781	NCU_LINK_CONNECTIONS			N01	B3	
-	Number of internal link connections			DWORD	PowerOn	
LINK						
-	-	0	0	32	3/1	M

Description: Value = 0

The software calculates the internal link connnections itself.

Value > 0

Number of internal link connnections from each NCU to each other NCU.

These link connnections do not accommodate the non-cyclic messages.

Each of these connections can transfer 240 bytes of raw data.

Non-cyclic messages occur with alarms, container switches and link variablen.

18782	MM_LINK_NUM_OF_MODULES			N01, N02	B3	
-	Number of NCU-link modules			DWORD	PowerOn	
-						
-	-	2	2	16	3/2	M

Description: LINK_NUM_OF_MODULES defines how many link modules can participate in the link communication.

18788	MM_CC_STATION_CHAN_MASK			N01	-	
-	Channel bit mask for allocating CC stations			DWORD	PowerOn	
-						
-	3	1,0,0	-	-	1/1	M

Description: Machine data for channel-specific creation of special additional software stations for compile cycles.

Enter a bit mask with the bits set for the channels, in which a compile cycle shall use the relevant station.

Meaning of the individual array elements:

$MN_MM_CC_STATION_CHAN_MASK[0]:

Creates a CC station at the end of the geometry preparation and prior to velocity planning in the preparation task. A compile cycle application can buffer the blocks there and manipulate their contents.

$MN_MM_CC_STATION_CHAN_MASK[1]:

Creates another CC-Station that is called directly after the first CC station (see above) and permits the internal block contents independently of this manipulation.

$MN_MM_CC_STATION_CHAN_MASK[2]:

Creates an additional CC station in the preparation task that is called directly prior to tool radius offset and allows manipulation of the internal block contents.

18790	MM_MAX_TRACE_LINK_POINTS			EXP, N02, N06	B3	
-	Trace data buffer size for NCU-Link			DWORD	PowerOn	
NBUP						
-	-	8	0	20000	2/2	M

Description: MM_MAX_TRACE_LINK_DATAPOINTS defines the size of an internal data buffer which contains the trace recordings for the NCU-link functionality.

The MD is only evaluated if bit 0 is set in MD18792 $MN_MM_TRACE_LINK_DATA_FUNCTION.

Related to:

MD22708 $MC_TRACE_SCOPE_MASK,
MD22714 $MC_MM_TRACE_DATA_FUNCTION,
MD28180 $MC_MM_MAX_TRACE_DATAPOINTS
MD22700 $MC_TRACE_STARTTRACE_EVENT,
MD22702 $MC_TRACE_STARTTRACE_STEP,
MD22704 $MC_TRACE_STOPTRACE_EVENT,
MD22706 $MC_TRACE_STOPTRACE_STEP,
MD22710 $MC_TRACE_VARIABLE_NAME,
MD22712 $MC_TRACE_VARIABLE_INDEX,
MD18792 $MN_MM_TRACE_LINK_DATA_FUNCTION

18792	MM_TRACE_LINK_DATA_FUNCTION			EXP, N02, N06	B3	
-	Specifies the contents of the NCU-link files			DWORD	PowerOn	
NBUP						
-	-	0	0	0x7FFFFFFF	2/2	M

Description: The NCK link sends and receives 32 buffers with a length of 240 bytes in each interpolation cycle.

These buffers are saved in a FIFO (first in-first out) memory of length MD18790 $MN_MM_MAX_TRACE_LINK_POINTS and written to a file (ncsctr01.mpf for the 1st channel) if a "trigger event" occurs (e.g. Cancel Alarm button, see MD22704 $MC_TRACE_STOPTRACE_EVENT and MD22700 $MC_TRACE_STARTTRACE_EVENT).

The machine data should be interpreted as a bit mask and has the following meaning:

BIT0 = 1

Enables the NCU link trace file.

The others are only evaluated if this bit is set!

MD18790 $MN_MM_MAX_TRACE_LINK_POINTS is only evaluated with this bit.

BIT1 = 1

The stored buffer content is analyzed according to its meaning and written to the file in plain text. This means setpoint transfer can be detected, for example, from the text items "desVal", actual value transfer from the identifiers "actVal" etc.

BIT1 = 0

The buffer content is displayed in HEX and is not analyzed.

BIT2 = 1

Only buffers that contain a sporadically occuring communication message (dynamic message) between the NCUs are recorded.

These include, for example, the following events:

- Set machine data
- Set link variables
- Alarms spanning NCUs
- Axis container rotation

BIT3 = 1

Every addition and deletion of a CLEARHIMSELF alarm transferred via LINK triggers the following action:

The internal receive tree is recorded before and after the action and the most recent values can be

found again in trace.

NOTICE: Very very time-consuming; please only use in an emergency.

18794	MM_TRACE_VDI_SIGNAL			EXP, N02, N06	-	
-	Trace specification of VDI signals			DWORD	PowerOn	
NBUP						
-	-	0	0	0x7FFFFFFF	2/2	M

Description: The NCK sends and receives PLC VDI signals. The Trace function stores the signals which have changed in each interpolation cycle in an FIFO memory (first in-first out) having a size of MM_MAX_TRACE_POINTS.

The FIFO is written to a file (for the 1st channel: ncsctr01.mpf) when a "trigger event" occurs (e.g. Cancel Alarm key, see MD22704 $MC_TRACE_STOPTRACE_EVENT and MD22700 $MC_TRACE_STARTTRACE_EVENT).

The machine data should be interpreted as bit mask. The corresponding VDI signals are recorded depending on which bit is set.

Bits 1.. 6 describe which axial VDI input signals are recorded in the trace

(see .. TRACE_DATA_FUNCTION).

18800	MM_EXTERN_LANGUAGE			N01, N12	K1	
-	Activation of external NC languages			DWORD	PowerOn	
-						
-	-	0x0000	0x0000	0x0001	7/2	M

Description: The corresponding NC language must be activated to execute part programs of other control manufacturers. Only one external NC language can be selected. The range of instructions which is made available in each case is to be taken from the current documentation.

Bit 0 (LSB):

Execution of part programs ISO_2 or ISO_3.

See MD10880 $MN_MM_EXTERN_CNC_SYSTEM for coding.

18840	MM_EPSPARAM_DIMENSION			EXP, N01, N02	ePS Dokumentation	
-	Dimension of ePS-specific variables $EPS_*			DWORD	PowerOn	
-						
-	-	10	0	100	0/0	S

Description: Dimension of ePS-specific parameters $EPS_R[i], $EPS_I[i], $EPS_B[i], $EPS_A[i], $EPS_C[i], #EPS_S[i]; i = 0-Value of the machine data - 1. MD data value zero indicates that the functionality is not available.

18860	MM_MAINTENANCE_MON			EXP, N01	W6	
-	Activation of maintenance data recording			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: Maintenance data is recorded when this MD has the value TRUE.

The axial MD33060 $MA_MAINTENANCE_DATA sets which data are to be recorded.

Details are to be found in the service documentation.

18864	MM_NUM_TRAFO_DATA_SETS			N02, N09	W1	
-	Maximum number of definable transformation data blocks.			DWORD	PowerOn	
-						
-	-	0	0	100	7/2	M

Description: Maximum number of definable transformation data blocks. The data for defining a transformation data block are set by the system variables $NT_XXX.

The data are stored in the buffered memory.

18866	MM_NUM_KIN_TRAFOS			N02, N09	W1	
-	Maximum number of transformation objects in NCK			DWORD	PowerOn	
-						
-	-	0	0	200	7/2	M

Description: Maximum number of transformation objects in NCK.

This machine data indicates the maximum number of transformation objects in the NCK.

If this machine data is 0, the maximum number of kinematic transformations per channel which can be created using machine data ($MC_TRAFO_TYPE_N) remains at 20 (conventional parameter setting for kinematic transformations).

If the machine data is not equal to zero, it indicates the possible total number of all transformations in the NCK. This can be transfomations parameterized conventionally as well as (alternatively or in addition) transformations paramterized using kinematic chains.

18870	MM_MAXNUM_KIN_CHAINS			EXP, N01	-	
-	Max. number of kinematic chains			DWORD	PowerOn	
-						
-	-	0	-	200	7/2	M

Description: Maximum number of kinematic chains in the system

18880	MM_MAXNUM_KIN_CHAIN_ELEM			EXP, N01	-	
-	maximum number of elements in kinematic chains			DWORD	PowerOn	
-						
-	-	0	-	1000	7/2	M

Description: Maximum number of links in kinematic chains. If this MD has the value 0 (default value) then no kinematic chains at all are possible.

18890	MM_MAXNUM_3D_PROT_AREAS			EXP, N01	-	
-	Maximum number of 3D protection areas			DWORD	PowerOn	
-						
-	-	0	0	200	7/2	M

Description: Maximum number of elements in protection zones. If this MD has the value 0 (default value) then no protection zones are possible.

18892	MM_MAXNUM_3D_PROT_AREA_ELEM			EXP, N01	-	
-	Max. number of protection zone elements			DWORD	PowerOn	
-						
-	-	0	0	1000	7/2	M

Description: Maximum number of protection zone elements. If this MD is 0 (default value), no protection zones are possible.

18893	MM_MAXNUM_3D_T_PROT_ELEM			EXP, N01	-	
-	Max. number of tool protection area elements			DWORD	PowerOn	
-						
-	-	0	0	500	7/2	M

Description: Maximum number of protection area elements for automatic creation of tool protection areas.

18894	MM_MAXNUM_3D_PROT_GROUPS			EXP, N01	-	
-	Max. number of protection zone groups			DWORD	PowerOn	
-						
-	-	0	0	100	7/2	M

Description: Maximum number of protection zone groups in the system

18895	MM_MAXNUM_3D_FACETS			EXP, N01	-	
-	Max. number of protection area facets			DWORD	PowerOn	
-						
-	-	0	0	5000	7/2	M

Description: Maximum number of Facets allowed for all protection areas.

Only applies when the MAXNUM_3D_PROT_AREAS is greater than zero.

18896	MM_MAXNUM_3D_COLLISION			EXP, N01	-	
-	Max. number of the memory location for collision check			DWORD	PowerOn	
-						
-	-	0	0	MAX_SIZE_3D_S_COLL_TREE_MD	7/2	M

Description: Maximum size of a temporary memory area (in KB), which is required for the collision check of two protection zones.

If the contents of this machine data is 0, the required memory space is determined automatically from machine data MD18892 $MN_MM_MAXNUM_3D_PROT_AREA_ELEM, MD18890 $MN_MM_MAXNUM_3D_PROT_AREAS and MD18895 $MN_MM_MAXNUM_3D_FACETS.

If the determined memory space is insufficient, it can be explicitely determined using this machine data.

18897	MM_MAXNUM_3D_INTRERFACE_IN			EXP, N01	-	
-	Max. no. of interf. bits for pre-activation of protection zones			DWORD	PowerOn	
-						
-	-	16	0	64	7/2	M

Description: Defines how many input bits are available on the VDI interface for pre-activation of 3D protection zones.

It will influence the size of the memory space required for each NC block.

If this machine data has value n, a memory size of approximately n * (n + 1) / 16 bytes will be required per block.

This machine data will be evaluated and will cause reservation of memory space, only if MD18890 $MN_MM_MAXNUM_3D_PROT_AREAS is inequal to 0.

18898	PROT_AREA_3D_TYPE_NAME_TAB			EXP, N12, N07	-	
-	Table of names for protection zone types			STRING	PowerOn	
-						
-	11	BOX,SPHERE,CYLINDER,CONE...	-	-	7/1	M

Description: Contains the names of the protection zone types.

Meaning of entries:

1. Empty (no protection zone defined)
2. Cuboid
3. Sphere
4. Cylinder
5. Cone
6. Truncated cone
7. Square pyramid
8. Rectangular pyramid
9. Square truncated pyramid
10. Rectangular truncated pyramid

Note: The meaning of each entry is determined by the position in the list. Therefore, simply changing the content does not change the function.

Example: If the third entry "SPHERE" is changed to "CUBOID", this new keyword "CUBOID" still designates a sphere.

Meaningful changes would only be "SPHERE" or "SP", for example.

18899	PROT_AREA_TOOL_MASK			EXP	-	
-	Controls the creation of automatically created tool protection areas			DWORD	NEW CONF	
-						
-	-	0	-	-	7/3	U

Description: Controls the way tool protection areas are automatically created with collision detection active.

This machine data is bit-coded.

Bit 0 (0x1) If no other data are available, create the tool protection area from the tool data (tool length and radius).

18900	FPU_ERROR_MODE			EXP	-	
-	System reaction to FPU calculation error			DWORD	PowerOn	
NBUP, NDLD						
-	-	0x1	-	-	0/0	S

Description: System response to floating point unit arithmetic errors

Bit 0 = 0: (LSB)

The response to an FPU arithmetic error takes place during a station change by the station controller polling the FPU status word. (For CPUs without exception handling)

Bit 0 = 1:

There is an immediate branch into an exception when an FPU arithmetic error occurs:

The address at which the arithmetic error occurred can be exactly localized in the alarm output

18910	FPU_CTRLWORD_INIT			EXP	-	
-	Basic initialization of FPU control word			DWORD	PowerOn	
NBUP, NDLD						
-	-	0x37F	-	-	0/0	S

Description: The basic initialization of the FPU control word enables the FPU mode of operation (e.g. rounding mode) to be changed.

Significance of the bit: see manual of the FPU used.

18920	FPU_EXEPTION_MASK			EXP	-	
-	Exception mask for FPU calculation errors			DWORD	PowerOn	
NBUP, NDLD						
-	-	0xD	-	-	0/0	S

Description: The exception mask for FPU calculation errors enables selection of the FPU error for which an exception was issued.

Significance of the bits for Intel 486:

Bit 0 (LSB):invalid operation

Bit 1: denormalized operand: | operand | < as the smallest 2nd power

Bit 2:zero divide

Bit 3:overflow: result is larger than the largest displayable number

Bit 4:underflow: result is smaller than the smallest displayable number

Bit 5:precision: result cannot be displayed exactly (e.g. 1/3)

Significance of the bits for Intel 960:

Bit 12:integer overflow

Bit 24:floating overflow

Bit 25:floating underflow

Bit 26:nvalid operation

Bit 27:zero divide

Bit 28:floating inexact (precision): result cannot be displayed exactly

Bit 29:denormalized operand

18930	COREFILE_NAME			EXP	-	
-	Path for core file creation			STRING	PowerOn	
-						
-	-		-	-	7/1	M

Description: File name with path name under which a core file is created in the case of a control crash.

The core file is used for problem analysis by NCK development.

A core file will be created, if a valid file name is entered in this MD.

18950	COLLISION_INIT			EXP, N01	-	
-	Configuration of the free path lengths in collision avoidance.			DOUBLE	PowerOn	
-						
-	5	4.0,2.5,0.5,0.950,0.250	0.001	-	0/0	S

Description: Configuration date of collision avoidance.

18960	POS_DYN_MODE		N01	K1	
-	Type of positioning axis dynamic response		BYTE	Reset	
-					
-	-	0	0	1	7/2	M

Description: The machine data deterrmines the accelerations and jerks which are applied in the case of positioning axis motion.

Value 0:

The acceleration is taken from the first field entry in $MA_MAX_AX_ACCEL (value for DYNNORM).

With G75 and active jerk limitation (SOFT), the jerk is taken from the first field entry in $MA_MAX_AX_JERK (value for DYNNORM); without jerk limitation (BRISK) it is infinite.

The following applies for all other positioning axis movements:

If $MA_JOG_AND_POS_JERK_ENABLE is true, the jerk is taken from $MA_JOG_AND_POS_MAX_JERK; otherwise it is infinite (BRISK behavior).

Value 1:

The acceleration is taken from the second field entry in $MA_MAX_AX_ACCEL (value for DYNPOS).

The jerk is taken from the second field entry in $MA_MAX_AX_JERK (value for DYNPOS).

For BRISK behavior, enter very high values here.

1.4 Channel-specific machine data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Description: Description

1.4.1 Basic channel machine data

20000	CHAN_NAME			C01, C10	B3,K1	
-	Channel name			STRING	PowerOn	
-						
-	-	CHAN1,CHAN2,CHAN3,CHAN4...	-	-	7/2	M

Description: The channel name can be defined in this MD. The channel name is only used for the display on the HMI.

20050	AXCONF_GEOAX_ASSIGN_TAB			C01, C10	TE7,TE8,M1,R2,K1,K2	
-	Assignment of geometry axis to channel axis			BYTE	PowerOn	
-						
-	3	1, 2, 3,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2	M

Description: This MD is used to specify which channel axis the geometry axis is assiged to. Each geometry axis must be assigned to a specific channel. If a geometry axis is not assigned to a channel axis, then this geometry axis is not available, and cannot be programmed (with the name defined under MD20060 $MC_AXCONF_GEOAX_NAME_TAB).

For example: Turning machine without transformation:

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[0] = 1 ; 1st geometry axis = 1st channel axis

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[1] = 0 ; 2nd geometry axis not defined

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[2] = 2 ; 3rd geometry axis = 2nd channel axis

The assignment made here is valid if no transformation is active. With active transformation n, the transformation-specific assignment table MD24... $MC_TRAFO_GEOAX_ASSIGN_TAB_... becomes active.

20060	AXCONF_GEOAX_NAME_TAB			C01, C11, C10	F2,V2,M1,K2	
-	Geometry axis name in channel			STRING	PowerOn	
-						
-	3	X, Y, Z,X, Y, Z...	-	-	7/2	M

Description: This MD is used to enter the names of the geometry axes separately for each channel. Geometry axes can be programmed in the part program using the names specified here.

Special cases:

- The geometry axis name entered must not conflict with the designations and assignments of the machine and channel axis names.
- The machine axis names entered must not be the same as the names entered for Euler angles (MD10620 $MN_EULER_ANGLE_NAME_TAB), names specified for directional vectors (MD10640 $MN_DIR_VECTOR_NAME_TAB), names given to intermediate point coordinates in the case of CIP (MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB) or the names of interpolation parameters (MD10650 $MN_IPO_PARAM_NAME_TAB).
- The geometry axis name entered must not include any of the following reserved address letters:

  - D Tool offset (D function) - E Reserved

  - F Feedrate (F function) - G Preparatory function

  - H Auxiliary function (H function) - L Subroutine call

  - M Miscellaneous function (M function) - N Subblock

  - P Subroutine number of passes - R Arithmetic parameters

  - S Spindle speed (S function) - T Tool (T function)
- The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).
- The use of an axis identifier consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z) followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.
- Identical names may be given to geometry axes assigned to different channels.

Related to:

MD10000 $MN_AXCONF_MACHAX_NAME_TAB

(machine axis name [axis no.])

MD20080 $MC_AXCONF_CHANAX_NAME_TAB

(channel axis name in the channel [channel axis no.])

20070	AXCONF_MACHAX_USED			C01, C10	TE3,B3,K5,M1,K1,K2,P3 pl,P3 sl,S1	
-	Machine axis number valid in channel			BYTE	PowerOn	
-						
710-6a2c	20	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M
710-31a10c	20	1, 2, 3, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M
710-31a10c6	20	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M
720-6a2c	20	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M
720-31a10c	20	1, 2, 3, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M
720-31a10c6	20	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M
730-6a2c	20	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M
730-31a10c	20	1, 2, 3, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M
730-31a10c6	20	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2	M

Description: This MD is used to specify the machine axis which the channel axis/special axis is assigned to. Each channel axis has to be assigned to a specific channel. A machine axis that has not been assigned to a channel is inactive, i.e. the axis control is not computed, the axis is not shown on the screen, and it cannot be programmed in any channel.

From software version 5, a machine axis need not be assigned to a channel axis for reasons of uniform configuration. The MD for the machine axis is set to 0 in this case. At the same time, MD11640 $MN_ENABLE_CHAN_AX_GAP must be set to 1 (channel axis gaps are permitted).

From software version 5, the machine data MD20070 $MC_AXCONF_MACHAX_USED does not directly refer to the machine axes created with MD10000 $MN_AXCONF_MACHAX_NAME_TAB, but to the logical machine axis map which is defined with MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB.

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB refers:

- directly to a local machine axis on the NCU,
- to a machine axis of another NCU in the NCU grouping or
- indirectly to an axis container with local or remote machine axes.

If the default values AX1, AX2, ..., AX31 are entered with MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB, then the NCK behaves in the same way as up to software version 4, this means that machine data MD20070 $MC_AXCONF_MACHAX_USED refers to the corresponding local machine axis.

Special cases:

- Each geometry axis must be assigned to a channel axis and a machine axis so that it can be programmed.
- If a machine axis is assigned to several channels by means of MD20070 $MC_AXCONF_MACHAX_USED, then the number of the channel from which the axis is to be programmed must be entered in MD30550 $MA_AXCONF_ASSIGN_MASTER_CHAN.

- Up to software version 4, the list of entries must not contain any gaps (as from software version 5 - see above). In contrast, the assignment of the machine axes used may contain gaps.

For example:

Permissible:

AXCONF_MACHAX_USED [0] = 3; 3rd MA is the 1st axis in the channel

AXCONF_MACHAX_USED [1] = 1; 1st MA is the 2nd axis in the channel

AXCONF_MACHAX_USED [2] = 5; 5th MA is the 3rd axis in the channel

AXCONF_MACHAX_USED [3] = 0

Error for software version 4, permissible for version 5:

AXCONF_MACHAX_USED [0] = 1; 1st MA is the 1st axis in the channel

AXCONF_MACHAX_USED [1] = 2; 2nd MA is the 2nd axis in the channel

AXCONF_MACHAX_USED [2] = 0; gap in the list ...

AXCONF_MACHAX_USED [3] = 3; ... of the channel axes

Axis identifiers must be defined in the corresponding list places of AXCONF_CHANAX_NAME_TAB for the axes activated in the channel.

Related to:

MD30550 $MA_AXCONF_ASSIGN_MASTER_CHAN

(Initial setting of the channel for axis change)

MD20080 $MC_AXCONF_CHANAX_NAME_TAB

(Channel axis name in the channel [channel axis number])

MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB

MD11640 $MN_ENABLE_CHAN_AX_GAP

Reference:

Description of Functions B3.

20080	AXCONF_CHANAX_NAME_TAB			C01, C11, C10	F2,V2,M1,K2,V1	
-	Channel axis name in channel			STRING	PowerOn	
-						
-	20	"X", "Y", "Z", "A", "B", "C", "U", "V", "X11", "Y11"...	-	-	7/2	M

Description: This MD is used to set the name of the channel axis/special axis. The first three channel axes are normally occupied by the three assigned geometry axes (see also MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB). The remaining channel axes are also designated as special axes. The channel axis/special axis is always displayed on the screen in the WCS (workpiece coordinate system) with the name set in this MD.

Special cases:

- The specified channel axis name/special axis name must not conflict with the designation and assignment of the machine and geometry axis names.
- The specified channel axis name must not be the same as the names entered for Euler angles (Eulerwinkel(MD10620 $MN_EULER_ANGLE_NAME_TAB), names specified for directional vectors (MD10640 $MN_DIR_VECTOR_NAME_TAB), names given to intermediate point coordinates in the case of CIP (MD10660 $MN_INTERMEDIATE_POINT_NAME_TAB) or the names of interpolation parameters (MD10650 $MN_IPO_PARAM_NAME_TAB).
- The channel axis name entered must not include any of the following reserved address letters:

  - D Tool offset (D function) - E Reserved
  - F Feedrate (F function) - G Preparatory function
  - H Auxiliary function (H function) - L Subroutine call
  - M Miscellaneous function (M function) - N Subblock
  - P Subroutine number of passes - R Arithmetic parameters
  - S Spindle speed (S function) - T Tool (T function)
- The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).
- The use of an axis identifier consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z) followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.
- No special names need be entered in this MD for channel axes to which geometry axes are assigned (normally the first three channel axes).

Axis identifiers that are not allowed are rejected with an alarm during runup.

20082	AXCONF_CHANAX_DEFAULT_NAME			C01, C11, C10	-	
-	Default axis name for axis variables in the channel			STRING	PowerOn	
-						
-	-		-	-	7/2	M

Description: Variables or parameters of type Axis which have not been initialized are initialized with a default axis identifier. The identifier can be configured via the machine data MD20082 $MC_AXCONF_CHANAX_DEFAULT_NAME. If this machine data is set with an empty string, the 1st geometry axis is used, as previously.

MD20082 $MC_AXCONF_CHANAX_DEFAULT_NAME can be set by default with all available, valid axis identifiers. The value of this machine data should generally always correspond to a value of $MD20060 $MC_AXCONF_GEOAX_NAME_TAB, MD20080 $MC_AXCONF_CHANAX_NAME_TAB or MD10000 $MN_AXCONF_MACHAX_NAME_TAB.

If an invalid axis name is entered as a value or if this name has been changed, for example, in MD20080 $MC_AXCONF_CHANAX_NAME_TAB but not in MD20082 $MC_AXCONF_CHANAX_DEFAULT_NAME, then this is indicated with alarm 4041 channel %1 block %2 axis identifier %3 is invalid".

Only valid axis identifiers, empty string and "NO_AXIS" may be entered in MD20082 $MC_AXCONF_CHANAX_DEFAULT_NAME. "NO_AXIS" is used to indicate a non-initialized axis variable, empty string means previous behavior, i.e. each variable is initialized with the 1st geometry axis.

20090	SPIND_DEF_MASTER_SPIND			C01, C03	H2,K1,K2,P3 pl,P3 sl,S1,W1	
-	Initial setting of master spindle in channel			BYTE	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	20	7/2	M

Description: Definition of the default setting for the master spindle (in the channel).

The number of the spindle is entered.

A number of functions are linked to the master spindle, which are not possible with any other spindle.

Note:

The language command SETMS(n) can declare the spindle number as the master spindle.

The spindle defined in this MD is declared once again as the master spindle with SETMS.

The spindle defined in this MD is also declared as the master spindle at program end and program abort.

20092	SPIND_ASSIGN_TAB_ENABLE		C01, C03, C10	S1	
-	Enable/disable the spindle converter.		BYTE	Reset	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	1	7/7	U

Description:

Value 0:

The spindle converter function is deactivated. The contents of SD42800 $SC_SPIND_ASSIGN_TAB[..] are not evaluated.

Value 1:

The spindle converter is activated. Conversion from logical to physical spindle takes place. For more information, see SD42800 $SC_SPIND_ASSIGN_TAB.

Note:

The spindle converter is deactivated after "Delete SRAM" (service switch in position "1").

Related to:

SD42800 $SC_SPIND_ASSIGN_TAB

20094	SPIND_RIGID_TAPPING_M_NR			C01, C03, C10	H2,K1,S1	
-	M function for switching into controlled axis mode			DWORD	PowerOn	
-						
-	-	70,70,70,70,70,70,70,70,70,70,70,70,70...	-	-	7/2	M

Description:

This machine data defines the M auxiliary function number with which the spindle is switched into axis mode.

The M number defined in the machine data replaces M70 in Siemens language mode.

Note:

On the VDI interface, M70 is always output with the corresponding address extension to indicate the switch to axis mode.

Restrictions: Refer to machine data MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,

MD10715 $MN_M_NO_FCT_CYCLE,

MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,

MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,

MD10804 $MN_EXTERN_M_NO_SET_INT

MD10806 $MN_EXTERN_M_NO_DISABLE_INT,

MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,

MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX

MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

$MD26008 $MC_NIBBLE_PUNCH_CODE

20095	EXTERN_RIGID_TAPPING_M_NR			C01, C11, C03, C10	H2,K1	
-	M function for switching to controlled axis mode(external mode)			DWORD	PowerOn	
-						
-	-	29,29,29,29,29,29,29,29,29,29,29,29,29...	-	-	7/2	M

Description: This machine data defines the M function number with which the switchover to controlled spindle/axis mode is to be carried out.

The M number defined in the machine data replaces M29 in external language mode.

Pre-defined M numbers, such as M00,M1,M2,M3, etc., are not allowed as M numbers.

Restrictions: See machine data MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,
MD10715 $MN_M_NO_FCT_CYCLE,
MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,
MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,
MD10804 $MN_EXTERN_M_NO_SET_INT
MD10806 $MN_EXTERN_M_NO_DISABLE_INT,
MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX
MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

20096	T_M_ADDRESS_EXT_IS_SPINO			C01, C04, C09	H2,W1	
-	Meaning of address extension at T, M tool change			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This MD is only significant if the functions 'Tool management'/'flat D numbers' are inactive.

FALSE

The contents of the address extensions of the NC addresses T and M 'tool change command number' are not evaluated by the NCK. The PLC decides on the significance of the programmed extension.

TRUE

The address extensions of the NC addresses T and M 'tool change command number' - 'tool change command number'=TOOL_CHANGE_M_CODE with 6 as the default value - are interpreted as spindle numbers.

NCK treats the extension in the same way as the active functions 'tool management' and 'flat D number management'.

That is, the programmed D number always refers to the T number of the programmed main spindle number.

See also:

MD20090 $MC_SPIND_DEF_MASTER_SPIND,
MD22550 $MC_TOOL_CHANGE_MODE,
MD22560 $MC_TOOL_CHANGE_M_CODE

20098	DISPLAY_AXIS			EXP, C01	-	
-	Display axis on HMI			DWORD	Immediately	
-						
-	20	0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF...	-	-	7/2	M

Description: Identifies whether the axis is to be displayed by the HMI as a machine, geometry or auxiliary axis.

This data is only evaluated by the HMI.

Bits 0 to 15: Machine

Bit 0= 1 Display machine axis in the actual value windows
0 Hide machine axis in the actual value windows

Bit 1= 1 Display machine axis in the reference point windows
0 Hide machine axis in the reference point windows

Bit 2=1 Display machine axis in preset/scratch/parameter work offset
0 Hide machine axis in preset/scratch/parameter work offset

Bit 3= 1 Display machine axis in the handwheel selection window
0 Hide machine axis in the handwheel selection window

Bit 16 to 31: WCS

Bit 16= 1 Display geometry axis in the actual value windows
0 Hide geometry axis in the actual value windows

(Bit 17) Not assigned

Bit 18= 1 Display geometry axis in parameter work offset
0 Hide geometry axis in parameter work offset

Bit 19= 1 Display geometry axis in the handwheel selection window
0 Hide geometry axis in the handwheel selection window

Bit 20= 1 Display position axes in the JOG/manual windows
0 Hide position axes in the JOG/manual windows

20100	DIAMETER_AX_DEF		C01, C10	H1,M5,P1,V1,W1	
-	Geometry axis with transverse axis function		STRING	PowerOn	
-					
-	-	-	-	7/2	M

Description: This MD is used to define a geometry axis as a transverse axis. Only one transverse axis can be defined here for each channel.

Further transverse axes for axis-specific diameter programming can be activated via MD30460 $MA_BASE_FUNCTION_MASK, bit 2.

The axis identifier of an active geometry axis that has been defined in the channel-specific MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[n] or MD24120 $MC_TRAFO_AX_GEOAX_ASSIGN_TAB_1[n] (from SW 4) and MD20060 $MC_AXCONF_GEOAX_NAME_TAB[n] must be specified.

If space characters are entered or if an axis identifier is specified for an axis which is not defined as a geometry axis, this leads to the following alarms:

- during runup, to alarm 4032 "Channel %1 wrong identifier for transverse axis in %2", if the "Diameter programming" function (DIAMON) or constant cutting velocity G96/G961/G962 is the switch-on setting.
- when the "Diameter programming (DIAMON)" function is activated, to alarm 16510 "Channel %1 block %2 No transverse axis available for diameter programming", if no axis has been permitted via DIAMCHANA[AX] for channel-specific diameter programming.
- when G96/G961/G962 has been programmed, to alarm 10870 "Channel %1 block %2 No transverse axis defined as reference axis for G96/G961/G962", if no geometry axis has been defined as the reference axis for G96/G961/G962 by the instruction SCC[ax].

Related to:

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[n]

(assignment of geometry axis to channel axis)

MD20060 $MC_AXCONF_GEOAX_NAME_TAB[n]

(geometry axis name in the channel)

MD24120 $MC_TRAFO_AX_GEOAX_ASSIGN_TAB_1[n]

(assignment of GEO axis to channel axis for transformation 1)

MD30460 $MA_BASE_FUNCTION_MASK

(Bit2 == 1: Axis-specific diameter programming)

20106	PROG_EVENT_IGN_SINGLEBLOCK		N01	K1,Z1	
-	Prog-Events ignore single block		DWORD	PowerOn	
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3F	7/2	M

Description: Event-driven program calls (Prog-Events) can be set regarding their single-block response.

Bit 0 = 1 :

Prog-Event after start-of-part-program causes block change without restart

Bit 1 = 1 :

Prog-Event after end-of-part-program causes block change without restart

Bit 2 = 1 :

Prog-Event after OP reset causes block change without restart

Bit 3 = 1 :

Prog-Event after ramp-up causes block change without restart

Bit 4 = 1 :

Prog-Event after 1st start after search causes block change without restart

Bit 5 = 1 :

Safety Prog-Event during ramp-up causes block change without restart

20107	PROG_EVENT_IGN_INHIBIT			N01	K1,Z1	
-	Prog-Events ignore read-in disable			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3F	7/2	M

Description: Event-driven programm calls (Prog-Events) can be set regarding their read-in disable response.

Bit 0 = 1 :

Prog-Event after start-of-part-program causes block change despite read-in disable

Bit 1 = 1 :

Prog-Event after end-of-part-program causes block change despite read-in disable

Bit 2 = 1 :

Prog-Event after OP reset causes block change despite read-in disable

Bit 3 = 1 :

Prog-Event after ramp-up causes block change despite read-in disable

Bit 4 = 1 :

Prog-Event after 1st start after search run causes block change despite read-in disable

Bit 5 = 1 :

Safety-Prog-Event during ramp-up causes block change despite read-in disable

20108	PROG_EVENT_MASK		N01, -	TE3,K1	
-	Setting of event-driven programm calls		DWORD	PowerOn	
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3F	7/2	M

Description: Parameterization of the events causing the user program set with MD11620 $MN_PROG_EVENT_NAME (default: _N_PROG_EVENT_SPF) or the safety program _N_SAFE_SPF to be called implicitly:

Bit 0 = 1 : Start-of-part-program

Bit 1 = 1 : End-of-part-program

Bit 2 = 1 : Operator panel reset

Bit 3 = 1 : Ramp-up

Bit 4 = 1 : Reserved

Bit 5 = 1 : Safety program booting

The user program is called via the following search path:

1. /_N_CUS_DIR/_N_PROG_EVENT_SPF
2. /_N_CMA_DIR/_N_PROG_EVENT_SPF
3. /_N_CST_DIR/_N_PROG_EVENT_SPF

The safety program has to be available in the following location:

1. /_N_CST_DIR/_N_SAFE_SPF

Furthermore, MD11450 $MN_SEARCH_RUN_MODE bit 1 also causes the user program set with MD11620 $MN_PROG_EVENT_NAME to be started up automatically after the action blocks, regardless of the settings in the machine data.

20109	PROG_EVENT_MASK_PROPERTIES			N01	K1	
-	Properties of Prog-Events			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2	M

Description: Parameterization of additional properties of the event-controlled program calls (in short, Prog-Event), that is, the MD20108 $MC_PROG_EVENT_MASK is further parameterized.

Bit 0 = 1 :

An ASUB started from channel status RESET does not result in a Prog-Event.

20110	RESET_MODE_MASK			C11, C03	F2,K6,M3,TE4,W5,B3,K5,M1,G2,K1,K2,P1,S1,W1,2.4,2.7	
-	Definition of basic control settings after reset/PP end			DWORD	Reset	
-						
-	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	0	0x7FFFF	7/2	M

Description: Definition of the initial setting of the control after ramp-up and at reset/end-of-part-program with regard to the G codes (in particular the active plane and the settable work offset), tool length offset and transformation by setting the following bits:

Bit 0: Reset mode

Bit 1: Suppress aux. funct. output on tool selection

Bit 2: Select reset response after power-on (e.g. tool offset)

Bit 3: Select reset response after end of test mode with regard to active tool offsets

Bit 4: Reserved

Bit 5: Reserved

Bit 6: Reset response "Active tool length offset"

Bit 7: Reset response "Active kinematic transformation"

Bit 8: Reset response "Coupled-motion axes"

Bit 9: Reset response "Tangential correction"

Bit 10: Reset response "Synchronous spindle"

Bit 11: Reset response "Revolutional feedrate"

Bit 12: Reset response "Geo axis replacement"

Bit 13: Reset response "Master value coupling"

Bit 14: Reset response "Basic frame"

Bit 15: Reset response "Electronic gearbox"

Bit 16: Reset response "Master spindle"

Bit 17: Reset response "Master toolholder"

Bit 18: Reset response "Reference axis for G96/G961/G962"

Bit 19: Reserved "Adjustable software limit switch ineffective"

Bits 4 to 11, 16, and 17 are only evaluated when bit 0 = 1.

Meaning of each bit:

Bit 0 (LSB) = 0: Corresponds with response of software version 1

Initial setting after ramp-up:

- G codes acc. to $MC_GCODE_RESET_VALUES
- Tool length offset not active
- Transformation not active
- No coupled-motion axis groupings active
- No tangential correction active
- No axial revolutional feedrate active
- Path revolutional feedrate with master spindle (default)

Initial setting after reset or end-of-part-program:

The current settings are retained.

When next part program is started, the following initial setting is in effect:

- G codes acc. to $MC_GCODE_RESET_VALUES
- Tool length offset not active
- Transformation not active
- No coupled-motion axis groupings active

- No tangential correction active
- No master value coupling active
- No axial revolutional feedrate active
- Path revolutional feedrate with master spindle (default)

Bit 0(LSB) = 1:

Initial setting after ramp-up:
- G codes acc. to $MC_GCODE_RESET_VALUES
- Tool length offset active acc. to $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE and $MC_SUMCORR_RESET_VALUE
- Transformation active acc. to $MC_TRAFO_RESET_VALUE
- Geometry axis replacement acc. to $MC_GEOAX_CHANGE_RESET
- No coupled-motion axis groupings active
- No tangential correction active

Initial setting after reset or end-of-part-program:

Depending on $MC_GCODE_RESET_MODE the current settings are retained for the G groups or the initial settings stored in $MC_GCODE_RESET_VALUES are set.

Initial setting after reset or end-of-part-program:

Depending on $MC_RESET_MODE_MASK bits 6 to 7,

the current settings are retained or the initial settings stored in the MDs are set for:
- Tool length offset
- Transformation

Depending on bits 8 and 9, the current settings of coupled-motion axes or tangentially corrected axes are either deactivated or retained.
- Synchronous spindle coupling configured:

The coupling is deselected depending on the setting in $MC_COUPLE_RESET_MODE_1.
- Synchronous spindle coupling not configured:

Depending on bit 10, the coupling is either deactivated or retained.

Depending on bit 14, the basic frame is either retained or deselected.

Bit 1 = 0:

Aux. funct. output (D, T, M) to PLC on tool selection according to MDs $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_TOOL_PRESEL_RESET_VALUE, and $MC_TOOL_CHANGE_MODE. If magazine management is active, T, M are generally not output as auxiliary functions.

The function uses its own communication to output T, M to the PLC, for example.

Bit 1 = 1:

Suppress aux. funct. output to PLC on tool selection.

If tool management or magazine management is active, T, M are generally not output as auxiliary functions.

Bit 2 = 0:

If tool or magazine management is not active:
- No tool offset active after power-on. Active and programmed T depend on the subsequent settings of the machine data (bits 0, 6).

If tool or magazine management is active:

- Not relevant

Bit 2 = 1:

If tool or magazine management is not active:

- If bits 0 and 6 both = 1 (0x41), the tool offset of the last tool active in the NCK is active after the first reset after power-on.

(The value of the programmed tool depends on the value of machine data $MC_TOOL_PRESEL_RESET_VALUE.)

Notice: The NCK does not know the conditions at the machine.

If tool or magazine management is active:

- Not relevant

Bit 3 = 0:

With and without active tool management:

End of test mode: "Retain current setting for active tool length offset" (bits 0 and 6 set) refers to the program which was active before activation of test mode.

Bit 3 = 1:

Relevant only if tool management is not active:

End of test mode: "Retain current setting for active tool length offset" (bits 0 and 6 set) refers to the program which was active at the end of test mode. (If tool management is active, the tool on the spindle is generally the active tool. Exception only for $MC_CUTTING_EDGE_DEFAULT = -2.)

Bit 4 = 0:Reserved

Bit 4 = 1:Reserved

Bit 5 = 0:Reserved

Bit 5 = 1:Reserved

Bit 6 = 0:

Initial setting for active tool length offset after reset/end-of-part-program acc. to $MC_TOOL_RESET_VALUE,$MC_CUTTING_EDGE_RESET_VALUE, $MC_USEKT_RESET_VALUE, and $MC_SUMCORR_RESET_VALUE.

If $MC_TOOL_CHANGE_MODE = 1, the tool specified in $MC_TOOL_PRESEL_RESET_VALUE is also preselected.

If tool or magazine management is active, $MC_TOOL_RESET_NAME is used instead of $MC_TOOL_RESET_VALUE.

Bit 6 = 1:

Current setting for active tool length offset is retained after reset/end-of-part-program.

If tool or magazine management is active, the tool that is currentlly on the master spindle (generally = master toolholder) is selected.

If the tool on the master spindle is disabled, the 'disabled' status is ignored.

Please note that after a program ends or is aborted either the most recent value for master spindle or master toolholder programmed in the program or the value specified with $MC_SPIND_DEF_MASTER_SPIND or $MC_TOOL_MANAGEMENT_TOOLHOLDER defines the master spindle or master toolholder.

(The selection is made using bit 16 or bit 17.)

For $MC_CUTTING_EDGE_DEFAULT = -2 the following applies specifically:

If a tool has been switched to the spindle but a new offset D has not yet been programmed, the previous tool is still active in the NCK.

If machining is aborted in this status (e.g. with the Reset key), the offset is defined with the smallest D number associated with the master spindle tool.

Bit 7 = 0:

Initial setting for active transformation after reset/end-of-part-program according to $MC_TRAFO_RESET_VALUE.

Bit 7 = 1:

The current setting for active transformation is retained after reset/end-of-part-program.

Bit 8 = 0:

Coupled-motion axis groupings are ungrouped at reset/end-of-part-program.

Bit 8 = 1:

Coupled-motion axis groupings remain active after reset/end-of-part-program.

Bit 9 = 0:

Tangential correction is switched off at reset/end-of-part-program.

Bit 9 = 1:

Tangential correction remains active after reset/end-of-part-program.

Bit 10 = 0:

Non-configured synchronous spindle coupling is switched off at reset/end-of-part-program.

Bit 10 = 1:

Non-configured synchronous spindle coupling remains active after reset/end-of-part-program.

Bit 11 = 0:

At reset/end-of-part-program the setting data $SA_ASSIGN_FEED_PER_REV_SOURCE is reset to 0 for all non-active axes/spindles, i.e. traversing at revolutional feedrate is canceled and the setting for path and synchronous axes is reset to the master spindle (default).

Bit 11 = 1:

The current setting for revolutional feedrate is retained after reset/end-of-part-program. At the start of the part program, the setting data $SA_ASSIGN_FEED_PER_REV_SOURCE is reset to 0 for all non-active axes/spindles, i.e. traversing at revolutional feedrate is canceled and the setting for path and synchronous axes is reset to the master spindle (default).

Bit 12 = 0:

If machine data $MC_GEOAX_CHANGE_RESET is set, a changed geometry axis assignment is canceled at reset/end-of-part-program. The initial setting for the geometry axis assignment defined in the machine data becomes active.

Bit 12 = 1:

A changed geometry axis assignment remains active after reset/end-of-part-program.

Bit 13 = 0:

Master value couplings are canceled at reset/end-of-part-program.

Bit 13 = 1:

Master value couplings remain active after reset/end-of-part-program.

Bit 14 = 0:

The basic frame is deselected.

Bit 14 = 1:

The current setting of the basic frame is retained.

Bit 15 = 0:

Active electronic gearboxes remain active at reset/end-of-part-program.

Bit 15 = 1:

Active electronic gearboxes are canceled at reset/end-of-part-program.

Bit 16 = 0:

Initial setting for the master spindle according to $MC_SPIND_DEF_MASTER_SPIND.

Bit 16 = 1:

The current setting of the master spindle (SETMS) is retained.

If $MC_TOOL_MANAGEMENT_TOOLHOLDER = 0, this bit has also an effect on the response of bit 6.

Bit 17 = 0:

Initial setting for the master toolholder according to $MC_TOOL_MANAGEMENT_TOOLHOLDER

Bit 17 = 1:

The current setting of the master toolholder (SETMTH) is retained

(Bit 17 is only relevant if tool or magazine management is active and if $MC_TOOL_MANAGEMENT_TOOLHOLDER> 0. Otherwise, the setting for master spindle bit 16 applies if tool or magazine management is active. This bit has also an effect on the response of bit 6.)

Bit 18 = 0:

Reference axis for G96/G961/G962 according to MD 20100: $MC_DIAMETER_AX_DEF.

When using SCC with its own spindle reset, setting bit 18 = 1 is recommended (see also MD 20112: $MC_START_MODE_MASK, bit 18).

Bit 18 = 1:

Reference axis for G96/G961/G962 is retained.

Bit 19: Reserved!

Bit 19 = 0:

The two adjustable software limit switches are deleted after reset and are no longer effective.

Bit 19 = 1:

The two adjustable software limit switches remain active after reset.

Corresponds with:

MD20120 $MC_TOOL_RESET_VALUE

MD20130 $MC_CUTTING_EDGE_RESET_VALUE

MD20150 $MC_GCODE_RESET_VALUES

MD20152 $MC_GCODE_RESET_MODE

MD20140 $MC_TRAFO_RESET_VALUE
MD20112 $MC_START_MODE_MASK
MD20121 $MC_TOOL_PRESEL_RESET_VALUE
MD20118 $MC_GEOAX_CHANGE_RESET

20112	START_MODE_MASK			C03	K6,M3,K5,M1,K1,K2,P1,S1,W1	
-	Definition of basic setting of control after part program start			DWORD	Reset	
-						
-	-	0x400,0x400,0x400,0x400,0x400,0x400...	0	0x7FFFF	7/2	M

Description: Definition of the initial setting of the control at the start of the part program with respect to G codes (in particular, active plane and active settable work offset), tool length offset, transformation, and axis couplings by setting the following bits:

Bit 0: Not assigned: MD20112 $MC_START_MODE_MASK is evaluated every time a part program starts up

Bit 1: Suppress aux. funct. output on tool selection

Bit 2: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 3: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 4: Start response for G code "Current plane"

Bit 5: Start response for G code "Settable work offset"

Bit 6: Start response for "Active tool length offset"

Bit 7: Start response for "Active kinematic transformation"

Bit 8: Start response for "Coupled-motion axes"

Bit 9:Start response for "Tangential correction"

Bit 10: Start response for "Synchronous spindle"

Bit 11: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 12: Start response for "Geo axis replacement"

Bit 13: Start response for "Master value coupling"

Bit 14: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 15: Not assigned, but reserved (see corresponding bit in RESET_MODE_MASK)

Bit 16: Start response for "Master spindle"

Bit 17: Start response for "Master toolholder"

Bit 18: Start response for "Reference axis for G96/G961/G962"

Bit 19: Reserved "Adjustable software limit switch ineffective"

Meaning of individual bits:

Bit 1 = 0:

Auxiliary function output (D, T, M, DL) to PLC on tool selection according to the following MDs:$MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_TOOL_PRESEL_RESET_VALUE, and $MC_TOOL_CHANGE_MODE.

Note:

If tool or magazine management is active, only auxiliary functions D and DL are output.

Bit 1 = 1:

Suppress auxiliary function output to PLC on tool selection.

Bit 1 is not relevant if tool or magazine management is active.

Bit 2 : Reserved (reset response after power-on)

Bit 3 : Reserved (end of test mode)

Bit 4 = 0:

The current setting for G code "current plane" is retained.

Bit 4 = 1:

Initial setting for G code "current plane" according to $MC_GCODE_RESET_VALUES

Bit 5 = 0:

The current setting for G code "settable work offset" is retained.

Bit 5 = 1:

Initial setting for G code "settable work offset" according to $MC_GCODE_RESET_VALUES

Bit 6 = 0:

The current setting for active tool length offset is retained.

If tool or magazine management is active, the tool currently on the active toolholder (spindle) is always selected.

If the tool that is currently on the spindle is disabled, it is automatically replaced by a suitable spare tool.

If such a spare tool does not exist, an alarm is output.

Bit 6 = 1:

Initial setting for active tool length offset according to $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_USEKT_RESET_VALUE, and $MC_SUMCORR_RESET_VALUE.

If $MC_TOOL_CHANGE_MODE == 1, the tool selected via $MC_TOOL_PRESEL_RESET_VALUE is preselected in addition.

If tool or magazine management is active, MD $MC_TOOL_RESET_NAME is used instead of $MC_TOOL_RESET_VALUE.

Bit 7 = 0:

The current setting for active transformation is retained.

Bit 7 = 1:

Initial setting for active transformation after reset/end-of-part-program according to $MC_TRAFO_RESET_VALUE

Bit 8 = 0:

Coupled-motion axis groupings remain active.

Bit 8 = 1:

Coupled-motion axis groupings are ungrouped.

Bit 9 = 0:

Tangential correction remains active.

Bit 9 = 1:

Tangential correction is switched off.

Bit 10 = 0:

Non-configured synchronous spindle coupling remains active.

Bit 10 = 1:

Non-configured synchronous spindle coupling is switched off.

Bit 11 : Reserved (revolutional feedrate)

Bit 12 = 0:

A changed geometry axis assignment remains active when the part program starts up.

Bit 12 = 1:

If machine data $MC_GEOAX_CHANGE_RESET is set, a changed geometry axis assignment is deleted when the part program starts up.

Bit 13 = 0:

Master value couplings remain active.

```
Bit 13 = 1:
   Master value couplings are canceled.
Bit 14 :   Reserved (basic frame)
Bit 15 = 0:
   Active electronic gearboxes remain active.
Bit 15 = 1:
   Active electronic gearboxes are canceled.
Bit 16 = 0:
   The current setting of the master spindle (SETMS) is retained.
Bit 16 = 1:
   Initial setting for the master spindle according to
   $MC_SPIND_DEF_MASTER_SPIND
Bit 17 = 0:
   The current setting of the master toolholder (SETMTH) is
   retained (relevant only if tool or magazine management is
   active)
Bit 17 = 1:
   Only if $MC_TOOL_MANAGEMENT_TOOLHOLDER> 0: Inital setting for
   the master toolholder according to
   $MC_TOOL_MANAGEMENT_TOOLHOLDER.
   Otherwise, the setting for the master spindle applies.
Bit 18 = 0:
   Reference axis for G96/G961/G962 according to MD20100
   $MC_DIAMETER_AX_DEF.
   When using SCC with its own spindle reset, setting bit 18 = 1 is
   recommended (see also MD 20110: $MC_RESET_MODE_MASK, bit 18).
Bit 18 = 1:
   Reference axis for G96/G961/G962 is retained.
Corresponds with:
MD20120 $MC_TOOL_RESET_VALUE
MD20130 $MC_CUTTING_EDGE_RESET_VALUE
MD20150 $MC_GCODE_RESET_VALUES
MD20152 $MC_GCODE_RESET_MODE
MD20140 $MC_TRAFO_RESET_VALUE
MD20110 $MC_RESET_MODE_MASK
MD20121 $MC_TOOL_PRESEL_RESET_VALUE
MD20118 $MC_GEOAX_CHANGE_RESET
```

20114	MODESWITCH_MASK			C03	K1	
-	Interruption MDA by mode change			DWORD	Reset	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2	M

Description: After program interruption in MDI mode (e.g. in order to carry out a measurement on the workpiece and to correct the tool wear values or after tool breakage) the tool can be manually withdrawn from the contour by changing into JOG mode.

In this case, the control stores the coordinates of the position of the interruption and indicates the path differences traversed by the axes in JOG mode as "Repos offset". When MDI mode is selected again, the axis is repositioned on the contour. This response can be canceled by means of this machine data.

Bit 0 (LSB)= 0:

When MDI (JOG, JOGREF, JOGREPOS, MDIREF and MDIREPOS) are deselected in stopped status, the system ASUB Repos is selected.

Bit 0 (LSB) = 1:

When MDI (JOG, JOGREF, JOGREPOS, MDIREF and MDIREPOS) are deselected in stopped status, the system ASUB Repos is not selected.

Bit 1 (LSB) = 0:

If the NCK stops at a part program block in the program execution in which repositioning is not possible, alarm 16916 is generated if an attempt is made to switch to manual mode.

Bit 1 (LSB) = 1:

If the NCK stops at a part program block in the program execution in which repositioning is not possible, no alarm is generated if an attempt is made to switch to manual mode.

20116	IGNORE_INHIBIT_ASUP			C01	K1,Z1	
-	Execuite interrupt program despite read-in disable			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: In spite of the set read-in disable, an assigned user ASUB is completely executed for the interrupt channel with the set bit.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

Related to:

MD20117 $MC_IGNORE_SINGLEBLOCK_ASUP

20117	IGNORE_SINGLEBLOCK_ASUP		C01	K1,Z1	
-	Execute interrupt program completely despite single block		DWORD	NEW CONF	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: In spite of the set single-block processing mode, an assigned user ASUB is completely executed for the relevant channel with the set bit.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

The MD is only active with single block type 1.

Related to:

MD20116 $MC_IGNORE_INHIBIT_ASUP

20118	GEOAX_CHANGE_RESET		C03	M1,K1,Z1	
-	Enable automatic geometry axis change		BOOLEAN	Reset	
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: 0: The current configuration of the geometry axes remains unchanged on reset and part program start. With this setting, the response is identical to that with older software versions without geometry axis replacement.

1: The configuration of the geometry axes remains unchanged on reset or part program end, depending on MD20110 $MC_RESET_MODE_MASK and, on part program start, depending on MD20112 $MC_START_MODE_MASK, or is switched to the initial state defined by MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB.

Related to:

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20120	TOOL_RESET_VALUE		C03	K1,W1	
-	Tool with length compens. during runup (reset/part program end).		DWORD	Reset	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2	M

Description: Definition of the tool for which tool length compensation is selected during runup or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK, and on part program start as a function of MD20112 $MC_START_MODE_MASK

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20121	TOOL_PRESEL_RESET_VALUE			C03	K1,W1	
-	Preselected tool on RESET			DWORD	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2	M

Description: Definition of the preselected tool in MD20310 $MC_TOOL_MANAGEMENT_MASK=1. A tool is selected after runup, or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK, and on part program start as a function of MD20112 $MC_START_MODE_MASK.

This MD is valid only without tool management.

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20122	TOOL_RESET_NAME			C03	-	
-	Active tool at RESET/START with tool management			STRING	Reset	
-						
-	-		-	-	7/2	M

Description: This MD is used only with active tool management.

Definition of the tool for which tool length compensation is selected during runup or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK, and on part program start as a function of MD20112 $MC_START_MODE_MASK.

Related to:

MD20110 $MC_RESET_MODE_MASK,

MD20112 $MC_START_MODE_MASK

MD20124 $MC_TOOL_MANAGEMENT_TOOLHOLDER

MD20130 $MC_CUTTING_EDGE_RESET_VALUE

20123	USEKT_RESET_VALUE			C03	-	
-	Preselected value of $P_USEKT on RESET			DWORD	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xF	7/2	M

Description: The system variable $P_USEKT is set with the value of this MD:

- after run-up:

As a function of MD20112 $MC_START_MODE_MASK

- after RESET or part program end:

As a function of MD20110 $MC_RESET_MODE_MASK

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20124	TOOL_MANAGEMENT_TOOLHOLDER			C03	H2,K1	
-	Tool holder number			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20	7/2	M

Description: This MD is only relevant with tool management active.

The TM must know on which tool holder a tool has to be loaded.

The data is only evaluated if the value is greater than zero.

Then, the numbers $TC_MPP5 are no longer regarded as spindle numbers but as tool holder numbers.

The automatic address extension of T and M=6 is then the value of this machine data, and no longer the value of MD20090 $MC_SPIND_DEF_MASTER_SPIND.

The MD defines the master tool holder number to which a tool preparation or a tool change refers.

Reference is also made to this value for the determination of the tool on the tool holder for the setting 'retain old offset' of MD20110 $MC_RESET_MODE_MASK.

If a machine has several tool holders but no defined master spindle, then the MD serves as a default value for determining the tool holder on which the tool is to be loaded during a tool change (reset, start, T='identifier', M6).

When defining the magazine locations of internal magazines (see documentation for TM), locations of the type 'SPINDLE' - $TC_MPP1=2 = spindle location can be given a 'location kind index' ($TC_MPP5). This assigns the location to a specific tool holder.

The tool holder with the number n can be declared the master tool holder with the language command SETMTH(n). That is, the offsets of a tool, which is loaded in a provisional buffer storage location of the type 'SPINDLE', correct the tool path with the value $TC_MPP5=n.

Tool changes on 'SPINDLE' locations with $TC_MPP5 unequal to the number of the master tool holder do not influence the path.

The tool holder defined in the MD is again declared as the master tool holder with SETMTH.

Related to:

MD20110 $MC_RESET_MODE_MASK,
MD20112 $MC_START_MODE_MASK
MD20122 $MC_TOOL_RESET_NAME
MD20130 $MC_CUTTING_EDGE_RESET_VALUE

References:

Description of Functions: Coordinate Systems (K2)

20125	CUTMOD_ERR			C08	-	
-	Error handling for function CUTMOD			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: When function CUTMOD becomes active (through explicit call or tool selection), various error conditions may occur. For any of these error conditions it can be set with this machine data whether the error shall trigger an alarm and, if so, whether such an alarm shall only be displayed (warning) or whether the interpretation of the part program shall be aborted.

Two machine data bits are assigned to each error condition (see also the description of alarm 14162).

```
Bit  Hex. Meaning
   Value
--------------------------------
0    0x1Display error "Invalid cutting direction"
1    0x2Program stop after error "Invalid cutting direction"
2    0x4Display error "Undefined cutting angles"
3    0x8Progam stop after error "Undefined cutting angles"
4    0x10Display error "Invalid clearance angle"
5    0x20Progam stop after error "Invalid clearance angle"
6    0x40Display error "Invalid holder angle"
7    0x80Progam stop after error "Invalid holder angle"
8    0x100Display error "Invalid insert angle"
9    0x200Progam stop after error "Invalid insert angle"
10   0x400Error "Invalid combination of cutting edge position and holder angle"
11   0x800Progam stop after error "Invalid combination of cutting edge position and holder angle"
12   0x1000Display error "Invalid rotation"
13   0x2000Progam stop after error "Invalid rotation"
```

20126	TOOL_CARRIER_RESET_VALUE			C03	W1	
-	Active tool holder on RESET			DWORD	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: Definition of the tool holder for which tool length compensation is selected during runup or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK and as a function of MD20112 $MC_START_MODE_MASK on part program start.

This data is valid without tool management.

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20127	CUTMOD_INIT			C08	K1,W1	
-	Initialize CUTMOD after power ON			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-2	999999999	7/2	M

Description: The value programmable with NC command CUTMOD is initialized automatically on power ON with the value stored in this machine data. If the value of the machine data equals -2, CUTMOD will be set to the value included in MD20126 $MC_TOOL_CARRIER_VALUE.

20128	COLLECT_TOOL_CHANGE			C04	-	
-	Tool change commands to PLC after search run			DWORD	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	1/1	M

Description: This MD is only relevant with active magazine management (MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, MD20310 $MC_TOOL_MANAGEMENT_MASK).

It defines whether or not tool change commands, tool preparation commands (tool change commands in general) are output to the PLC after block search with calculation.

1: Tool change commands, tool preparation commands are collected and, after reaching the search target, output to the PLC with program start.

0: All tool/magazine-specific commands that have been collected during the block search are not output to the PLC with the subsequent program start! This means that programmed POSM, TCI, TCA commands are not output either.

Note 1:

Without active magazine management, the tool change M code is not collected if it is not assigned to an auxiliary function group. With active magazine management, this corresponds to MD value = 0.

Note 2:

Value = 0 is appropriate if, for example, after reaching of the search target, the collected tool change commands are output to the PLC in an ASUB by means of the GETSELT, GETEXET commands.

Related to:

MD22560 $MC_TOOL_CHANGE_M_CODE

20130	CUTTING_EDGE_RESET_VALUE			C03	-	
-	Tool edge with length compens. during runup (reset/end of pp)			DWORD	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2	M

Description: Definition of the cutting edge for which tool length compensation is selected during runup or on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK, and as a function of MD20112 $MC_START_MODE_MASK on part program start.

With active tool management and with bit 0 and bit 6 set in MD20110 $MC_RESET_MODE_MASK at selection, the last offset of the tool active at power OFF - as a rule the tool on the spindle - is effective after runup.

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20132	SUMCORR_RESET_VALUE			C03	-	
-	Effective resulting offset on RESET			DWORD	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	6	7/2	M

Description: Definition of the total offset with which the tool length compensation is selected in the runup and on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK and as a function of MD20112 $MC_START_MODE_MASK on part program start.

MD18110 $MN_MM_MAX_SUMCORR_PER_CUTTEDGE determines the maximum useful value which can be entered.

20140	TRAFO_RESET_VALUE			C03	F2,TE4,M1	
-	Transformation data block selected during runup (reset/pp end)			BYTE	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20	7/2	M

Description: Definition of the transformation data block which is selected during runup and on reset or part program end as a function of MD20110 $MC_RESET_MODE_MASK, and as a function of MD20112 $MC_START_MODE_MASK on part program start.

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20142	TRAFO_RESET_NAME			C03	K1	
-	Transformation during power up (reset/part program end)			STRING	Reset	
-						
-	-		-	-	7/2	M

Description: Specifies the name of a transformation ($NT_NAME[n]) defined with the aid of kinematic chains, which is selected during power on or on reset/part program end as a function of MD 20110: $MC_RESET_MODE_MASK and, on part program start, as a function of MD 20112: $MC_START_MODE_MASK.

If this machine data is not empty, machine data MD20140 $MC_TRAFO_RESET_VALUE is ignored. This means that MD20142 $MC_TRAFO_RESET_NAME has priority over MD20140 $MC_TRAFO_RESET_VALUE.

Not relevant:

MD20110 $MC_RESET_MODE_MASK, bit 0 = 0

20144	TRAFO_MODE_MASK			C07	M1	
-	Function selection of kinematic transformation			BYTE	Reset	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x03	7/2	M

Description: The specific functionality of the kinematic transformation is selected by setting the following bits:

Bit 0 = 0:

Default behavior.

Bit 0 = 1:

The transformation as defined in MD20140 $MC_TRAFO_RESET_VALUE is persistent. That is, it is also selected with TRAFOOF and not shown in the display. This requires that the transformation defined in MD20140 $MC_TRAFO_RESET_VALUE is selected automatically after RESET and START via MD20110 $MC_RESET_MODE_MASK and MD20112 $MC_START_MODE_MASK. This means that:

MD20110 $MC_RESET_MODE_MASK bit 0 = 1 and bit 7 = 0,

MD20112 $MC_START_MODE_MASK bit 7 = 1

MD20118 $MC_GEOAX_CHANGE_RESET = TRUE

Bit 1 = 0:

Default behavior.

Bit 1 = 1:

The last active transformation is selected again after control power on. MD20110 $MC_RESET_MODE_MASK Bit 0 = 1 and Bit 7 = 1 also have to be set.

20150	GCODE_RESET_VALUES			C11, C03	F2,TE4,K3,M1,M5,K1,K2,P1,V1	
-	Initial setting of G groups			BYTE	Reset	
-						
-	70	2, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 2, 1, 2, 1, 1, 1, 1, 1, 1...	-	-	7/2	M

Description: Definition of the G codes which become active on runup and reset or at part program end depending on MD20110 $MC_RESET_MODE_MASK (up to software version 4) and MD20152 $MC_GCODE_RESET_MODE (from software version 5) and at part program start depending on MD20112 $MC_START_MODE_MASK.

The index of the G codes in the respective groups must be programmed as the default value.

For a list of the G groups and their G functions, please refer to References:

Programming Manual, Fundamentals

TitleGroupDefault setting on 840D

```
GCODE_RESET_VALUES[0]    12 (G1)
GCODE_RESET_VALUES[1]    20 (inactive)
GCODE_RESET_VALUES[2]    30 (inactive)
GCODE_RESET_VALUES[3]    42 (STARTFIFO)
GCODE_RESET_VALUES[4]    50 (inactive)
GCODE_RESET_VALUES[5]    61 (G17)
GCODE_RESET_VALUES[6]    71 (G40)
GCODE_RESET_VALUES[7]    81 (G500)
GCODE_RESET_VALUES[8]    90 (inactive)
GCODE_RESET_VALUES[9]   101 (G60)
GCODE_RESET_VALUES[10]   110 (inactive)
GCODE_RESET_VALUES[11]   121 (G601)
GCODE_RESET_VALUES[12]   132 (G71)
GCODE_RESET_VALUES[13]   141 (G90)
GCODE_RESET_VALUES[14]   151 (G94)
GCODE_RESET_VALUES[15]   161 (CFC)
GCODE_RESET_VALUES[16]   171 (NORM)
GCODE_RESET_VALUES[17]   181 (G450)
GCODE_RESET_VALUES[18]   191 (BNAT)
GCODE_RESET_VALUES[19]   101 (ENAT)
GCODE_RESET_VALUES[20]   211 (BRISK)
GCODE_RESET_VALUES[21]   221 (CUT2D)
GCODE_RESET_VALUES[22]   231 (CDOF)
GCODE_RESET_VALUES[23]   241 (FFWOF)
GCODE_RESET_VALUES[24]   251 (ORIWKS)
GCODE_RESET_VALUES[25]   262 (RMI)
GCODE_RESET_VALUES[26]   271 (ORIC)
GCODE_RESET_VALUES[27]   281 (WALIMON)
GCODE_RESET_VALUES[28]   291 (DIAMOF)
GCODE_RESET_VALUES[29]   301 (COMPOF)
GCODE_RESET_VALUES[30]   311 (inactive)
GCODE_RESET_VALUES[31]   321 (inactive)
GCODE_RESET_VALUES[32]   331 (FTOCOF)
```

```
GCODE_RESET_VALUES[33]   341 (OSOF)
GCODE_RESET_VALUES[34]   351 (SPOF)
GCODE_RESET_VALUES[35]   361 (PDELAYON)
GCODE_RESET_VALUES[36]   371 (FNORM)
)GCODE_RESET_VALUES[37]   381 (SPIF1)
GCODE_RESET_VALUES[38]   391 (CPRECOF)
GCODE_RESET_VALUES[39]   401 (CUTCONOF)
GCODE_RESET_VALUES[40]   411 (LFOF)
GCODE_RESET_VALUES[41]   421 (TCOABS)
GCODE_RESET_VALUES[42]   431 (G140)
GCODE_RESET_VALUES[43]   441 (G340)
GCODE_RESET_VALUES[44]   451 (SPATH)
GCODE_RESET_VALUES[45]   461 (LFTXT)
GCODE_RESET_VALUES[46]   471 (G290  SINUMERIK mode)
GCODE_RESET_VALUES[47]   483 (G462)
GCODE_RESET_VALUES[48]   491 (CP)
GCODE_RESET_VALUES[49]   501 (ORIEULER)
GCODE_RESET_VALUES[50]   511 (ORIVECT)
GCODE_RESET_VALUES[51]   521 (PAROTOF)
GCODE_RESET_VALUES[52]   531 (TOROTOF)
GCODE_RESET_VALUES[53]   541 (ORIROTA)
GCODE_RESET_VALUES[54]   551 (RTLION)
GCODE_RESET_VALUES[55]   561 (TOWSTD)
GCODE_RESET_VALUES[56]   571 (FENDNORM)
GCODE_RESET_VALUES[57]   581 (RELIEVEON)
GCODE_RESET_VALUES[58]   591 (DYNNORM)
GCODE_RESET_VALUES[59]   601 (WALCS0)
GCODE_RESET_VALUES[60]   611 (ORISOF)
:       ::
GCODE_RESET_VALUES[69]   701 (not defined)
```

20152	GCODE_RESET_MODE			C03	M1,K1,K2,P1	
-	Reset response of G groups			BYTE	Reset	
-						
-	70	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	M

Description:

This MD is only evaluated if bit 0 is set in MD20110 $MC_RESET_MODE_MASK.

For each entry in MD20150 $MC_GCODE_RESET_VALUES (that is for each G group), this MD is used to determine whether, on reset/part program end, the setting in MD20150 $MC_GCODE_RESET_VALUES is used again (MD = 0) or the current setting is retained (MD = 1).

Example:

Here, the basic setting for the 6th G group (current plane) is read from MD20150 $MC_GCODE_RESET_VALUES at each reset / part program end:

$MC_GCODE_RESET_VALUES[5]=1 ; reset value of the 6th G group is M17

$MC_GCODE_RESET_MODE[5]=0 ; basic setting for 6th G group corresponds, after

;reset / part program end

;to MD20150 $MC_GCODE_RESET_VALUES[5]

However, if the current setting for the 6th G group (current plane) is to be retained after reset / part program end, then the following setting results:

$MC_GCODE_RESET_VALUES[5]=1 ; reset value of the 6th G group is M17

$MC_GCODE_RESET_MODE[5]=1 ; current setting for 6th G group

;is retained even after reset / part program end.

Related to:

MD20110 $MC_RESET_MODE_MASK

MD20112 $MC_START_MODE_MASK

20154	EXTERN_GCODE_RESET_VALUES			C11, C03	-	
-	Initial setting of G groups in ISO mode			BYTE	Reset	
-						
-	31	1, 1, 1, 2, 1, 1, 1, 3, 4, 1, 1, 2, 2, 1, 3, 2, 1, 0, 1, 1, 1...	-	-	2/2	M

Description:

When an external NC programming language is used, the G codes which become active on runup and reset or at part program end are defined as a function of MD20110 $MC_RESET_MODE_MASK and at part program start as a function of MD20112 $MC_START_MODE_MASK.

The following external programming languages are possible:

ISO2 dialect Milling

ISO3 dialect Turning

The G group division that is to be used is stated in the current SINUMERIK documentation.

The following groups within MD20154 $MC_EXTERN_GCODE_RESET_VALUES can be written:

ISO2 dialect M:

G group 2: G17/G18/G19

G group 3: G90/G91

G group 5: G94/G95

G group 6: G20/G21

G group 13: G96/G97

G group 14: G54-G59

ISO3 dialect T:

G group 2: G96/G97

G group 3: G90/G91

G group 5: G94/G95

G group 6: G20/G21

G group 16: G17/G18/G19

20156	EXTERN_GCODE_RESET_MODE			C03	-	
-	Reset response of external G groups			BYTE	Reset	
-						
-	31	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2	M

Description:

```
This MD is evaluated only if bit0 is set in MD20110
$MC_RESET_MODE_MASK (see there).
For each entry in MD20154 $MC_EXTERN_GCODE_RESET_VALUES (that is
for each G group), this MD is used to determine whether, on reset/
part program end, the setting in MD20154
$MC_EXTERN_GCODE_RESET_VALUES is used again (MD = 0) or the cur-
rent setting is retained (MD = 1).
Example for ISO dialect M:
Here, the basic setting for the 14th G group (settable zero off-
set) is read from MD20154 $MC_EXTERN_GCODE_RESET_VALUES at each
reset / part program end:
MD20154 $MC_EXTERN_GCODE_RESET_VALUES[13]=1 ; the reset value for
the 14th G group
                                            ;is G54
MD20156 $MC_EXTERN_GCODE_RESET_MODE[13]=0 ; the basic setting for
the 14th G group
                                            ;after reset / part
program end is defined by
                                            ;MD20154
$MC_EXTERN_GCODE_RESET_VALUES[13]
                                            ;
However, if the current setting for the 14th G group is to be
retained beyond reset / part program end, this results in the fol-
lowing setting:
MD20154 $MC_EXTERN_GCODE_RESET_VALUES[13]=1 ;reset value for the
14th G group
                                            ;is G54
MD20156 $MC_EXTERN_GCODE_RESET_MODE[13]=1 ;current setting for the
14th
                                            ;G group is retained
even after
                                         ;reset / part program end
```

20160	CUBIC_SPLINE_BLOCKS			EXP, C09	-	
-	Number of blocks for C spline			BYTE	PowerOn	
-						
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	4	9	7/2	M

Description:

```
Number of motion blocks across which a spline section is calcu-
lated with the cubic spline (CSPLINE) function.
The larger the value, the closer the generated contour is to the
ideal mathematical cubic spline, which in the boundary condition
CUBIC_SPLINE_BLOCKS = reaches infinity.
However, the higher the value, the longer the block search calcu-
lation time.
References:
  /PA/, Programming Guide: Fundamentals
```

20170	COMPRESS_BLOCK_PATH_LIMIT		C09	B1	
mm	Maximum traversing distance of an NC block with compression		DOUBLE	NEW CONF	
-					
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/2	M

Description: The machine data defines the maximum traversing length of a block that can be compressed. Longer blocks interrupt the compression and are traversed in the normal way.

Related to:

MD33100 $MA_COMPRESS_POS_TOL (maximum deviation with compression)

References:

/PA/, Programming Guide: Fundamentals

20172	COMPRESS_VELO_TOL			C09	B1,V1	
mm/min	Max. permissible deviation of path feedrate with compression			DOUBLE	PowerOn	
-						
-	-	60000.0,60000.0,60000.0,60000.0...	-	-	7/2	M

Description: The value indicates the maximum permissible deviation for the compression for the path feedrate. The larger the value, the more short blocks can be compressed into one long block. The maximum number of compressible blocks is limited by the size of the spline buffer.

Related to:

MD33100 $MA_COMPRESS_POS_TOL[AXn]

MD20170 $MC_COMPRESS_BLOCK_PATH_LIMIT

References:

/PGA/, Programming Guide, Advanced

20178	ORISON_BLOCK_PATH_LIMIT			C09	-	
mm	Maximum traversing length with orientation smoothing			DOUBLE	NEW CONF	
-						
-	-	20.0,20.0,20.0,20.0,20.0,20.0,20.0...	-	-	7/2	M

Description: The machine data defines the maximum traversing length of a block, for which the orientation is still being smoothed with G code ORISON. Longer blocks interrupt the smoothing and are run as programmed.

20180	TOCARR_ROT_ANGLE_INCR			C08	W1	
-	Rotary axis increment of orientable tool holder			DOUBLE	NEW CONF	
-						
-	2	0.0, 0.0,0.0, 0.0,0.0, 0.0,0.0, 0.0...	-	-	7/3	M

Description: For orientable tool carriers, this machine data defines the size of the minimum increment (in degrees) by which the first or second orientation axis can be changed (e.g. for Hirth tooth systems).

A programmed or calculated angle is rounded to the nearest value resulting from

phi = s + n * d

with integer n.

In which:

s = MD20180 $MC_TOCARR_ROT_ANGLE_INCR[i]

d = MD20182 $MC_TOCARR_ROT_ANGLE_OFFSET[i]

and i is 0 for the 1st and 1 for the 2nd axis.

There is no rounding if this machine data is equal to zero.

20182	TOCARR_ROT_ANGLE_OFFSET			C08	-	
-	Rotary axis offset of orientable tool holder			DOUBLE	NEW CONF	
-						
-	2	0.0, 0.0,0.0, 0.0,0.0, 0.0,0.0, 0.0...	-	-	7/3	M

Description: This machine data defines the offset of the rotary axis for an orientable tool holder if its position cannot be continuously changed.

It is only evaluated if MD20180 $MC_TOCARR_ROT_ANGLE_INCR is not equal to zero.

For the precise meaning of this machine data, see the description of MD20180 $MC_TOCARR_ROT_ANGLE_INCR.

20184	TOCARR_BASE_FRAME_NUMBER			C08	K2,W1	
-	Base frame number for holding machine table offset			DWORD	NEW CONF	
-						
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-1	15	7/3	M

Description: This machine data indicates into which channel-specific base frame the table offset of an orientable tool holder with a rotary table is written.

This machine data must refer to a valid base frame.

If its content is less than 0 or greater than or equal to the maximum number of base frames set in MD28081 $MC_MM_NUM_BASE_FRAMES, selection of a corresponding tool holder causes an alarm.

20188	TOCARR_FINE_LIM_LIN			C07	W1	
mm	Limit of linear fine offset TCARR			DOUBLE	Immediately	
-						
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/3	M

Description: Indicates for each channel the input limit for the linear fine offset values of an orientable tool holder.

20190	TOCARR_FINE_LIM_ROT			C07	W1	
degrees	Limit of rotary fine offset TCARR			DOUBLE	Immediately	
-						
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/3	M

Description: Indicates for each channel the input limit for the rotary fine offset values of an orientable tool holder.

20191	IGN_PROG_STATE_ASUP			EXP	K1	
-	Do not display interrupt program execution on OPI			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: If the ASUB is started, OPI variables

progStatus and chanStatus do not change, i.e. the HMI does not see this normally short program execution.

Bit 0 is assigned to interrupt channel 1.

Bit 1 is assigned to interrupt channel 2, etc.

Korrespondiert mit:

MD20192 $MC_PROG_EVENT_IGN_PROG_STATE

20192	PROG_EVENT_IGN_PROG_STATE			EXP	-	
-	Do not display the Prog-Event on OPI			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3F	7/2	M

Description: Event-driven program calls (Prog-Events) can be set regarding their response on the OPI.

The progStatus and chanStatus variables remain unaffected despite Prog-Event processing being active and retain the old value. This provides a means of concealing Prog-Event processing from the HMI.

Bit 0 = 1 :

Reserved bit, ineffective

Bit 1 = 1 :

Prog-Event after end-of-part-program does not change progStatus and chanStatus

Bit 2 = 1 :

Prog-Event after OP reset does not change progStatus and chan-Status

Bit 3 = 1 :

Prog-Event after ramp-up does not change progStatus and chan-Status

Bit 4 = 1 :

Reserved

Bit 5 = 1 :

Safety-Prog-Event during ramp-up does not change progStatus and chanStatus

20193	PROG_EVENT_IGN_STOP			EXP	-	
-	Prog-Events ignore the stop key			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xF	7/2	M

Description: Event-controlled program calls (Prog-Events) can be influenced with regard to their behavior after pressing of the stop key.

The Stop, StopAll and StopAtEnd key of the PLC is ignored, if required.

Bit 0 = 1 :

Prog-Event after part program start delays the stop until the part program starts, i.e. the stop only becomes active in the part program, not before its start. If the part program starts with a traversing block, it is possible that it starts briefly, i.e. a short motion occurs, although Stop has already been pressed in the Start-Prog-Event.

Bit 1 = 1 :

Prog-Event after part program end ignores the stop

Bit 2 = 1 :

Prog-Event after operator panel reset ignores the stop

Bit 3 = 1 :

Prog-Event after power up ignores the stop

20196	TOCARR_ROTAX_MODE			C07	W1	
-	ToolCarrier: rotary axis setting with axis positions not defined			DWORD	Immediately	
-						
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	3	7/3	U

Description: The MD is bit-coded. Bit 0 applies to orientable tool holders with one axis, bit 1 for those with 2 axes.

When the axis positions of an orientable tool holder are determined from a specified frame, it might happen that the required orientation is achieved at any position of a rotary axis.

This MD specifies how the rotary axis position is defined in these cases:

If the relevant bit is 0, the position of the rotary axis will be 0; a possibly necessary rotation is performed through the specified frame.

If the relevant bit is 1, the rotation is performed by means of the rotary axis of the orientable tool holder. The resulting frame will no longer include a rotation.

Example:

A tool in its basic position points into the Z direction, and an axis of the orientable tool holder rotates the workpiece around Z (C_Axis). If the tool shall be oriented in parallel with the Z axis of a rotating frame, and if the frame only rotates around the Z axis, the tool orientation will not be changed, if the C axis is rotated. The condition saying that the tool is to point in the direction of the Z axis defined by the frame is therefore fulfilled for any position of the Z axis.

20200	CHFRND_MAXNUM_DUMMY_BLOCKS			EXP, C02, C06, C09	V1	
-	Empty blocks with chamfer/radii			BYTE	PowerOn	
-						
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	15	7/2	M

Description: Indicates the maximum number of blocks without traversing information in the compensation plane (dummy blocks) that can be programmed between two blocks with traversing information when chamfer/rounding are active.

20201	CHFRND_MODE_MASK			C09	V1	
-	Chamfer/rounding behavior			DWORD	Reset	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2	M

Description: Determination of the chamfer/rounding behavior

Bit 0: (LSB) Assignment of the chamfer/rounding to the preceding or following block.

This influences:

- The technology of the chamfer/rounding (feed, type of feed, M commands ...)
- The execution of the blocks without movement in the active plane (e.g. M commands, movement in the applicate) before or after a modal rounding (RNDM)

Bit 1: free

Meaning of the individual bits:

Bit 0 = 0

Chamfer/rounding is derived from the following block (default value).

The technology of the chamfer/rounding is determined by the following block. Blocks without movement (M commands) or movement only in the applicate between two movement blocks in the plane are executed before the modal rounding.

Bit 0 = 1:

Chamfer/rounding is derived from the preceding block.

The technology of the chamfer/rounding is determined by the preceding block. Blocks without movement (M commands) or movement only in the applicate between two movement blocks in the plane are executed after the modal rounding.

20202	WAB_MAXNUM_DUMMY_BLOCKS			C02, C06	W1	
-	maximum number of blocks w/o traversing movement with SAR			BYTE	Reset	
-						
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	0	10	7/2	M

Description: Maximum number of blocks which can appear between the SAR (soft approach and retraction) block and the traversing block which determines the direction of the approach or retraction tangent.

20204	WAB_CLEARANCE_TOLERANCE			C06	W1	
mm	Change of direction with SAR			DOUBLE	PowerOn	
-						
-	-	0.01,0.01,0.01,0.01,0.01,0.01,0.01...	-	-	7/2	M

Description: In the case of smooth approach and retraction, the point defined with DISCL, from which, in the case of infeed from the initial plane, traversing is carried out at lower speed (G341) or the point in which the actual approach movement begins (G 340), must lie between the initial plane and the approach plane.

If this point lies outside this interval and the deviation is less than or equal to this machine data, it is assumed that the point lies in the approach or retraction plane.

If the deviation is greater, then alarm 10741 is output.

Example:

An approach is made from position Z = 20. The SAR plane is at Z = 0. The point defined by DISCL must therefore lie between these two values. If it lies between 20.000 and 20.010 or between 0 and -0.010, it is assumed that the value 20.0 or 0.0 was programmed (under the condition that the MD has the value 0.010). The alarm is output if the position is greater than 20.010 or less than -0.010.

20210	CUTCOM_CORNER_LIMIT			C08, C06	W1	
degrees	Maximum angle f. compensation blocks in tool radius compensation			DOUBLE	Reset	
-						
-	-	100.,100.,100.,100.,100.,100.,100....	0.0	150.	7/2	M

Description: Where outer corners are very pointed, G451 can result in long idle paths. The system therefore switches automatically from G451 (intersection) to G450 (transition circle, with DISC where appropriate) when the outer corners are very pointed. The contour angle which can be traversed following this automatic switchover (intersection ---> transition circle) can be defined in CUTCOM_CORNER_LIMIT.

20220	CUTCOM_MAX_DISC			C08, C06	W1	
-	Maximum value for DISC			DOUBLE	Reset	
-						
-	-	50.0,50.0,50.0,50.0,50.0,50.0,50.0...	0.0	75.0	7/2	M

Description: The G450 transition circle cannot produce sharp outer contour corners, because the path of the tool center point through the transition circle is controlled so that the cutting edge stops at the outer corner (programmed position).

Where sharp outer corners are to be machined with G450, the DISC instruction can be used in the program to program an overshoot. This transforms the transition circle into a conic section and the cutting edge lifts off from the outer corner.

The value range of the DISC instruction extends from 0 to theoretically 100 in steps of 1.

DISC = 0 ...Overshoot disabled, transition circle active

DISC = 100 ...Overshoot large enough to theoretically produce a response similar to intersection (G451).

Programmed values of DISC which are higher than those stored in CUTCOM_MAX_DISC are limited to this maximum value without output of a message. A severely non-linear alteration in the path speed can thus be avoided.

Special cases:

It is not generally meaningful to enter values higher than 50 in DISC.

It is therefore not possible to enter values > 75.

20230	CUTCOM_CURVE_INSERT_LIMIT			C08, C06	W1	
-	Maximum angle for calculation of intersection with TRC			DOUBLE	Reset	
-						
-	-	10.,10.,10.,10.,10.,10.,10.,10.,10....	0.0	150.	7/2	M

Description: Where outer corners are very flat, G450 (transition circle) and G451 (intersection) approximate each other more and more. In such a case, it is no longer useful to insert a transition circle. Especially with 5-axis machining, it is not allowed to insert a transition circle at these outer corners, as this might lead to losses in velocity during continuous-path mode (G64).

That is why the system switches automatically from G450 (transition circle, possibly with DISC) to G451 (intersection) in the case of very flat outer corners. The contour angle (in degrees), as of which the automatic switchover (transition circle ---> intersection) is to be carried out, can be specified in CUTCOM_CURVE_INSERT_LIMIT.

20240	CUTCOM_MAXNUM_CHECK_BLOCKS			C08, C02	W1	
-	Blocks for look-ahead contour calculation with TRC			DWORD	PowerOn	
-						
-	-	4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4	2	10000	7/2	M

Description: Indicates the maximum number of blocks with traversing information at the offset plane that are considered simultaneously for collision detection with active radius compensation.

20250	CUTCOM_MAXNUM_DUMMY_BLOCKS			C08, C02	W1	
-	maximum number of blocks without traversing motion in TRC			DWORD	PowerOn	
-						
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	1000	7/2	M

Description: During active TRC only program blocks with movements of geometry axes perpendicular to the current tool orientation are normally programmed. Nevertheless, individual intermediate blocks that do not contain such path information may also be programmed during active TRC. For example:

- Movements in the direction of tool orientation
- Movements in axes that are not geometry axes
- Auxiliary functions
- In general: Blocks that are taken over into the main run and executed there

The maximum number of intermediate blocks is defined with this MD. If the value is exceeded, alarm 10762 "Too many empty blocks between 2 traversing blocks during active tool radius compensation" is output.

Note:

Comment blocks, arithmetic blocks and empty blocks are not intermediate blocks in the sense of this MD and can therefore be programmed in any number (without an alarm being triggered).

20252	CUTCOM_MAXNUM_SUPPR_BLOCKS			EXP, C01, C08, C02	W1	
-	Maximum number of blocks with compensation suppression			DWORD	PowerOn	
-						
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	0	1000	7/2	M

Description: Indicates the maximum number of blocks for active tool radius compensation, in which the function "Keep radius offset constant" (CUTCONON or reprogramming of G41 / G42 during active TRC) may be active.

Note:

The restriction of the number of blocks with active CUTONON is necessary in order to carry out repositioning in this situation too. Increasing this value for the machine data can lead to an increased memory requirement for NC blocks.

20254	ONLINE_CUTCOM_ENABLE			EXP, C01, C08	-	
-	Real-time tool radius compensation enabled			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This data enables online tool radius compensation. When the function is enabled, the control reserves the necessary memory space required for online tool radius compensation after POWER ON.

ONLINE_CUTCOM_ENABLE = 0:

Online tool radius compensation can be used

ONLINE_CUTCOM_ENABLE = 1:

Online tool radius compensation cannot be used

20256	CUTCOM_INTERS_POLY_ENABLE			C09	W1	
-	Intersection procedure for polynomials is possible			BOOLEAN	PowerOn	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2	M

Description: If this machine data is TRUE and tool radius compensation active, the transitions at outer corners where polynomes (splines) are involved can be treated with the intersection mode. If the machine data is FALSE, conic sections (circles) are always inserted in this case.

If the machine data is FALSE, the response is identical to that of software releases older than 4.0.

20260	PATH_IPO_IS_ON_TCP			EXP, C09, C05	-	
-	Velocity control with spline			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	0/0	S

Description: For SW-internal function optimization.

20262	SPLINE_FEED_PRECISION			EXP, C09, C05	-	
-	Permissible rel. error of path velocity for spline			DOUBLE	PowerOn	
-						
-	-	0.001,0.001,0.001,0.001,0.001,0.001...	0.000001	1.0	0/0	S

Description: This machine data is evaluated only if MD28540 $MC_MM_ARCLENGTH_SEGMENTS is greater than 0.

The factor indicates how large the relative error of the path velocity may be for splines, compressor and polynomial interpolation. The smaller the factor the more computing time is required for preprocessing.

Furthermore, more memory is required to display the arc length function (see 28540 $MC_MM_ARCLENGTH_SEGMENTS).

Example:

SPLINE_FEED_PRECISION=0.1, programmed path velocity=1000 mm/min.

The actual path velocity for polynomial and spline interpolations may then vary within the range between 900 and 1100 mm/min.

20270	CUTTING_EDGE_DEFAULT			C11, C03	H2,W1	
-	Initial position of tool cutting edge without programming			DWORD	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-2	32000	7/2	M

Description: Default cutting edge after tool change

If no cutting edge has been programmed after a tool change, the default cutting edge number set in MD20270 $MC_CUTTING_EDGE_DEFAULT is used.

Value

:= 0

Initially, no cutting edge is active after a tool change.

The cutting edge is not selected until D programming.

:= 1

MD_SLMAXCUTTINGEDGENUMBER

No. of cutting edge (MD_SLMAXCUTTINGEDGENUMBER=9 is valid up to P4)

:= -1

Cutting edge number of old tool also applies to new tool.

:= -2

Cutting edge (correction) of old tool remains active until D is programmed. This means that the old tool remains the active tool until D is programmed. In other words, the tool on the spindle remains the programmed tool until D is programmed.

Example:

MD20270 $MC_CUTTING_EDGE_DEFAULT = 1;

After a tool change, the first cutting edge is active if no other cutting edge has been programmed.

20272	SUMCORR_DEFAULT			C03	H2,W1	
-	Initial position resulting offset without program			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-1	6	7/2	M

Description: The number of the total offset of the cutting edge which becomes active when a new cutting edge compensation is activated without a programmed DL value being available.

MD18110 $MN_MM_MAX_SUMCORR_PER_CUTTEDGE

defines the maximum useful value which can be entered.

Value Meaning

> 0 Number of the total offset

= 0 No total offset active with D programming

= 1 The total offset number for the previously programmed D is used.

Related to:

MD20270 $MC_CUTTING_EDGE_DEFAULT.

20280	LIMIT_CHECK_MODE			EXP	-	
-	Type of limit position check			DWORD	Reset	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	1	1/1	M

Description: This MD can be used to set the mode of operation for the software limit position check.

The following options are available:

0: The limit positions are checked in real time on active transformation

1: The limit positions are checked in a preparative manner on active transformation

20310	TOOL_MANAGEMENT_MASK			C09	P3 pl,P3 sl	
-	Activation of tool management functions			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFFFFF	7/2	M

Description:

MD = 0: Tool management inactive

Bit 0 to bit4

Bit 0=1: Tool management active

Tool management functions are enabled for the current channel.

Bit 1=1: Tool monitoring function active

The functions for monitoring the tools (tool life and guantity) are enabled.

Bit 2=1: OEM functions active

The memory for user data can be used (see also MD18090 $MN_MM_NUM_CC_MAGAZINE_PARAM to MD18098 $MN_MM_NUM_CC_MON_PARAM)

Bit 3=1: Consider adjacent location active

Bit 0 to bit 3 must be set as in MD18080 $MN_MM_TOOL_MANAGEMENT_MASK.

Bit 4=1: The PLC has the option of requesting a T preparation again with changed parameters.

The acknowledgment states "2", "7" und "103" are enabled with this bit. The tool selection is then recalculated in the NCK.

Bit 5 to bit 8

Bit 5 and bit 7 refer to the main spindle

Bit 6 und bit 8 refer to secondary spindles

Bit 5 = 1: The command is regarded as output when the internal transport acknowledgment + the transport acknowledgment are present, that is, when the command has been accepted by the basic PLC program.

(Bit 19=1 also allows the block change to be prevented (main run) until the required acknowledgments have been received.)

Bit 7 = 1: The output of the command is not regarded as being completed until the end acknowledgment has been received from the PLC. That is, the command has beren acknowledged by the PLC user program with status "1".

(Bit 19=1 also allows the block change to be prevented (main run) until the required acknowledgments have been received.)

Bit 5 and bit 7 (alternatively bit 6 and bit 8) are mutually exclusive.

Only the following combinations are permissible:

Bit 5: ...0...1...0

Bit 7: ...0...0...1

With the default setting, that is bits 5 to 8 = 0, synchronisation takes place in the block in which a cutting edge is selected for the first time.

Setting these bits delays the block processing.

Bit 9 to bit 11

Bit 9: Reserved for test purposes

It can also be used by machine manufacturers during the test phase, provided that the PLC program does not yet control the tool change.

Bit 10=1: M06 is delayed until the preparation has been accepted by the PLC user program.

The change command is not output until the preparation acknowledgment has been received. That can be, for example, status "1" or "105".

Bit 10=0: The change command is output without delay, directly after the preparation command.

Bit 11=1: The tool preparation command (PLC command numbers=2, 4, 5) is also executed if the same tool preparation command has already been executed. (Commands 4, 5 contain the tool preparation)

Example: (Tool changed with M6 (PLC command no.= 3):

T="Tool1"; tool preparation

M6; tool change

T="Tool2" ; 1st tool preparation after M6 (for same tool holder)

; is always output to PLC.

T="Tool2"; 2nd tool preparation is only output as a command to the PLC if bit 11 = 1.

; This tool preparation counts as the first if the state of the tool has changed since the previous tool preparation such that it would no longer be serviceable.

That might be, for example, an asynchronous unloading of the tool. This tool preparation then attempts to select a replacement tool.

Bit 11=0: The preparation command can only be output once for any one tool.

Bit 12 to bit 14

Bit 12=1: The preparation command (PLC command numbers = 2, 4, 5) is also executed when the tool is already in the spindle/tool holder.

T="Tool1" ; tool preparation

M6; tool change

T="Tool1"; tool is already in the tool holder

; 1st tool preparation after M6 (for the same tool holder)

; is only output to the PLC if bit 12 = 1.

; An unserviceable tool (e.g. disabled because of tool monitoring.) on the tool holder does not count as being on the tool holder. This tool preparation then attempts to select a replacement tool.

T="Tool2" ; 2nd tool preparation - the rules of bit 11 apply to the output.

Bit 12=0: The preparation command is not executed if the tool is already in the spindle.

Bit 13=1: On reset, the commands are retrieved from the diagnostics buffer and stored in the passive file system (TCTRAxx.MPF under part program) This file is required by the Hotline.

The tool sequences are only recorded in the the diagnostics buffers of systems that have adequate memory (NCU572, NCU573)).

Bit 14=1: Reset mode

Tool and offset selection correspond to the settings in MD20110 $MC_RESET_MODE_MASK and MD20112 $MC_START_MODE_MASK.

Bit 14=0: No reset mode

Bit 15 to bit 19

Bit 15=1: No return transport of the tool if there are multiple preparation commands (Tx->Tx).

Bit 15=0: Return transport of the tool from any defined buffers.

Bit 16=1: T = location number is active

Bit 16=0: T="Tool name"

Bit 17=1: Tool life decrementation can be started and stopped via the PLC in channel DB 2.1...DBx 1.3.

Bit 18=1: Activation of monitoring of "Last tool in the tool group"

Bit 18 Lengthens the search for a suitable tool, above all, when there are a large number of disabled replacement tools.

Bit 18=0: No monitoring of "Last tool in the tool group"

Bit 19=1: The synchronizations determined by bits 5...8 refer to the main run block. This means that the block change is delayed until the required acknowledgments have been received.

Bit 19, in conjunction with set bits 5, 6, 7, 8, delays block processng.

Bit 19=0: The synchronizations determined by bits 5...8 refer to the tool command output. This means that the block change is not delayed.

Bit 20 to bit 24

Bit 20=0: If the PLC signal "Program test active" is present, then the commands generated are not output to the PLC. The NCK acknowledges the commands itself. The magazine and tool data are not changed.

Bit 20=1: If the PLC signal "Program test active" is present, then the commands generated are output to the PLC. Depending upon the type of acknowledgment, tool/magazine data can be changed in the NCK. If the acknowledgment parameters for the "target magazine" are given the values of the "source magazine", then there is no tool transport, and thus also no data change in the NCK.

Bit 21=0: Default setting: Ignore the tool state "W" during tool selection.

Bit 21=1: Tools in the state "W" cannot be selected by another tool change/tool preparation command.

Bit 22=1: Function "Tool subgroups"

$TC_TP11[x] is the grouping or selection parameter

Bit 23=0: Default setting

The tool management selects the tool optimally and safely in the main run. This means that the interpreter may have to wait until the end of the tool selection for the offset selection.

Bit 23=1: For simple applications

The interpreter selects the tool itself. This means synchronization with the main run is not required for the offset selection. (However, an uncorrectable alarm may be issued if a tool becomes unserviceable after selection but before loading.)

Bit 24=0: Default setting

If the PLC commands 8 and 9 (asynchronous transfer) want to move a tool to a location reserved for another tool, then this is rejected with an alarm.

Bit 24=1: If the PLC commands 8 and 9 want to move a tool to a location reserved for another tool with "Reserved for tool from buffer" (bit value= "H4"), then this is possible. This location reservation is removed before execution of the motion ("Reserved for new tool to be loaded" (bit value= "H8") remains effective).

Related to:

MD18080 $MN_MM_TOOL_MANAGEMENT_MASK

MD20320 $MC_TOOL_TIME_MONITOR_MASK

MD20122 $MC_TOOL_RESET_NAME

MD20110 $MC_RESET_MODE_MASK

MD20124 $MC_TOOL_MANAGEMENT_TOOLHOLDER

MD22560 $MC_TOOL_CHANGE_M_CODE

20320	TOOL_TIME_MONITOR_MASK			C06, C09	-	
-	Time monitoring for tool in tool holder			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	-	-	7/2	M

Description: Activation of the tool time monitoring for the tool holders and spindles 1..x.

As soon as the path axes have been traversed (not with G00, always with G63), the tool time monitoring data of the active D compensation are updated for the tool in the selected tool holder, which is also the master tool holder.

Bit 0...x-1: Monitoring of the tool in tool holder 1...x

20350	TOOL_GRIND_AUTO_TMON			C06, C09	-	
-	Activation of tool monitoring. 0/1: Monitoring off/on			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: This MD is used to define whether tool monitoring is switched on automatically if tool length compensation for a grinding tool with monitoring is selected (odd type number types 401 - 499).

TOOL_GRIND_AUTO_TMON = 1 : Automatic monitoring switched on

TOOL_GRIND_AUTO_TMON = 0 : Automatic monitoring switched off

20360	TOOL_PARAMETER_DEF_MASK			C09	M5,P1,W1	
-	Definition of tool parameters			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2	M

Description:

```
Definition of the effects of tool parameters.
Bit no. Meaning when bit is set
------------------------------------------------------------------------------
Bit 0: (LSB):
  For turning and grinding tools, the wear parameter of the trans-
  verse axis is included in the calculaton as a diameter value.
Bit 1:
  For turning and grinding tools, the tool length component of the
  transverse axis is included in the calculaton as a diameter
  value.
Bit 2:
  If a wear component or a length component is included in the
  calculaton as a diameter value, the tool may only be used in the
  plane that was active when the tool was selected. If the bit is
  set, a plane change leads to an alarm.
Bit 3:
  Zero offsets in frames in the transverse axis are included in
  the calculaton as a diameter value.
Bit 4:
  PRESET value is included in the calculaton as a diameter value
Bit 5:
  Include the external work offset in the transverse axis in the
  calculaton as a diameter value
Bit 6:
  Read actual values of the transverse axis as diameter values.
  (AA_IW, AA_IEN, AA_IBN, AA_IB. Notice! Not AA_IM.)
Bit 7:
  Display all actual values of the transverse axis as diameter
  values, irrespective of the G code of group 29 (DIAMON / DIAMOF)
Bit 8:
  Always display the distance-to-go as a radius in the work (WCS)
Bit 9:
  During DRF handwheel travel of a transverse axis, only half the
  distance of the specified increment is traveled (on condition
  that MD11346 $MN_HANDWH_TRUE_DISTANCE = 1).
Bit10:
  Activate the tool component of an active, orientable tool car-
  rier even if no tool is active.
Bit11:
  The tool parameter $TC_DP6 is not interpreted as a tool radius
  but as a tool diameter.
Bit12:
  The tool parameter $TC_DP15 is not interpreted as wear of the
  tool radius but as wear of the tool diameter.
Bit13:
```

During JOG of circles, the circle center coordinate is always a radius value, see D42690 $SC_JOG_CIRCLE_CENTRE.

Bit14:

Absolute values of the transverse axis with cycle masks in the radius

Bit15:

Incremental values of the transverse axis with cycle masks as diameter

20370	SHAPED_TOOL_TYPE_NO			C01, C08	-	
-	Tool type number for contour tools			DWORD	Immediately	
-						
-	4	0, 0, 0, 0,0, 0, 0, 0,0, 0, 0, 0...	-	-	7/2	M

Description: Indicates for each channel max. two number ranges for tool types that are treated as forming tools. Therefore individual ranges are possible both for grinding and for turning tools.

The first range is specified by the first and the second number, the second range by the third and fourth number.

If the first number is not smaller than the second one (the same applies for the third and fourth number), no range will be defined, but two individual numbers will be specified instead.

The numbers 400 through 599 are permissible (tool type numbers for turning and grinding tools), and also value 0 (no tool type number defined).

Examples:

400 405 590 596 : Tool types 400-405 and 590-596 are contour tools

410 400 590 596 : tool types 400, 410 and 590-596 are contour tools

450   0 420 430 : Tool types 450 and 420-430 are contour tools

20372	SHAPED_TOOL_CHECKSUM			C01, C08	-	
-	Checksum test for contour tools			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/5	U

Description: Indicates for each channel whether for completion of the contour tool definition an edge must be available that includes the negative sums of tool length components and tool radius of the previous edges.

20380	TOOL_CORR_MODE_G43G44			C01, C08, C11	-	
-	Treatment of tool length compensation with G43 / G44			BYTE	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/2	M

Description: This machine data determines in ISO dialect M (G43 / G44) the way in which length compensations programmed with H are processed.

0: Mode A

Tool length H always acts on the third geometry axis (usually Z)

1: Mode B

Tool length H acts, depending on the active plane, on one of the three geometry axes. This means with

G17 on the 3rd geometry axis (usually Z)

G18 on the 2nd geometry axis (usually Y)

G19 on the 1st geometry axis (usually X)

In this mode, compensations in all three geometry axes can be configured through multiple programming, i.e. through the activation of one component, the length compensation possibly active in another axis is not deleted.

2: Mode C

The tool length acts, independent of the active plane, on the axis that has simultaneously been programmed with H. Otherwise, the response is the same as with mode B.

20382	TOOL_CORR_MOVE_MODE			C01, C08	-	
-	Traversing of tool length compensation			BOOLEAN	Reset	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This machine data determines how the tool length compensations are traversed.

0: A tool length compensation is only traversed if the associated axis has been programmed (behavior as in previous software versions)

1: Tool lengths are always traversed independently of whether the associated axes are programmed or not.

20384	TOOL_CORR_MULTIPLE_AXES			C01, C08, C11	-	
-	Tool length compensation in several axes simultaneously			BOOLEAN	Reset	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2	M

Description: This machine data determines for tool length compensation in ISO dialect M (ISO2) (G43 / G44), whether the compensation shall be allowed in mode C (selection of the axis on which the compensation is acting by specifying the corresponding axis letter) to act on several axes simultaneously.

If this machine data is 1, this type of programming is allowed; otherwise it is rejected with an alarm.

20390	TOOL_TEMP_COMP_ON		C01, C08	K3,W1	
-	Activation of temperature compensation for tool length		BOOLEAN	Reset	
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This machine data activates the temperature compensation in tool direction (see also SD42960 $SC_TOOL_TEMP_COMP)

20392	TOOL_TEMP_COMP_LIMIT			C01, C08	W1	
mm	Max. temperature compensation for tool length			DOUBLE	Reset	
-						
-	3	1.0, 1.0 , 1.0,1.0, 1.0 , 1.0...	-	-	7/7	U

Description: With temperature compensation, this machine data indicates the maximum permissible value for the tool length for each geometry axis.

If a temperature compensation value larger than this limit value is entered, it will be limited without an alarm.

20396	TOOL_OFFSET_DRF_ON			C01, C08	-	
-	Handwheel override in tool direction			BOOLEAN	Reset	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	-1/2	M

Description: This machine data activates the handwheel override in tool direction.

When this machine data is set, a handwheel override is active in the axis that is assigned to length L1 of the active tool, in the direction defined by tool orientation.

Example:

G17 is active; the tool is a milling tool; tool length L1 is therefore assigned to the Z axis (the 3rd geometry axis).

When the tool (e.g. with active 5-axis transformation) is turned around the Y axis by 90 degrees, so that it shows in X direction, a handwheel override becomes active in the 3rd axis in the X axis.

20400	LOOKAH_USE_VELO_NEXT_BLOCK			EXP, C05	B1	
-	LookAhead following block velocity			BOOLEAN	PowerOn	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2	M

Description: For SW-internal function optimization.

20430	LOOKAH_NUM_OVR_POINTS			EXP, C02, C05	B1	
-	Number of override characteristics for LookAhead			DWORD	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2	M

Description: For SW-internal function optimization.

20440	LOOKAH_OVR_POINTS			EXP, C05	B1	
-	Override switch points for Look Ahead			DOUBLE	PowerOn	
-						
-	2	1.0, 0.2,1.0, 0.2,1.0, 0.2,1.0, 0.2...	0.2	2.0	7/2	M

Description: For SW-internal function optimization.

20442	LOOKAH_SYSTEM_PARAM			EXP	-	
-	System parameter for extended LookAhead			DOUBLE	NEW CONF	
-						
-	20	0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	-	-	0/0	S

Description: System parameter for extended LookAhead.

20443	LOOKAH_FFORM			EXP, C05	-	
-	Activate extended LookAhead			BYTE	NEW CONF	
-						
-	5	0, 0, 0, 0, 0,0, 0, 0, 0, 0...	-	-	7/2	M

Description: The MD specifies for which technology group the extended LookAhead is active. Value 0: default LookAhead; value 1: extended LookAhead

e.g. MD20443 $MC_LOOKAH_FFORM[4]=1; i.e. activation for DYNFINISH.

Entry for all dynamic G code groups.

When changing between the default LookAhead and the extended LookAhead or vice versa the continuous-path mode is interrupted by an interpolatory stop.

20450	LOOKAH_RELIEVE_BLOCK_CYCLE			EXP, C05	B1	
-	Relief factor for block cycle time			DOUBLE	PowerOn	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2	M

Description: Block cycle problems occur for the following reason:

The traversing length of the NC blocks to be processed is so short that the Look Ahead function must reduce the machine velocity to provide enough time for block preparation. In this situation, constant deceleration and acceleration of the path motion can occur.

This machine data defines the extent to which such velocity fluctuations are to be smoothed.

Special cases:

Values up to approx. 1.0 are appropriate.

The value 0.0 means that the function is deactivated.

20455	LOOKAH_FUNCTION_MASK			EXP, C05	-	
-	Look Ahead special functions			BYTE	NEW CONF	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	1	7/2	M

Description: Look Ahead special functions:

Bit 0 = 1:

The Safety Integrated setpoint limitation is already taken into account in Look Ahead.

20460	LOOKAH_SMOOTH_FACTOR			EXP, C05	B1	
%	Smoothing factor for Look Ahead			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.	500.0	7/2	M

Description: A smoothing factor can be defined to give a more stable path velocity control.

It defines the maximum permitted productivity loss.

Acceleration procedures which contribute less than this factor to a shorter program run time are then not executed.

In this case, only those acceleration procedures whose frequency lies above the frequency parameterized in MD32440 $MA_LOOKAH_FREQUENCY are taken into account.

The entry of 0.0 deactivates the function.

20462	LOOKAH_SMOOTH_WITH_FEED			EXP, C05	B1	
-	Path velocity smoothing with programmed feed			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2	M

Description: The MD defines whether the programmed feed is also taken into account for smoothing the path velocity. In these cases, the factor defined in MD20460 $MC_LOOKAH_SMOOTH_FACTOR can be better maintained when the override is set to 100%.

Related to:

MD32440 $MA_LOOKAH_FREQUENCY,

MD20460 $MC_LOOKAH_SMOOTH_FACTOR

20464	PATH_MODE_MASK			EXP, C05	-	
-	Path behavior			DWORD	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xffff	7/2	M

Description: This machine data is used to influence the path action

Bit0:

If only rotary axes are traversed in the block as path axes with active G700, the programmed rotary axis velocity corresponds to

0: [degrees/min]

1: [25.4*degrees/min]

20465	ADAPT_PATH_DYNAMIC			EXP, C05	B1	
-	Adaptation of path dynamic response			DOUBLE	NEW CONF	
-						
-	2	1.0, 1.0,1.0, 1.0,1.0, 1.0,1.0, 1.0...	1.0	100.0	7/2	M

Description: This adaptation factor can be used to reduce the dynamics of changes in tool path velocity.

ADAPT_PATH_DYNAMIC[0] is effective with Brisk, reducing the permissible acceleration

ADAPT_PATH_DYNAMIC[1] is effective with Soft, reducing the permissible jerk

Considering only acceleration processes using a frequency above the frequency parameterized in MD32440 $MA_LOOKAH_FREQUENCY.

To disable this function, enter 1.0.

20470	CPREC_WITH_FFW			EXP, C06, C05	K6	
-	Programmable contour accuracy			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This machine data defines the behavior of the programmable function CPRECON in conjunction with feedforward control.

FALSE: The CPRECON function is inactive when feedforward control is activated simultaneously.

TRUE: CPRECON is also active with feedforward control.

Related to:

SD42450 $SC_CONTPREC, SD42460 $SC_MINFEED

20480	SMOOTHING_MODE			EXP	B1	
-	Behavior of smoothing with G64x			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	15744	7/7	U

Description: Configuration of smoothing with G641 and G642 or G643.

The MD is decimal-coded. The units digits define the behavior with G643, and the tens digits the behavior with G642. The hundreds digit can define whether, with G641 or G642, the axes might be accelerated within the smoothing range or traversed at constant velocity. The thousands and ten-thousands digits are used to configure smoothing with G644.

x0: G643 uses axis-specific tolerances; these are set with the axis-specific MD33100 $MA_COMPRESS_POS_TOL.

x1: G643 uses the contour tolerance SD42465 $SC_SMOOTH_CONTUR_TOL for smoothing the geometry axes. The axis-specific tolerances in MD33100 $MA_COMPRESS_POS_TOL are used for smoothing all other axes.

x2: The angular tolerance SD42466 $SC_SMOOTH_ORI_TOL is used for smoothing the orientation movement. The axis-specific tolerances in MD33100 $MA_COMPRESS_POS_TOL are used for all other axes.

x3: Combination of the two options 01 and 02. This means that G643 uses the tolerances SD42465 $SC_SMOOTH_CONTUR_TOL and SD42466 $SC_SMOOTH_ORI_TOL. All other axes are smoothed with an axis-specific tolerance.

x4: G643 uses the smoothing length programmed with ADIS= or ADISPOS=. The specification of possible axis-specific tolerances or contour and orientation tolerances is ignored.

0x: G642 uses axis-specific tolerances; these are set with the axis-specific MD33100 $MA_COMPRESS_POS_TOL.

1x: G642 uses the contour tolerance for smoothing the geometry axes. The axis-specific tolerances in MD33100 $MA_COMPRESS_POS_TOL are used for smoothing all other axes.

2x: The orientation movement with G642 is smoothed using the angular tolerance SD42466 $SC_SMOOTH_ORI_TOL. The axis-specific tolerances in MD33100 $MA_COMPRESS_POS_TOL are used for smoothing all other axes.

3x: Combination of both options 10 and 20. This means that G642 uses the tolerances SD42465 $SC_SMOOTH_CONTUR_TOL und SD42466 $SC_SMOOTH_ORI_TOL. All other axes are smoothed with an axis-specific tolerance.

x4: G642 uses the smoothing length programmed with ADIS= or ADISPOS=. The specification of possible axis-specific tolerances or contour and orientation tolerances is ignored.

Possible values of the hundreds digit (specification of path velocity for smoothing):

0xx: A profile of the limit velocity is calculated within the smoothing range from the specified maximum values for acceleration and jerk of the axes or path involved. This can lead to an increase in

path velocity in the smoothing range and consequently to an acceleration of the axes involved.

1xx: A profile of the limit velocity is not calculated for smoothing blocks with G641. Only a constant limit velocity is specified. In the case of smoothing with G641/G642 this prevents the axes involved accelerating in the

smoothing range. However, this setting may lead to smoothing blocks being traversed at a velocity that is too low, especially in the case of long smoothing ranges.

2xx: No velocity profile for G642 and G645 (see the above scenario for description)

4xx: The "effective" path velocity in a smoothing block will remain constant if possible as long as the dynamic response of the axes permits this. Differing from the default setting, with this setting, the smoothing blocks are also interpolated as a path.

Possible values for the thousands digit (configuration of G644):

0xxx:

When smoothing with G644, the maximum deviations of each axis specified in MD COMPRESS_POS_TOL are adhered to. If the dynamic response of the axis allows, the specified tolerance might not be fully utilized.

1xxx:

When smoothing with G644, the smoothing distance is specified.

2xxx:

When smoothing with G644, the maximum frequency at which the smoothing movement of each axis occurs is limited. The maximum frequency is specified in MD32440 $MA_LOOKAH_FREQUENCY.

3xxx:

When smoothing with G644, neither the tolerance nor the smoothing distance is monitored. Each axis traverses around a corner with the maximum possible dynamic response. With SOFT, both the maximum acceleration and the maximum jerk of each axis are observed. With BRISK, the jerk is not limited; instead each axis traverses with the maximum possible acceleration.

4xxx:

When smoothing with G644, the maximum deviations of each axis specified in MD COMPRESS_POS_TOL are adhered to. In contrast to the value 0xxx, the specified tolerance is fully utilized where possible. The axis then does not reach its maximum possible dynamic response.

5xxx:

When smoothing with G644, the smoothing distance is specified (ADIS or ADISPOS). In contrast to the value 1xxx, the specified smoothing distance is also fully utilized if possible. The axes involved then might not reach their maximum dynamic response.

Possible values for the ten-thousands digit (configuration of G644):

0xxxx:

The velocity profiles of the axes in the smoothing range are defined without jerk limitiation when BRISK is active, and with jerk limitation when SOFT is active.

1xxxx:

The velocity profiles of the axes in the smoothing range are always defined with jerk limitation no matter whether BRISK or SOFT is active.

The values of the units, tens, hundreds and thousands digits are added.

Related to:

```
MD33100 $MA_COMPRESS_POS_TOL,
SD42465 $SC_SMOOTH_CONTUR_TOL,
SD42466 $SC_SMOOTH_ORI_TOL
```

20482	COMPRESSOR_MODE			EXP	F2	
-	Mode of compressor			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	333	7/7	U

Description: This MD is used to set the compressor operating mode.

The units digits, the tens digits, and the hundreds digits have different meanings.

The following options are available:

Units digits:

0: With the compressor, the tolerances specified with MD33100 $MA_COMPRESS_POS_TOL are met for all axes (geometry and orientation axes).

1: With the compressor, the contour tolerances specified with SD42475 $SC_COMPRESS_CONTUR_TOL become active for the geometry axes.

For the orientation axes, the axis-specific tolerances MD33100 $MA_COMPRESS_POS_TOL become active.

2: With the compressor, the axis-specific tolerances MD33100 $MA_COMPRESS_POS_TOL become active for the geometry axes. The orientation movement is compressed in compliance with the maximum angular deviations specified with SD42476 $SC_COMPRESS_ORI_TOL and SD42477 $SC_COMPRESS_ORI_ROT_TOL.

3: With the compressor, the contour tolerance SD42475 $SC_COMPRESS_CONTUR_TOL becomes active for the geometry axes and the maximum angular deviation SD42476 $SC_COMPRESS_ORI_TOL or SD42477 $SC_COMPRESS_ORI_ROT_TOL becomes active for the orientation axes.

Tens digits:

The tens digits of this MD can be used to set a compressor response that is compatible with previous software releases (< SW 6.3).

0x: All blocks with orientations and value assignments are compressed.

This is the default setting.

Notice: This response is incompatible with previous software releases!

1x: Blocks with value assignments are not compressed (e.g. X=100 ..., etc.)

2x: Blocks with a programmed tool orientation are not compressed (e.g. A3= B3= C3=).

3x: All blocks with value assignments and/or programmed tool orientation are not compressed. With this setting, the response is fully compatible with previous software releases (< 6.3).

Hundreds digits:

The hundreds digit can be used to set which blocks in addition to G01 blocks are to be compressed or not:

0xx: Circular blocks and G00 blocks are not compressed. Is compatible with previous releases.

1xx: Circular blocks are linearized and compressed by COMPCAD.

2xx: G00 blocks are compressed; a different tolerance may be applied here (see MD 20560 $MC_G0_TOLERANCE_FACTOR).

3xx: Combination of the two previous options: Both circular blocks and G00 blocks are compressed.

20484	COMPRESSOR_PERFORMANCE			EXP	-	
-	Compressor power			BYTE	Reset	
-						
-	-	9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9	0	9	0/0	S

Description: This MD is used to set the compressor power. Higher values ensure better surfaces, but also require a higher computer power. The correct value is prespecified for each NCU. For this reason, this MD should only be modified in exceptional cases.

20485	COMPRESS_SMOOTH_FACTOR			EXP, C05	B1	
-	Smoothing by compressor			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	1.	7/2	M

Description: Smoothing of the programmed block end points with compressor type COMPCAD. Value 0: no smoothing. Value 1: maximum smoothing.

Entry for all dynamic G code groups.

20486	COMPRESS_SPLINE_DEGREE			EXP, C05	B1	
-	Compressor spline degree			BYTE	NEW CONF	
-						
-	5	3, 3, 3, 3, 3,3, 3, 3, 3, 3...	3	5	0/0	S

Description: Spline degree for compressor type COMPCAD. Value 3 is recommended; value 5 may be possible for roughing, if soft and rapid movements are more important than accuracy

Entry for all dynamic G code groups.

20487	COMPRESS_SMOOTH_FACTOR_2			EXP, C05	B1	
-	Smoothing by compressor			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	1.	7/2	M

Description: Extent to which the programmed block end points are smoothed in the case of compressor type COMPCAD for non-geometry axes. Value 0: No smoothing. Value 1: Maximum smoothing.

Entry for each dynamic G code group.

20488	SPLINE_MODE			EXP	B1	
-	Setting for spline interpolation			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	7	7/7	M

Description: This MD is used to determine the settings for spline interpolation. The allocation of the spline segments to the NC blocks can thus be influenced. With spline interpolation, the spline blocks are combined, if possible, in such a way, that there are no blocks that are too short and could lead to a reduction in the possible path velocity.

Bit 0: With BSPLINE, blocks that are too short are avoided.

Bit 1: With BSPLINE/ORICURVE, blocks that are too short are avoided.

Bit 2: With CSPLINE, blocks that are too short are avoided.

20490	IGNORE_OVL_FACTOR_FOR_ADIS			EXP	B1	
-	G641/G642 independent of overload factor			BOOLEAN	NEW CONF	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7	U

Description: A block transition is normally only smoothed with G641 and G642 when the path velocity at block transition is reduced by the overload factor set in MD32310 $MA_MAX_ACCEL_OVL_FACTOR. When SOFT is active, the maximum jerk occurring at block transitions is also limited by MD32432 $MA_PATH_TRANS_JERK_LIM. This means that the effect of smoothing with G641 and G642 depends on the values set for the overload factor and possibly for the maximum jerk.

By setting MD20490 $MC_IGNORE_OVL_FACTOR_FOR_ADIS = TRUE a block transition can be smoothed with G641 and G642, irrespectively of the values set for the overload factor.

20500	CONST_VELO_MIN_TIME			EXP, C05	B2	
s	Minimum time with constant velocity			DOUBLE	PowerOn	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	0.1	7/2	M

Description: Defines the minimum time for constant velocity during transition from acceleration to deceleration in short blocks in which the set velocity cannot be reached. Entering a time of at least several IPO cycles prevents a direct transition from the acceleration to the deceleration phase and thus reduces the acceleration jump to half. This acceleration limitation is only active with the acceleration profile BRISK.

MD irrelevant for:

Look Ahead does not take account of this function.

20550	EXACT_POS_MODE			EXP	B1	
-	Exact stop conditions on G00/G01.			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	33	7/2	M

Description: Configuration of the exact stop conditions for G00 and other G codes of the 1st G code group.

The MD is decimal-coded. The units digits define the behavior at G00 (infeed motion) and the tens digits the behavior of all the other G codes of the 1st group ("machining G codes").

x0: At G00, the relevant programmed exact stop conditions become active.

x1: At G00, G601 (fine positioning window) becomes active independent of the programmed exact stop condition.

x2: At G00, G602 (coarse positioning window) becomes active independent of the programmed exact stop condition.

x3: At G00, G603 (setpoint value reached) becomes active independent of the programmed exact stop condition.

0x: At the machining G codes, the relevant programmed exact stop conditions become active.

1x: At the machining G codes, G601 (fine positioning window) becomes active independent of the programmed exact stop condition.

2x: At the machining G codes, G602 (coarse positioning window) becomes active independent of the programmed exact stop condition.

3x: At the machining G codes, G603 (setpoint value reached) becomes active independent of the programmed exact stop condition.

The values of the units digits and tens digits are added.

For example, the value of EXACT_POS_MODE = 2 means that the exact stop condition G602 is always activated automatically at G00, independently of which exact stop condition was programmed. At all other G codes of group 1, the programmed exact stop condition becomes active.

20552	EXACT_POS_MODE_G0_TO_G1			EXP	B1	
-	Exact stop condition at G00-G01 transition			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	5	7/2	M

Description:

```
Configuration of a stop at transition from G00 to a different G
code of the 1st G code group, and also vice versa, at transition
from non-G00 to G00 in continuous-path mode.
In exact-stop mode, the positioning window programmed or set in
MD20550 $MC_EXACT_POS_MODE is used.
The following applies:
0:   No additional stop, no control of exact stop
1:   Behavior active as with G601 (positioning window, fine).
2:   Behavior active as with G602 (positioning window, coarse).
3:   Behavior active as with G603 (setpoint reached).
4:   As 0,
   in addition, the override of the subsequent non-G00 block is
   taken into account in the G00 block via LookAhead in the case of
   a change from G00 to non-G00.
5:   As 0,
   in addition, the override of the subsequent block is taken into
   account via LookAhead in the case of a change from G00 to non-
   G00 and non-G00 to G00.
```

20560	G0_TOLERANCE_FACTOR			EXP	B1	
-	Tolerance factor for G00			DOUBLE	NEW CONF	
-						
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	1.e-9	-	1/1	M

Description:

```
Tolerance factor for G00.
This factor is used to make different settings for the tolerances
for processing when G00 is active (rapid traverse, infeed motion).
This tolerance factor is relevant for the following control func-
tions:
1. Compressor (COMPCAD, COMPCURV, and COMPON)
2. Smoothing with G64x
3. Smoothing of orientation with OST
4. Smoothing of orientation response with ORISON
This factor can be both greater than 1 and less than 1. However,
higher tolerance settings are usual for infeed motion.
If the factor is equal to 1, the tolerances applied for G00 motion
are the same as those for non-G00 motion.
```

20600	MAX_PATH_JERK			C05	B1,B2	
m/s³	Path-related maximum jerk			DOUBLE	NEW CONF	
-						
-	5	100., 100., 100., 100., 100....	1.e-9	-	7/2	M

Description: The jerk limitation restricts the path acceleration change in SOFT mode. The path acceleration divided by the jerk limitation value produces a time in which the acceleration change takes place.

The jerk limitation is activated on the path by the NC command SOFT, and deactivated by BRISK.

MD irrelevant for:

Error states that lead to a rapid stop. In addition, the limitation is also inactive for positioning axes.

There is an entry for each dynamic G code group.

20602	CURV_EFFECT_ON_PATH_ACCEL			EXP, C05	B1,B2	
-	Effect of path curvature on path dynamic			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	0.95	7/2	M

Description: This MD is used to determine whether the reaction of path curvature on path acceleration and path velocity is taken into account.

0:

Not taken into account

> 0:

If required, the path velocity and path acceleration are reduced in order to keep a sufficient reserve on the machine axes for centripetal acceleration.

0.75: Recommended setting.

MD20602 $MC_CURV_EFFECT_ON_PATH_ACCEL defines the proportion of the axis accelerations (see MD32300 $MA_MAX_AX_ACCEL[..]) that can be used for centripetal acceleration. The remainder is used for changing the path velocity.

Centripetal acceleration is not required for linear blocks; the full axis acceleration is therefore available for the path acceleration. On slightly curved contours or with a sufficiently low maximum path feedrate $MC_CURV_EFFECT_ON_PATH_ACCEL has only a partial or no effect. Accordingly, the path acceleration is higher than that specified by (1. - MD20602 $MC_CURV_EFFECT_ON_PATH_ACCEL) * MD32300 $MA_MAX_AX_ACCEL[..].

There is an entry for each dynamic G code group.

20603	CURV_EFFECT_ON_PATH_JERK			EXP, C05	B1	
-	Effect of path curvature on path jerk			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	1000.	7/2	M

Description: Allows the reaction of the path curvature on the path jerk to be taken into account on especially jerk-sensitive machines.

Entry for each dynamic G code group.

20605	PREPDYN_SMOOTHING_FACTOR			EXP, C05	B1	
-	Factor for curve smoothing			DOUBLE	NEW CONF	
-						
-	5	1., 1., 1., 1., 1.,1., 1., 1., 1., 1....	-	-	1/1	M

Description: Factor to determine the degree of smoothing and torsion.

A larger value of this MD causes a stronger smoothing and thus a more homogenous curvature/torsion and resulting path velocity.

With this factor being zero no smoothing is performed.

There is an entry for all dynamic G code groups.

20606	PREPDYN_SMOOTHING_ON			EXP, C05	B1	
-	Activation of curve smoothing			BOOLEAN	NEW CONF	
-						
-	5	0, 0, 0, 0, 0,0, 0, 0, 0, 0...	-	-	7/2	M

Description: Switch on of curve and torsion smoothing.

Smoothing of the curve or torsion causes a homogenous path velocity.

Smoothing is only performed, when the relevant factor is MD 20605 $MC_PREPDYN_SMOOTHING_FACTOR > 0.

There is an entry for all dynamic G code groups.

20607	PREPDYN_MAX_FILT_LENGTH_GEO			EXP, C05	B1	
mm, degrees	Maximum filter length for geometry axes			DOUBLE	NEW CONF	
-						
-	5	2., 2., 2., 2., 2.,2., 2., 2., 2., 2....	-	-	0/0	S

Description: Maximum filter length for curve and torsion smoothing of the geometry axes.

There is an entry for all dynamic G code groups.

20608	PREPDYN_MAX_FILT_LENGTH_RD			EXP, C05	B1	
mm, degrees	Maximum filter length for rotary axes			DOUBLE	NEW CONF	
-						
-	5	5., 5., 5., 5., 5.,5., 5., 5., 5., 5....	-	-	0/0	S

Description: Maximum filter length for curve and torsion smoothing of the rotary axes.

There is an entry for all dynamic G code groups.

20610	ADD_MOVE_ACCEL_RESERVE		C05	F2,B2,K1	
-	Acceleration margin for overlaid movements		DOUBLE	PowerOn	
-					
-	-	.2,.2,.2,.2,.2,.2,.2,.2,.2,.2,.2,.2,.2...	0.	0.9	7/2	M

Description: This machine data contains the factor which defines the acceleration margin which is not used by a path movement in order to provide sufficient acceleration reserves for an overlaid movement for the velocity control.

A factor of 0.2 means that the path axes utilize 80% of the path acceleration in normal operation. Only when a request for overlaid movement is made, can 100% of the path acceleration be utilized.

MD irrelevant for:

Error states that lead to a rapid stop. In addition, the limitation is also ineffective for positioning axes.

Special cases:

At the moment the machine data is only taken into account if the function "Fast retraction" is first activated.

Related to:

MD32300 $MA_MAX_AX_ACCEL (axis acceleration)

20620	HANDWH_GEOAX_MAX_INCR_SIZE		C08, C06	H1		
mm	Limitation handwheel increment for geometry axes		DOUBLE	PowerOn		
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2	M

Description: > 0: Limitation of the size of the selected increment for geometry axes

$MN_JOG_INCR_SIZE0[<increment/VDI signal>] or

SD41010 $SN_JOG_VAR_INCR_SIZE for geometry axes

0: No limitation on geometry axes

20621	HANDWH_ORIAX_MAX_INCR_SIZE		C08, C06	-		
degrees	Limiting of handwheel increment for orientation axes		DOUBLE	PowerOn		
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2	M

Description: > 0: Limitation of the size of the selected increment for orientation axes

$MN_JOG_INCR_SIZE[<increment/VDI signal>] or

SD41010 $SN_JOG_VAR_INCR_SIZE for orientation axes

= 0: No limitation on orientation axes

20622	HANDWH_GEOAX_MAX_INCR_VSIZE		C08, C06, C05	-		
mm/min	Path velocity override		DOUBLE	PowerOn		
-						
-	-	500.,500.,500.,500.,500.,500.,500....	-	-	7/2	M

Description: The following applies to the velocity override of the path:

> 0: Limitation of the size of the selected increment

($MN_JOG_INCR_SIZE_[<increment/VDI signal>] or

SD41010 $SN_JOG_VAR_INCR_SIZE) / 1000*IPO sampling time

= 0: No limitation

20623	HANDWH_ORIAX_MAX_INCR_VSIZE			C08, C06, C05	-	
rev/min	Orientation velocity overlay			DOUBLE	PowerOn	
-						
-	-	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1...	-	-	7/2	M

Description:

```
For the orientation velocity overlay:
> 0: Limitation of the size of the selected increment
   ($MN_JOG_INCR_SIZE[< increment/VDI signal>] or
   SD41010 $SN_JOG_VAR_INCR_SIZE) / 1000 * IPO sampling time
= 0: No limitation
```

20624	HANDWH_CHAN_STOP_COND			EXP, C09	H1,P1	
-	Definition of response of handwheel travel, channel-specific			DWORD	PowerOn	
-						
-	-	0x13FF,0x13FF,0x13FF,0x13FF,0x13FF...	0	0xFFFF	7/2	M

Description: Definition of the behavior for handwheel travel to channel-specific VDI interface signals (bit 0 to bit 7) or the context-sensitive interpolator stop (bit 7):

Bit = 0:

Interruption or collection of the displacements entered via the handwheel.

Bit = 1:

Traversing aborted and no collecting

Bit assignment:

Bit 0: Mode group stop

Bit 1: Mode group stop, axes plus spindle

Bit 2: NC stop

Bit 3: NC stop, axes plus spindles

Bit 4: Feed disable (exceptions with MD30460 $MA_BASE_FUNCTION_MASK bit 6)

For bit 4 feed disable, it must be taken into account that a PLC-controlled axis, for which MD30460 $MA_BASE_FUNCTION_MASK bit 6 = 1, is not stopped by the feed disable, and that no interruption and no abort are triggered here.

Bit 5: Feedrate override

Bit 6: Rapid traverse override

Bit 7: Feed stop, geometry axis or context-sensitive interpolator stop

Bit 8 = 0:

The maximum feedrate for handwheel travel of geometry axes is that specified in machine data JOG_AX_VELO for the corresponding machine axis/axes.

Bit 8 == 1:

The maximum feedrate for handwheel travel of geometry axes is that specified in machine data MAX_AX_VELO for the corresponding machine axis/axes.

Bit 9 = 0:

The override is active during handwheel travel of geometry axes

Bit 9 = 1:

During handwheel travel of geometry axes, the override is assumed to be 100% irrespective of the position of the override switch.

Exception: override 0, which is always active.

Bit 10 = 0:

MD11310 $MN_HANDWH_REVERSE is not active for DRF, i.e. handwheel travel with DRF is carried out as if MD11310 $MN_HANDWH_REVERSE = 0.

Bit 10 = 1:

MD11310 $MN_HANDWH_REVERSE is active for DRF.

Bit 11 = 0:

When the contour handwheel is deselected, program processing is continued automatically.

Bit 11 = 1:

When the contour handwheel is deselected, an NCSTOP is triggered automatically. Program processing is not continued until NCSTART is entered.

Bit 12 = 0

NC start has no effect on handwheel travel.

Bit 12 = 1:

The previously collected paths are rejected at NC start.

Bit 13 = 0:

For DRF, bits 0 - 3 and bit 12: bit = 0 / bit = 1 are active (see above).

Bit 13 = 1:

For DRF, bits 0 - 3 and bit 12 are NOT active: the DRF motion is not interrupted by a stop, and a DRF motion can take place even in "Automatic interrupted" state (achieved by NC Stop).

Note:

If an alarm leads to an axis stop and if such an alarm is pending, no DRF motion can take place.

Bit 14 = 0:

The maximum feedrate for handwheel travel of geometry axes is that specified in SD41120 $SN_JOG_REV_SET_VELO or in MD32050 $MA_JOG_REV_VELO (for revolutional feedrate) or in MD32040 $MA_JOG_REV_VELO_RAPID (for rapid traverse) for the corresponding machine axis, the spindle or rotary axis feedrate is included in the calculation.

Bit 14 = 1:

The maximum rotational feedrate for handwheel travel of geometry axes is the feedrate specified in MD32000 $MA_MAX_AX_VELO for the corresponding machine axis (see also bit 6).

Bit 15 = 0:

If an axis with active diameter programming is traversed in the channel, only half the distance of the specified increment is traveled during handwheel travel ($MN_HANDWH_TRUE_DISTANCE = 1 or 3).

Bit 15 = 1:

If an axis with active diameter programming is traversed in the channel, the specified increment is fully traveled during handwheel travel ($MN_HANDWH_TRUE_DISTANCE = 1 or 3).

20700	REFP_NC_START_LOCK			C01, C03	D1,R1,Z1	
-	NC start disable without reference point			BYTE	Reset	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2	M

Description: 0: The NC/PLC interface signal DB21-30 DBX7.1 (NC start) for starting part programs or part program blocks (MDI and overstore) is active even if one or all axes of the channel have not yet been referenced.

To ensure that the axes nevertheless reach the correct position after NC startup, the work (workpiece coordinate system = WCS) must be set to the correct value by means of other methods (scratch method, automatic work offset determination etc.).

1: Axes for which the axial MD34110 $MA_REFP_CYCLE_NR specifies that a reference point is mandatory (value > -1), must be referenced for NC startup to be enabled.

2: Advanced form of setting 1 in that the axis state "Position restored" (instead of "referenced") is sufficient for NC startup in MDI or overstore.

20730	G0_LINEAR_MODE			C09	P2	
-	G0 interpolation mode			BOOLEAN	PowerOn	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2	M

Description: This machine data defines the interpolation behavior of G0:

0: Non-linear interpolation (RTLIOF): Each path axis interpolates as an individual axis (positioning axis), independently of the other axes, at the rapid traverse velocity of the axis (MD32000 $MA_MAX_AX_VELO).

1: Linear interpolation (RTLION): The path axes are interpolated jointly.

Related to:

MD20732 $MC_EXTERN_G0_LINEAR_MODE

20732	EXTERN_G0_LINEAR_MODE			N12	P2	
-	G00 interpolation mode			BOOLEAN	PowerOn	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2	M

Description: This machine data defines the interpolation behavior of G00:

0: Axes are traversed as positioning axes

1: Axes interpolate with each other

Related to:

MD10886 $MN_EXTERN_INCREMENT_SYSTEM

20734	EXTERN_FUNCTION_MASK			N12	-	
-	Function mask for external language			DWORD	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xFFFF	7/2	M

Description:

```
This machine data is used to influence functions in ISO mode.
Bit0: 0:
   ISO mode T: "A" and "C" are interpreted as axes. If contour def-
   inition has been programmed, "A" or "C" must be preceded by a
   comma.
       1:
   "A" and "C" in the part program are always interpreted as a con-
   tour definition. An axis "A" or "C" is not allowed.
Bit1: 0:
   ISO mode T: G10 P < 100 tool geometry
                   P > 100 tool wear
       1:
               G10 P < 10000 tool geometry
                   P > 10000 tool wear
Bit2: 0:
   G04 dwell time: always [s] or [ms]
       1:
   If G95 is active, in spindle revolutions
Bit3: 0:
   Errors in ISO scanner lead to an alarm
       1:
   Errors in ISO scannner are not output, the block is transferred
   to the Siemens translator.
Bit4: 0:
   G00 is traversed with the current exact stop - continuous-path
   mode G code
       1:
   G00 is always traversed with G09
Bit5: 0:
   Modulo rotary axis is positioned at the shortest possible dis-
   tance
       1:
   Direction of rotation of modulo rotary axis depends on sign
Bit6: 0:
   Only 4-digit program number allowed.
       1:
   8-digit program number allowed. If the program number has less
   than 4 digits, it is expanded to 4 digits with 0.
Bit7: 0:
   Axis programming for geometry axis exchange/parallel axes is
   compatible with ISO mode.
       1:
   Axis programming for geometry axis exchange/parallel axes in
   ISO mode is compatible with Siemens mode.
Bit8: 0:
```

With cycles, the F value transferred is always interpreted as a feedrate.

1:

With threading cycles, the F value transferred is interpreted as a pitch.

Bit9: 0:

Multiplication with 0.01mm / 0.0001inch is carried out in ISO mode T for G84, G88 and in standard mode F for G95.

1:

Multiplication with 0.001mm / 0.00001inch is carried out in ISO mode T for G84, G88 and in standard mode F for G95.

Bit10: 0:

With M96 Pxx, the program programmed with Pxx is always called in the case of an interrupt

1:

With M96 Pxx, CYCLE396.spf is always called in the case of an interrupt

Bit11: 0:

With G54 Pxx, only G54.1 is displayed

1:

With G54 Pxx, the programmed program is displayed after the point, e.g. G54.48

Bit12: 0:

When the subroutine defined with M96 Pxx is called, $P_ISO_STACK is not modified

1:

When the subroutine defined with M96 Pxx is called, $P_ISO_STACK is incremented

Bit13: 0:

G10 is executed without internal STOPRE

1:

G10 is executed with internal STOPRE

Bit14: 0:

ISO_mode T: No alarm if a cutting edge has been programmed in the T command.

1:

ISO mode T: Alarm 14185 if a cutting edge has not been programmed in the T command.

20750	ALLOW_G0_IN_G96			C09, C05	P2,V1	
-	G0 logic with G96, G961			BOOLEAN	PowerOn	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2	M

Description: This machine data defines the speed regulation characteristic of the spindle in G0 blocks with constant cutting rate (G96, G961) selected .

1: In a G0 block, the spindle speed is kept constant at the last value of the previous block that was unequal G0.

Prior to a subsequent block that does not contain G0, the spindle speed is increased to a value that belongs to the transverse axis position of the subsequent block.

0: In a G0 block, the spindle speed changes against the transverse axis position.

20800	SPF_END_TO_VDI			C04, C03	H2,K1	
-	End of subroutine to PLC			BYTE	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/2	M

Description: Bit 0 = 1:

The M functions for subroutine end (M17 and/or M2/M30) are transferred to the PLC interface.

Bit 0 = 0:

The M functions for subroutine end (M17 and/or M2/M30) are not transferred to the PLC interface.

Note:

To prevent stopping in continuous-path mode, M17 must not be programmed alone in a block.

Example of a subroutine: G64 F2000 G91 Y10 X10
X10 Z10 M17

Bit 1 = 0:

M01:

conditional program stop is always output to PLC, irrespective of whether the M01 signal is active or not.

Fast auxiliary function output M=QU(1) is inactive because M01 is assigned to the 1st M function group and thus is always output at block end.

Bit 1 = 1:

M01:

conditional program stop is only output to PLC, if M01 is also active.

This thus enables optimal run-time processing of the part program.

With fast auxiliary function output M=QU(1), M1 is output during the movement; thus it is possible to traverse blocks in continuous-path mode with programmed M01 as long as M01 is not active.

The request of the M01 signal with M=QU(1) no longer occurs at block end but during the movement.

20850	SPOS_TO_VDI			C04, C03	S1	
-	Output of M19 to PLC on SPOS/SPOSA			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description:

```
Bit 0 = 0:
   When bit 19 is also set to '0' in MD35035
   $MA_SPIND_FUNCTION_MASK, auxiliary function M19 is not gener-
   ated with SPOS and SPOSA. This also eliminates the acknowledge-
   ment time for the auxiliary function, which can cause faults
   wiith very short blocks.
Bit 0 = 1:
   When SPOS and SPOSA are programmed in the part program, auxil-
   iary function M19 is generated and output to the PLC. The
   address extension corresponds to the spindle number.
Related to:
   SPIND_FUNCTION_MASK
```

20900	CTAB_ENABLE_NO_LEADMOTION			EXP	M3	
-	Curve tables with jump of slave axis			BYTE	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/2	M

Description:

This MD is used to configure the way jumps of the slave axis are processed in curve tables. A jump of the slave axis results from the presence of a movement of the slave axis in a segment of the curve table with no corresponding movement of the master axis.

The jumps of the slave axis may be programmed directly, or they are created internally in the control.

These segments may be created especially if a curve table with active tool radius compensation is generated.

The following configurations are possible:

0: No curve tables are created that contain a jump of the slave axis. If a jump of the slave axis occurs, alarm 10949 (CTAB_NO_LEADMOTION) is issued and program processing is terminated. This setting is compatible with previous software versions.

1: Curve tables containing a jump of the slave axis may be implemented. If a jump of the slave axis occurs, alarm 10955 (CTAB_NO_LEADMOTIONWARNING) is issued without terminating program processing.

2: Curve tables with jumps of the slave axis are implemented without issuing an alarm or a note.

20905	CTAB_DEFAULT_MEMORY_TYPE			EXP	M3	
-	Default memory type for curve tables			BYTE	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: This machine data defines the memory (SRAM or DRAM) in which the curve tables are created by default.

This MD is only relevant if no memory type was specified when defining a curve table using CTABDEF().

The following settings can be selected:

0: By default, curve tables are created in the SRAM.

1: By default, curve tables are created in the DRAM.

21000	CIRCLE_ERROR_CONST			C06	-	
mm	Circle end point monitoring constant			DOUBLE	PowerOn	
-						
-	-	0.01,0.01,0.01,0.01,0.01,0.01,0.01...	-	-	7/2	M

Description: This machine data is used to specify the permissible absolute circle error [mm].

When a circle is programmed, both conditions (that the distances from the programmed center point to the start and end points (circle radius) must be the same and that the center point of the circle must be located on the perpendicular bisector of the straight line connecting the start and end points (perpendicular bisector of the circular plane)) apply.

The fact that the circular parameters can be freely programmed means that these conditions are not usually met exactly in the case of circular-path programming with I, J, and K (the circle is "overdefined").

The maximum permissible difference between the two radii that is accepted without an alarm, as well as the distance between the programmied center point of the circle and the perpendicular bisector described above, is defined by the larger value in the following data:

- MD21000 $MC_CIRCLE_ERROR_CONST
- Start radius multiplied by MD21010 $MC_CIRCLE_ERROR_FACTOR

This means that for small circles the tolerance is a fixed value (MD21000 $MC_CIRCLE_ERROR_CONST), and for large circles it is proportional to the start radius.

Related to:

MD21010 $MC_CIRCLE_ERROR_FACTOR

(circle end point monitoring factor)

In the context of the predefined tolerances, conflicting circle data is compensated essentially by moving the center point of the circle. Please note that the deviation between the programmed center point and the actual center point can reach the order of magnitude set with machine data $MC_CIRCLE_ERROR_CONST and/or $MC_CIRCLE_ERROR_FACTOR. In the case of circles which are almost full circles in particular, this can also lead to contour deviations of the same order of magnitude.

21010	CIRCLE_ERROR_FACTOR			C06	-	
-	Circle end point monitoring factor			DOUBLE	PowerOn	
-						
-	-	0.001,0.001,0.001,0.001,0.001,0.001...	-	-	7/2	M

Description: Factor for permissible radius difference.

Defines the factor for large circles by which the starting radius and end radius may deviate from each other

(see also MD21000 $MC_CIRCLE_ERROR_CONST (circle end point monitoring constant).

When a circle is programmed, both conditions (that the distances from the programmed center point to the start and end points (circle radius) must be the same and that the center point of the circle must be located on the perpendicular bisector of the straight line connecting the start and end points (perpendicular bisector of the circular plane)) apply.

The fact that the circular parameters can be freely programmed means that these conditions are not usually met exactly in the case of circular-path programming with I, J, and K (the circle is "overdefined").

The maximum permissible difference between the two radii that is accepted without an alarm, as well as the distance between the programmied center point of the circle and the perpendicular bisector described above, is defined by the larger value in the following data:

- MD21000 $MC_CIRCLE_ERROR_CONST
- Start radius multiplied by MD21010 $MC_CIRCLE_ERROR_FACTOR

This means that for small circles the tolerance is a fixed value (MD21000 $MC_CIRCLE_ERROR_CONST), and for large circles it is proportional to the start radius.

Related to:

MD21000 $MC_CIRCLE_ERROR_CO'NST

(circle end point monitoring factor)

In the context of the predefined tolerances, conflicting circle data is compensated essentially by moving the center point of the circle. Please note that the deviation between the programmed center point and the actual center point can reach the order of magnitude set with machine data $MC_CIRCLE_ERROR_CONST and/or $MC_CIRCLE_ERROR_FACTOR. In the case of circles which are almost full circles in particular, this can also lead to contour deviations of the same order of magnitude.

21015	INVOLUTE_RADIUS_DELTA			C06	A2	
mm	Involute end point monitoring			DOUBLE	PowerOn	
-						
-	-	0.01,0.01,0.01,0.01,0.01,0.01...	-	-	7/2	M

Description: Permissible absolute difference of radius at involute interpolation [mm].

At involute interpolation, the radius of the basic circle determined by the end point may differ from the programmed radius.

This data is used to limit the permissible maximum difference between start radius and end radius.

21016	INVOLUTE_AUTO_ANGLE_LIMIT			C06	A2	
-	Automatic angle limitation during involute interpolation			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: If the angle of rotation is programmed for an involute (AR=angle), the maximum angle of rotation is limited in case the involute is travelling towards the basic circle (AR < 0). The maximum angle of rotation is reached when the involute touches the basic circle.

Normally, if an angle larger than the maximum angle is programmed, an alarm is issued and the NC program aborted.

If this MD is set to TRUE any angle is accepted without an alarm for programming. If required, this angle is limited automatically.

21020	WORKAREA_WITH_TOOL_RADIUS			C03, C06	A3	
-	Consideration of tool radius for working area limitation			BOOLEAN	Reset	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This machine data indicates whether the tool radius is taken into account in the working area limitation.

0: It is checked whether the tool center lies within the working area limits.

1: The tool radius is taken into account when the working area limitation is checked. This means that the working area is reduced by the tool radius.

21050	CONTOUR_TUNNEL_TOL			C06	K6	
mm	Response threshold for contour tunnel monitoring			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2	M

Description: Response threshold for contour tunnel monitoring. Defines the radius of the "tunnel" around the path of the tool tip.

If three geometry axes are defined, the tunnel can be regarded as a tube through the center of which the path of the tool tip travels.

If only two geometry axes are defined, this tube can be regarded as squashed flat in the plane of the two geometry axes.

Monitoring is only active if:

- option contour tunnel monitoring is present and
- MD21050 $MC_CONTOUR_TUNNEL_TOL is larger than 0.0 and
- at least two and at most three geometry axes are defined.

Related to:

MD21060 $MC_CONTOUR_TUNNEL_REACTION,
MD21070 $MC_CONTOUR_ASSIGN_FASTOUT,
MD36500 $MA_ENC_CHANGE_TOL

21060	CONTOUR_TUNNEL_REACTION			C06	K6	
-	Reaction when contour tunnel monitoring responds			BYTE	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2	M

Description:

```
Reaction to response of the alarm
0:   Only display alarm, continue machining
1:   Ramp stop
2:   Rapid stop
MD irrelevant:
   If the contour tunnel monitoring option is not available
Related to:
   MD21050 $MC_CONTOUR_TUNNEL_TOL, MD21070
   $MC_CONTOUR_ASSIGN_FASTOUT
```

21070	CONTOUR_ASSIGN_FASTOUT			C01, C06	K6	
-	Assignment of an analog output for the output of contour error			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8	7/2	M

Description:

```
Assignment of an analog output on which the calculated contour
error can be output.
0:   No output
1:   Output on output 1
2:   Output on output 2
etc.
8:   Output on output 8
An error as large as the response threshold MD21050
$MC_CONTOUR_TUNNEL_TOL appears on the output as a voltage of 10V.
Multiple assignment of the same output by other signals is checked
automatically.
MD irrelevant:
   If the contour tunnel monitoring option is available
Related to:
   MD21050 $MC_CONTOUR_TUNNEL_TOL, MD21060
   $MC_CONTOUR_TUNNEL_REACTION
```

21080	CUTCOM_PARALLEL_ORI_LIMIT			C08, C06	-	
degrees	Minimum angle (path tangent / tool orientation) in 3D TRC			DOUBLE	Reset	
-						
-	-	3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3....	0.1	89.	7/2	M

Description:

```
With 3D tool radius compensation, the angle between the path tan-
gent and the tool orientation may not drop below a certain limit
angle. This machine data specifies this angle (in degrees).
Generally speaking, the lower the value entered in this machine
data, the greater the computing capacity required to check that
the above conditions are fulfilled.
Linear blocks with constant orientation are an exception.
```

21082	CUTCOM_PLANE_ORI_LIMIT			C08, C06	-	
degrees	Minimum angle between surface normal vector and tool orientation			DOUBLE	Reset	
-						
-	-	3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3....	1.0	89.	7/2	M

Description: This machine data applies to 3D face milling operations and specifies the minimum angle that must exist between the surface normal vector and the tool orientation on every point of the path if the applied lateral angle is not equal to zero and the tool is not a ball mill. Otherwise, machining is aborted with an alarm if the angle is smaller than the value set here.

Generally speaking, the lower the value entered in this machine data, the greater the computing capacity required to check that the above conditions are fulfilled.This data has no effect in linear blocks with constant orientation. The angle between the surface normal vector and tool orientation may be as small as desired in such cases, even if the lateral angle is not equal to zero.

21084	CUTCOM_PLANE_PATH_LIMIT			C08, C06	W5	
degrees	Min. angle betw. surface normal vector and path tangent vector			DOUBLE	Reset	
-						
-	-	3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3.,3....	1.0	89.	7/2	M

Description: This machine data applies to 3D face milling operations and specifies the minimum angle that must exist between the surface normal vector and the path tangent vector on every point of the path. Otherwise machining is aborted with an alarm if the angle is smaller than the value set here.

Generally speaking, the lower the value entered in this machine data, the greater the computing capacity required to check that the above conditions are fulfilled.

21090	MAX_LEAD_ANGLE			C08, C09	M1	
degrees	Maximum value of permitted lead angle for orientation progr.			DOUBLE	NEW CONF	
-						
-	-	80.,80.,80.,80.,80.,80.,80.,80.,80....	0.	80.	7/7	U

Description: Maximum permissible value of the lead angle in degrees.

21092	MAX_TILT_ANGLE			C08, C09	M1	
degrees	Maximum value of permitted side angle for orientation progr.			DOUBLE	NEW CONF	
-						
-	-	180.,180.,180.,180.,180.,180.,180....	-180.	180.	7/7	U

Description: Maximum permissible value of the tilt angle in degrees.

21094	ORIPATH_MODE			C02	F2	
-	Setting for ORIPATH path-relative orientation			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1211	7/7	U

Description: This MD is used to set the response for ORIPATH, i.e. path-relative interpolation of tool orientation.

The various digits of this machine data are used to activate different functions for ORIPATH.

Meaning of the units digit: Activation of "true" path-relative orientation interpolation

xxx 0:

The tool orientation has the relation to the path tangent and the normal vector programmed with LEAD and TILT only at the end of the block; within the block, the orientation does not follow the path tangent. This corresponds to the response in SW release 6.xx.

xxx1:

The tool orientation relation to the path tangent and the surface normal vector programmed with LEAD/TILT is retained throughout the block. Meaning of the tens digit: Interpretation of the TILT angle.

Meaning of the tens digit: Interpretation of the angle programmed with LEAD and TILT.

xx0x:

The angles programmed with LEAD and TILT are evaluated in the following rotation sequence:

1. LEAD = Rotation around direction vertical to tangent and normal vector

(forward angle)

2. TILT = Rotation of orientation around normal vector

This is the interpretation of the LEAD/TILT angles in SW releases < 7.2

xx1x:

The angles programmed with LEAD and TILT are evaluated in the following rotation sequence:

1. LEAD = Rotation around direction vertical to tangent and normal vector

(forward angle)

2. TILT = Rotation of orientation around vector in direction of tangent

(tilt angle)

xx2x:

The angles programmed with LEAD and TILT are evaluated in the following rotation sequence:

1. LEAD = Rotation around direction vertical to tangent and normal vector

(forward angle)

2. TILT = Rotation of orientation around vector in direction of rotated (new) tangent

(tilt angle)

xx3x:

The angles programmed with LEAD and TILT are evaluated in the following rotation sequence:

1. TILT = Rotation of orientation around vector in direction of tangent
(tilt angle)
2. LEAD = Rotation around direction vertical to tangent and normal vector
(forward angle)

xx4x:

The angles programmed with LEAD and TILT are evaluated in the following rotation sequence:

1. TILT = Rotation of orientation around vector in direction of tangent
(tilt angle)
2. LEAD = Rotation around direction vertical to tangent and rotated (new) normal vector
(forward angle)

Meaning of hundreds digit: Activation of a retract movement in the case of reorientation.

0xx:

In the case of reorientation with ORIPATH, a retract movement is not executed.

1xx:

In the case of reorientation with active ORIPATH, a retract movement in the direction of the programmed vector is executed. The programmed vector for the direction of the retract movement refers to the coordinate system defined by the current tool direction (z coordinate) and the change in orientation (x coordinate).

2xx:

In the case of reorientation with active ORIPATH, a retract movement in the direction of the programmed vector is executed. The programmed vector for the direction of the retract movement refers to the coordinate system defined by the current surface normal vector (z coordinate) and the change in orientation (x coordinate).

A retract movement is possible only with a "true" path-relative orientation interpolation, i.e. if the units digit of this MD has a value of one.

Meaning of the thousands digit: Response of path-relative orientation on activation / deactivation of tool offset.

0xxx:

The path-relative orientation is also retained in activation / dectivation blocks associated with tool offset.

1xxx:

The path-relative orientation is not retained in activation / dectivation blocks associated with tool offset. In these blocks, the tool orientation usually remains constant. However, tool orientation can be programmed in these blocks and then traversed there, although any orientation has to be programmed with vectors (the programming of rotary axis positions is not permitted).

21100	ORIENTATION_IS_EULER			C01, C09	F2,TE4,M1	
-	Angle definition for orientation programming			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description:

This data is only active for MD21102 $MC_ORI_DEF_WITH_G_CODE = 0

MD = 0 (FALSE):

The values programmed with A2, B2, C2 during orientation programming are interpreted as an RPY angle (in degrees).

The orientation vector is produced by rotating a vector in direction Z first by C2 around the Z axis, then by B2 around the new Y axis and finally by A2 around the new X axis. In contrast to Euler angle programming, all three values influence the orientation vector in this case.

MD = 1 (TRUE):

The values programmed with A2, B2, C2 during orientation programming are interpreted as Euler angles (in degrees).

The orientation vector is produced by rotating a vector in direction Z first by A2 around the Z axis, then by B2 around the new X axis and finally by C2 around the new Z axis. This means that the value of C2 is meaningless.

21102	ORI_DEF_WITH_G_CODE			C01, C07	F2	
-	Definition of orientation axes with G code			BOOLEAN	NEW CONF	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2	M

Description:

Definition of the orientation angles A2, B2, C2

0: Definition as per MD21100 $MC_ORIENTATION_IS_EULER

1: Definition as per G code (ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2)

21103	ORI_ANGLE_WITH_G_CODE			C01, C07	-	
-	Definition of orientation angles via G code			BOOLEAN	NEW CONF	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2	M

Description:

Definition of the orientation angles A2, B2, C2:

FALSE: Definition as per MD21100 $MC_ORIENTATION_IS_EULER

TRUE : Definition as per G code (ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2)

Only programming of angles with A2, B2, C2 is interpreted in accordance with G codes ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2 and not programming of angles by means of the orientation axes, as is the case with MD21102 $MC_ORI_DEF_WITH_G_CODE = 1.

21104	ORI_IPO_WITH_G_CODE			C01, C07	F2	
-	G code for orientation interpolation			BOOLEAN	NEW CONF	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: Definition of the type of interpolation for the orientation

FALSE:Referred to G codes ORIWKS and ORIMKS

TRUE :Referred to G codes ORIAXES, ORIVECT, ORIPLANE, ORICONxx and ORICURVE of the 51st G code group

21106	CART_JOG_SYSTEM			C01, C07	F2,M1	
-	Coordinate systems for Cartesian JOG			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	7	7/2	M

Description: This machine data has two meanings. First, it is used to activate the "Cartesian manual traverse" function. Second, it is used to determine the reference systems between which a switchover can be performed.

The meaning of the individual bits is determined as follows:

Bit 0 : Basic coordinate system

Bit 1 : Workpiece coordinate system

Bit 2 : Tool coordinate system

21108	POLE_ORI_MODE		C07	F2	
-	Response with vector interpolation in pole position		DWORD	NEW CONF	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	122	7/7	U

Description:

This MD defines how the change in orientation in the case of vector interpolation is treated if the orientation runs through the pole taper, which is defined by MD2.... $MC_TRAFO5_POLE_LIMIT_...n.

Vector interpolation is present, if tool orientation is interpolated independent of the kinematics, e.g. by means of large circle interpolation (orientation is swiveled in a plane), taper interpolation or through interpolation of a 2nd reference point on the tool (ORICURVE), and not directly the orientation axes.

In the pole, the pole axis can have any position. For large circle interpolation, however, this axis requires a certain orientation.

If the start orientation is equal or close to the pole orientation and the end orientation of the block lies outside the tolerance circle defined by machine data TRAFO5_POLE_LIMIT_n, the pole axis can be moved to a position suitable to ensure that the subsequent vector interpolation can be carried out. This is set via the units and tens digits of this machine data.

The units digits can have the following values (active if start orientation equal to pole orientation):

0: The interpolation is carried out as an axis interpolation. The specified orientation path (large circle) is followed only if the pole axis (coincidentally) has the right position and the basic orientation is perpendicular to the 2nd rotary axis.

1: A block, that positions the pole axis to a position enabling large circle interpolation to be carried out in the subsequent block, is inserted before the block where the situation described occurs.

2: If the block preceding the block in which the situation described occurs contains a geometry axis movement but no orientation movement the required positioning movement of the pole axis is additionally carried out in this previous block.

If one of the two conditions is not fulfilled (block does not contain a geometry axis movement or block contains an orientation movement), the pole axis movement is carried out in a separate block (same behavior as under 1.)

The tens digits can have the following values (active if the start orientation differs from the pole orientation, but lies within the tolerance circle defined by TRAFO5_POLE_LIMIT_n):

00: The interpolation is carried out as an axis interpolation. The specified orientation path (large circle) is followed only if the pole axis (coincidentally) has the right position hat and the basic orientation is perpendicular to the 2nd rotary axis.

10: A block, which positions the two rotary axes to the point where the programmed large circle interpolation intersects with the tolerance circle defined by TRAFO5_POLE_LIMIT_n, is inserted before the block where the situation described occurs. In the original block, large circle interpolation is applied as of this point.

20: If the block preceding the block in which the described situation occurs contains a geometry axis movement but no orientation movement the necessary positioning movements of the two rotary axes are additionally carried out in this previous block. The residual movement in the original block is the same as that of value 10 of this machine data.

If one of the two conditions is not fulfilled (block does not contain a geometry axis movement or block contains an orientation movement), the pole axis movement is carried out in a separate block (same behavior as under 10.)

The behavior for the case that the orientation runs through the pole taper or ends within the pole taper is set with the hundreds digit of this MD.

The hundreds digit can have the following values:

000: A block with the orientation running within the pole taper is subdivided only if the start orientation is equal to the pole orientation (with POLE_ORI_MODE = 1) or is close to the pole orientation (with POLE_ORI_MODE = 10). If the pole orientation occurs at an arbitrary point in the block, the whole change in orientation is traversed by means of rotary axis interpolation. In general, this leads to a more or less significant deviation from the programmed orientation path.

100: If the programmed orientation path runs through the pole taper, the block is subdivided in up to 3 parts, so that there is a deviation from the orientation path only within the pole taper. Outside the pole taper, the orientation is interpolated exactly on the programmed orientation path.

The values of the units, tens and hundreds digits are added.

21110	X_AXIS_IN_OLD_X_Z_PLANE			EXP, C01, C09	M1,K2	
-	Coordinate system for automatic frame definition			BOOLEAN	PowerOn	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	M

Description: 1 = With automatic definition of a frame (TOFRAME), the Z direction of which equals the current tool orientation, the new coordinate system is additionally rotated around the new Z axis so that the new X axis is in the old Z-X plane.

0 = With automatic definition of a frame (TOFRAME), the Z direction of which equals the current tool orientation, the new coordinate system is maintained as it results from the kinematics of the machine, i.e. it is assumed that the coordinate system is fixed to the tool and rotates with the tool (orientation).

From SW 5.3:

This machine data is only effective when the three lowest value decimal positions (units, tens, hundreds) of SD42980 $SC_TOFRAME_MODE) equal zero. Otherwise the frame definition is specified by SD42980 $SC_TOFRAME_MODE.

MD irrelevant for:

No orientation programming

Related to:

MD21100 $MC_ORIENTATION_IS_EULER

Further references:

/PG/, Programming Guide, Fundamentals

21120	ORIAX_TURN_TAB_1			C07	F2,M1	
-	Definition of reference axes for orientation axes			BYTE	NEW CONF	
-						
-	3	1, 2, 3,1, 2, 3,1, 2, 3,1, 2, 3...	0	3	7/2	M

Description:

Defines the assignment of the rotations of the orientation axes around the reference axes for each channel (definition 1).

This orientation description is activated with the G code ORIVIRT1

0: No rotation

1: Rotation around reference axis X

2: Rotation around reference axis Y

3: Rotation around reference axis Z

Example :

MD21120 $MC_ORIAX_TURN_TAB_1[0] = 3 ; 1st ORI axis rotates around reference axis Z

MD21120 $MC_ORIAX_TURN_TAB_1[1] = 2 ; 2nd ORI axis rotates around reference axis Y

MD21120 $MC_ORIAX_TURN_TAB_1[2] = 1 ; 3rd ORI axis rotates around reference axis X

21130	ORIAX_TURN_TAB_2			C07	F2	
-	Definition of reference axes for orientation axes			BYTE	NEW CONF	
-						
-	3	1, 2, 3,1, 2, 3,1, 2, 3,1, 2, 3...	0	3	7/2	M

Description:

Defines the assignment of the rotations of the orientation axes around the reference axes for each channel (definition 2).

This orientation description is activated with the G code ORIVIRT2

0: No rotation

1: Rotation around reference axis X

2: Rotation around reference axis Y

3: Rotation around reference axis Z

Example :

MD21120 $MC_ORIAX_TURN_TAB_1[0] = 3 ; 1st ORI axis rotates around reference axis Z

MD21120 $MC_ORIAX_TURN_TAB_1[1] = 2 ; 2nd ORI axis rotates around reference axis Y

MD21120 $MC_ORIAX_TURN_TAB_1[2] = 1 ; 3rd ORI axis rotates around reference axis X

21132	ORI_DISP_IS_MODULO			C07	F2	
-	Modulo display of orientation axis positions			BOOLEAN	NEW CONF	
-						
-	3	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description:

This MD is used to activate the modulo display of orientation axes.

This only impairs the displayed positions and not the possible programming or traversing range of these axes.

The modulo range is set using MD21134 $MC_ORI_DISP_MODULO_RANGE and MD21136 $MC_ORI_DISP_MODULO_RANGE_START.

21134	ORI_DISP_MODULO_RANGE			C07	-	
degrees	Size of the modulo range for orientation axis display.			DOUBLE	NEW CONF	
-						
-	3	360.0, 360.0, 360.0,360.0, 360.0, 360.0...	1.0	360000000.0	7/7	U

Description: Defines the size of the modulo range for the display of orientation axis positions.

This modulo range does not impair the programmable values of the positions nor the possible traversing range of orientation axes.

21136	ORI_DISP_MODULO_RANGE_START			C07	-	
degrees	Starting position of the modulo range for orientation axis display.			DOUBLE	NEW CONF	
-						
-	3	-180.0, -180.0, -180.0,-180.0, -180.0, -180.0...	-	-	7/7	U

Description: Defines the start position for the modulo range used to display the positions of orientation axes.

This only impairs the displayed positions, but not the possible programming or traversing range of these axes.

Example:

Start =   0 degree -> modulo range   0 <->360 degrees

Start = 180 degrees -> modulo range 180 <->540 degrees

Start = -180 degrees -> modulo range -180 <->180 degrees

21150	JOG_VELO_RAPID_ORI			C07	F2,R2	
rev/min	JOG rapid traverse for orientation axes			DOUBLE	Reset	
-						
-	3	10.0, 10.0, 10.0,10.0, 10.0, 10.0...	-	-	7/2	M

Description: Velocity in JOG mode with rapid traverse override for orientation axes in the channel [degrees/min]

21155	JOG_VELO_ORI			C07	F2	
rev/min	Jog feedrate for orientation axes			DOUBLE	Reset	
-						
-	3	2.0, 2.0, 2.0,2.0, 2.0, 2.0...	-	-	7/2	M

Description: Velocity in JOG mode for orientation axes in the channel

21160	JOG_VELO_RAPID_GEO			C07	F2	
mm/min	JOG rapid traverse for geometry axes			DOUBLE	Reset	
-						
-	3	10000., 10000.0, 10000.,10000., 10000.0, 10000....	-	-	7/2	M

Description: Velocity in JOG mode with rapid traverse override for geometry axes in the channel (mm/min)

21165	JOG_VELO_GEO			C07	F2	
mm/min	Jog feedrate for geometry axes			DOUBLE	Reset	
-						
-	3	1000., 1000., 1000.,1000., 1000., 1000....	-	-	7/2	M

Description: JOG velocity for geometry axes in the channel (mm/min)

21170	ACCEL_ORI			C07	F2	
rev/s²	Acceleration for ORI axes			DOUBLE	NEW CONF	
-						
-	3	.05, .05, .05,.05, .05, .05...	-	-	7/2	M

Description: Acceleration for orientation axes in the channel

21180	ROT_AX_SWL_CHECK_MODE			C07	F2	
-	Check of software limits for orientation axes			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	112	7/7	U

Description: This machine data is evaluated only with the generic 5-axis transformation.

If the block preparation shows that the path programmed in the direction programming would lead to a violation of the software limits of the orientation axes, this machine data determines how the motions of the rotary axes have to be modified.

The units digit of the MD is used to determine how alternative end positions of the rotary axes are created if the software limits would be violated. The tens digit is used to determine how the axes approach these end positions. The hundreds digit is used to activate an automatic limitation of the axis that swivels through the pole (non-pole axis).

Meaning of the units digit:

0: The path is not modified. Alarm 10720 (SW_LIMITSWITCH) is output if it is not possible to travel along the shortest path.

1: If the initially determined orientation path would violate the limits of the orientation axes, an attempt is made to modify the end points so that a motion becomes possible.

The first attempt uses the second solution. (There are usually two solutions to the conversion: orientation ==> angle of axis). If this solution would also violate the axis limits, an attempt is made to find a permissible solution by modifying both rotary axes by multiples of 360 degrees in both solutions.

The modifications of end positions described will only be performed if axis interpolation of rotary axes is active.

2: Monitoring and possibly modifications of the rotary-axis positions are the same as those when the machine data has the value 1.

However, modifications are also permissible if vector interpolation (large-circle interpolation, taper circumference interpolation, etc.) is active. If, in such a case, the rotary-axes positions would have to be modified, there is a switch to axis interpolation. The originally programmed orientation path will then usually not be followed.

Meaning of the tens digit:

0x: The orientation axes travel simultaneously to their possible end positions. There may be larger or smaller deviations from the original orientation path.

1x: If possible, the orientation is first rotated in the pole direction. In the pole position, the pole axis is then positioned so that the final orientation can be approached by rotating the orientation from the pole position into the programmed direction. The originally programmed orientation path is then followed.

Meaning of the hundreds digit:

0xx: The range of the non-pole axis is determined by its software limits or working area limitations.

1xx: The range of the non-pole axis is limited either in the positive or negative travel range. The possible range is limited by the larger of the absolute positive and negative values.

```
Examples:
 1. MD36100 $MA_POS_LIMIT_MINUS[AX5] = -5.0 and MD36110
$MA_POS_LIMIT_PLUS[AX5] = 135.0, the possible range of axis AX5
is 0 ... 135.0
 2. MD36100 $MA_POS_LIMIT_MINUS[AX5] = -100.0 and MD36110
$MA_POS_LIMIT_PLUS[AX5] = 10.0, the possible range of axis AX5
is -100.0 ... 0.0
3. MD36100 $MA_POS_LIMIT_MINUS[AX5] = 5.0 und MD36110
$MA_POS_LIMIT_PLUS[AX5] = 120.0, the possible range is 5.0 ...
120.0, there is no automatic limitation of the travel range.
```

21186	TOCARR_ROT_OFFSET_FROM_FR			C01, C07	F2	
-	Offset of TOCARR rotary axes from WO			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2	M

Description: Rotary axes offset for the orientable tool holder is automatically accepted from the work offset activated on activation of the orientable tool holder for the rotary axes.

21190	TOFF_MODE			C08	F2,2.4	
-	Mode of correction in tool direction			BYTE	Reset	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: This machine data specifies the online correction mode in tool direction via $AA_TOFF[ ].

Bit 0: Behavior of $AA_TOFF in case of a RESET

0: $AA_TOFF is deseclected in case of a RESET

1: $AA_TOFF is maintained also after RESET

Bit 1: Effect of the value assignment on the 1st component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

Bit 2: Effect of the value assignment on the 2nd component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

Bit 3: Effect of the value assignment on the 3rd component of $AA_TOFF[ ]

0: absolute value

1: incremental value (integrator)

21194	TOFF_VELO			C08	F2,2.4	
mm/min	Feedrate for online correction in tool direction			DOUBLE	NEW CONF	
-						
-	3	0., 0., 0.,0., 0., 0.,0., 0., 0....	-	-	7/2	M

Description: Feedrate for online correction in tool direction [mm/min] via $AA_TOFF[ ]

21196	TOFF_ACCEL			C08	2.4	
m/s²	Acceleration for online correction in tool direction			DOUBLE	NEW CONF	
-						
-	3	100., 100., 100.,100., 100., 100....	1.0e-3	-	7/2	M

Description: Acceleration for online correction in tool direction [m/s**2] via $AA_TOFF[ ]

21198	ORI_TRAFO_ONLINE_CHECK_LIM			C07	F2	
mm	Activation limit of the realtime dynamic monitoring			DOUBLE	NEW CONF	
-						
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/2	M

Description: If, in the case of an orientation transformation, the effective BCS position or the effective tool length deviates from the values applied in preprocessing by more than the value defined in this machine data (e.g. due to superimposed movement or the activation of online tool length offset), real-time limiting of the dynamic response is activated.

21199	ORI_TRAFO_ONLINE_CHECK_LIMR			C07	F2	
degrees	Activation limit for real-time monitoring of dynamic response, rotary axes			DOUBLE	NEW CONF	
-						
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/2	M

Description: If, in the case of an orientation transformation, the effective BCS position of one of the rotary axes involved in the transformation deviates from the values applied in preprocessing by more than the value defined in this machine data (e.g. due to superimposed movement), real-time limiting of the dynamic response is activated.

21200	LIFTFAST_DIST			C09	K1,V1,2.6,6.1	
mm	Traversing distance on rapid lift from contour			DOUBLE	PowerOn	
-						
-	-	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1...	-	-	7/2	M

Description: The machine data determines the absolute value of the traverse movement for rapid lift. The direction of the traverse movement is defined in the part program by the command ALF.

References:

/PA/, Programming Guide: Fundamentals

21202	LIFTFAST_WITH_MIRROR			C09	K1	
-	Rapid retract with mirrorring			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: 1: When determining the retraction direction, if mirroring of the contour is active then the retraction direction is also mirrored. Mirroring of the retraction direction only refers to the directional components vertical to the tool direction.

0: Mirroring of the contour is NOT taken into account when determining the retraction direction.

21204	LIFTFAST_STOP_COND			C09	M3	
-	Stop behavior with fast retraction			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: Specifies the stop behavior of the liftfast motion under different stop conditions

Bit0: Axial NC/PLC interface signal DB31, ... DBX4.3 (Axial feed stop / Spindle stop) or context-sensitive interpolator stop

=0 Stop of the retraction motion in case of an axial feed stop or context-sensitive interpolator stop

=1 No stop of the retraction motion in case of an axial feed stop or context-sensitive interpolator stop

Bit1: Feed disable in channel NC/PLC interface signal DB21-30 DBX6.0 (Feed stop)

=0 Stop of the retraction motion in case of the feed stop in the channel

=1 No stop of the retraction motion in case of the feed stop in the channel

21210	SETINT_ASSIGN_FASTIN			C01, C09	-	
-	HW assignment of ext. NCK input byte for NC progr. interrupts			DWORD	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/2	M

Description: HW assignment of the fast input byte for NC program interrupts

Bit 0 to 7:

Number of input used

Bit 16 to 23:

Mask of signals that the channel is not to evaluate

Bit 24 to 31:

Mask of signals that are to be evaluated in inverted form

Bit set: Interrupt initiated by falling edge.

Possible inputs:

1:

On board-inputs of the 840D (4 fast + 4 bits via VDI default)

2 - 5:

External digital inputs (fast NCK I/Os or VDI default)

128 - 129:

Comparator byte (results from fast analog inputs or VDI default)

21220	MULTFEED_ASSIGN_FASTIN			C01, C09	A4,V1	
-	Assignment of the NCK I/Os for 'several feedrates in the block'			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description:

In MD21220 $MC_MULTFEED_ASSIGN_FASTIN (assignment of the input bytes of the NCK I/Os for "Multiple feeds in one block"), at most two digital input bytes or comparator input bytes of the NCK I/Os can be assigned to the input byte for the "Multiple feeds in one block" function.

Furthermore, the assigned input signals can be inverted with the machine data.

The MD is coded as follows:

Bit 0-7:

No. of 1st digital input byte or comparator input byte used

Bit 8 - 15:

No. of 2nd digital input byte or comparator input byte used

Bit 16 - 23:

Inversion mask for describing the 1st byte

Bit 24 - 31:

Inversion mask for describing the 2nd byte

Bit=0: do not invert

Bit=1: invert

The number for the digital inputs should be specified as follows:

1: for the on-board byte

2 - 5: for external bytes

The number for a comparator input byte should be specified as follows:

128: for comparator 1 (corresponds to 80Hex)

129: for comparator 2 (corresponds to 81Hex)

21230	MULTFEED_STORE_MASK			C01, C09	V1	
-	Memory response for 'several feedrates in the block'			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description:

The priority of the signals for feeds F2 - F7 of the "Multiple feeds in one block" function decreases as the bit number increases in the input byte. The highest priority signal determines the current feed.

The MD21230 $MC_MULTFEED_STORE_MASK (store input signals of the "Multiple feeds in one block" function) can be used to specify the response when the highest priority input drops out:

Set bit 2 - 7 has the effect that the associated feed (F2 to F7) that has been selected by the highest priority input signal in each case is retained, even if the input signal drops out and a lower priority is present.

The MD is coded as follows:

Bit 0 - 1: No significance

Bit 2 - 7: Storage response of the feed signals

Bit 8 - 31: Reserved

21240	PREVENT_SYNACT_LOCK_CHAN			C01, C09	-	
-	Protected synchronized actions			DWORD	PowerOn	
-						
-	2	-1, -1,-1, -1,-1, -1,-1, -1,-1, -1...	-1	255	7/2	M

Description: The machine data specifies a range of synchronized action IDs.

Synchronized actions with IDs in this range cannot be overwritten, cancelled or locked via synchronized actions.

With 0.0, there is no range of protected synchronized actions. The values are read as absolute values; the upper value and the lower value can be indicated in any order.

If a value is configured with -1, the configuration of the general machine data becomes active.

Note:

During the creation of protected static synchronized actions, the protection should be cancelled; otherwise, a power ON would be necessary for each change in order to be able to redefine the logic.

21300	COUPLE_AXIS_1			C09	S3	
-	Synchr.spindle pair def, mach.axis no: follow.sp[0], lead.sp[1]			BYTE	PowerOn	
-						
-	2	0, 0,0, 0,0, 0,0, 0,0, 0,0, 0,0, 0...	0	31	7/2	M

Description: One pair of synchronous spindles per NC channel can be defined in a fixed configuration with this machine data.

The machine axis numbers (channel-specific MD20070 $MC_AXCONF_MACHAX_USED) applicable in the NC channel must be entered for the following spindle [n=0] and the leading spindle [n=1].

The coupling is not regarded as configured if values of "0" are entered, thus leaving 2 couplings to be configured freely via the NC part program.

MD irrelevant for:

User-defined coupling

Related to:

Channel-specific MD21310 $MC_COUPLING_MODE_1
(type of coupling in synchronous spindle mode)
Channel-specific MD21340 $MC_COUPLE_IS_WRITE_PROT_1
(coupling parameters cannot be changed)
Channel-specific MD21330 $MC_COUPLE_RESET_MODE_1
(coupling abort response)
Channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1
(block change response in synchronous spindle mode)
SD42300 $SC_COUPLE_RATIO_1
(speed ratio parameters for synchronous spindle mode)

21310	COUPLING_MODE_1			C03, C09	S3	
-	Type of coupling in synchronous spindle operation			BYTE	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2	M

Description:

This machine data determines the type of coupling for the fixed coupling configuration defined with machine data COUPLE_AXIS_1[n].

1: Setpoint coupling activated.

With a setpoint coupling, the reference variable for the following spindle is calculated from the position setpoint of the leading spindle, thus allowing the setpoints for the FS and LS to be input simultaneously. This has a particularly positive effect on the spindle synchronism during acceleration and deceleration processes.

A setpoint coupling thus achieves better command behavior than an actual-value coupling.

When a setpoint coupling is used, the following conditions must be fulfilled before synchronous mode is activated:

- The LS must be assigned to the same NC channel as the FS
- The FS and LS must be in position control mode (SPCON)
- The FS and LS must have the same dynamic control response

0: Actual-value coupling activated.

With an actual-value coupling, the command variable for the following spindle is calculated from the position actual value of the leading spindle. With this type of coupling, the following drive must be significantly more dynamic than the leading drive, but never vice versa.

The actual-value coupling can be used, for example, in the following cases:

- The LS must be assigned to a different NC channel than the FS.
- For leading spindles which are not suitable for position control.
- In cases where the dynamic control response of the leading spindle is considerably slower than that of the following spindle. As soon as the actual-value coupling is active, the NC/PLC interface signal DB31, ... DBX98.2 (Actual-value coupling) for the FS is set to "1-signal".

2: Speed coupling activated.

Internally, the speed coupling is a setpoint coupling. Lower dynamic requirements are placed on the FS and LS. A defined relation between the positions of the FS and LS cannot be established.

A speed coupling is used in the following cases:

- LS and/or FS are not in position control.
- There are no measuring systems present.

The coupling type can be altered in the NC part program when the coupling is deactivated by means of language instruction COUPDEF provided this option has not been inhibited by the channel-specific MD21340 $MC_COUPLE_IS_WRITE_PROT_1. However, the parameterized value of channel-specific MD21310 $MC_COUPLING_MODE_1 remains unchanged.

MD irrelevant to:

User-defined coupling

Related to:

Channel-specific MD21300 $MC_COUPLE_AXIS_1

(definition of pair of synchronous spindles)

Channel-specific MD21340 $MC_COUPLE_IS_WRITE_PROT_1

(write-protection for configured coupling parameters)

NC/PLC interface signal DB31, ... DBX98.2 (Actual-value coupling)

21320	COUPLE_BLOCK_CHANGE_CTRL_1			C09	S3	
-	Block change behavior in synchronous spindle operation			BYTE	PowerOn	
-						
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	3	7/2	M

Description: This machine data determines the condition under which a block change has to be executed when synchronous mode is activated for the fixed coupling configuration defined in the channel-specific machine data COUPLE_AXIS_ [n].

The following options are available:

0: Block change is enabled immediately

1: Block change in response to "Fine synchronization"

2: Block change in response to "Coarse synchronization"

3: Block change in response to IPOSTOP (i.e. after setpoint-based synchronization)

The block change response can be altered in the NC part program with language instruction COUPDEF provided this option is not inhibited by the channel-specific MD21340 $MC_COUPLE_IS_WRITE_PROT_1. However, the parameterized value of the channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1 remains unchanged.

The selected block change response remains valid even when the velocity ratio is changed or a defined angular offset is programmed while the coupling is active.

MD irrelevant for:

User-defined coupling

Related to:

Channel-specific MD21300 $MC_COUPLE_AXIS_1

(definition of pair of synchronous spindles)

Channel-specific MD21340 $MC_COUPLE_IS_WRITE_PROT_1

(coupling parameters cannot be changed)

Channel-specific MD37200 $MA_COUPLE_POS_TOL_COARSE or MD37220 $MA_COUPLE_VELO_TOL_COARSE

(threshold value for coarse synchronization)

Channel-specific MD37210 $MA_COUPLE_POS_TOL_FINE or MD37230 $MA_COUPLE_VELO_TOL_FINE

(threshold value for fine synchronization)

21330	COUPLE_RESET_MODE_1			C03, C09	S3,K1	
-	Coupling abort behavior			DWORD	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	0x3FF	7/2	M

Description: This machine data defines the behavior of the synchronous mode for the pair of synchronous spindles configured with machine data COUPLE_AXIS_1[n].

Bit 0=0:

Synchronous mode remains active with a new program start and, as long as the control remains switched on, can be canceled only with COUPOF.

Bit 0=1:

Synchronous mode is canceled with program start (from the reset condition).

Bit 1=0:

Synchronous mode remains active even with program end and reset and, as long as the control remains switched on, can be canceled only with COUPOF.

Bit 1=1:

Synchronous mode is canceled with program end or RESET.

Bit 5=1:

The configured data are activated with program start.

Bit 6=1:

The configured data are activated with program end or RESET.

Bit 9=1:

Synchronous mode is switched on with program start.

Note:

Synchronous mode is not deselected with NC Start after NC Stop.

MD irrelevant to:

User-defined coupling

Related to:

Channel-specific MD21300 $MC_COUPLE_AXIS_1 (definition of pair of synchronous spindles)

NC/PLC interface signal DB31, ... DBX84.4 (Active spindle mode - synchronous mode)

21340	COUPLE_IS_WRITE_PROT_1			C09	S3	
-	Coupling parameters cannot be altered			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This machine data defines whether or not the coupling parameters (speed ratio, block change response, coupling type) for the pair of synchronous spindles configured with channel-specific machine data COUPLE_AXIS_1[n] may be altered by the NC part program.

1: Coupling parameters may not be altered by the NC program (write-protection active)

An alarm message is generated if an attempt is made to change the parameters.

0: NC part program may alter coupling parameters using language instruction COUPDEF.

MD irrelevant for:

User-defined coupling

Related to:

Channel-specific MD21300 $MC_COUPLE_AXIS_1

(definition of pair of synchronous spindles)

Channel-specific MD21310 $MC_COUPLING_MODE_1

(type of coupling in synchronous spindle mode)

Channel-specific MD21330 $MC_COUPLE_RESET_MODE_1

(coupling abort response)

Channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1

(block change response in synchronous spindle mode)

SD42300 $SC_COUPLE_RATIO_1

(speed ratio parameters for synchronous spindle mode)

21380	ESR_DELAY_TIME1			EXP, N09	M3	
s	Delay time ESR axes			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2	M

Description: When, for example, an alarm occurs, this MD can be used to delay deceleration in order, for example, to enable a retraction from the tooth gap (ESR) in gear wheel machining.

21381	ESR_DELAY_TIME2			EXP, N09	M3	
s	ESR time for IPO controlled braking			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2	M

Description: When time MD21380 $MC_ESR_DELAY_TIME1 has expired, the time (MD21381 $MC_ESR_DELAY_TIME2) specified for interpolatory braking is still available.

When time MD21381 $MC_ESR_DELAY_TIME2 has expired, rapid deceleration with following tracking is initiated.

1.4.2 Machine data for grinding function

21500	TRACLG_GRINDSPI_VERT_OFFSET			C07	-	
mm	Vertical position offset of grinding axis in centerless grinding			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: The vertical offset of the grinding axis is specified in this MD.

21501	TRACLG_GRINDSPI_HOR_OFFSET			C07	-	
mm	Horiz. position offset of grinding axis in centerless grinding			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: Horizontal position offset of the grinding axis in centerless grinding.

The setting in this MD is significant only when MD: TRAFO_AXES_IN_n[0] = 0, i.e. no axis is programmed for the grinding wheel.

21502	TRACLG_CTRLSPI_VERT_OFFSET			C07	-	
mm	vert. position offset of regulating axis in centerless grinding			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: The vertical offset for the regulating axis is specified in this MD.

21504	TRACLG_SUPPORT_VERT_OFFSET			C07	-	
mm	Vertical offset of work blade in centerless grinding			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: Y offset for work blade

Rule: X(0) = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)

21506	TRACLG_SUPPORT_HOR_OFFSET			C07	S8	
mm	Horizontal offset of work blade in centerless grinding			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: X offset for work blade

Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)

21508	TRACLG_VERT_DIR_SUPPORTAX_1			C07	-	
-	Vertical component of work blade direction vector for Q1			DOUBLE	PowerOn	
-						
-	-	1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1....	-	-	7/2	M

Description: Y component of blade direction vector for Q1

Rule: Y0 = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)

21510	TRACLG_HOR_DIR_SUPPORTAX_1			C07	-	
-	Horizontal component of work blade direction vector for Q1			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: X component of blade direction vector for Q1

Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)

21512	TRACLG_VERT_DIR_SUPPORTAX_2			C07	-	
-	Vertical component of work blade direction vector for Q2			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: Y component of blade direction vector for Q2

Rule: Y(0) = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)

21514	TRACLG_HOR_DIR_SUPPORTAX_2			C07	-	
-	Horizontal component of work blade direction vector for Q2			DOUBLE	PowerOn	
-						
-	-	1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1....	-	-	7/2	M

Description: X component of blade direction vector for Q2

Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)

21516	TRACLG_SUPPORT_LEAD_ANGLE			C07	-	
degrees	Lead angle of work blade in centerless grinding			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-90.	90.	7/2	M

Description: The angle of lead of the work blade (a) is entered here.

21518	TRACLG_CONTACT_UPPER_LIMIT			C07	-	
mm	Upper contact limit of work blade with work in centerl. grinding			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: It is necessary to specify the upper contact limit of the blade with the part to be ground (d1) for the purpose of monitoring the support range limits.

Related to:

MD21520 $MC_TRACLG_CONTACT_LOWER_LIMIT

21520	TRACLG_CONTACT_LOWER_LIMIT			C07	-	
mm	Lower contact limit of work blade with work in centerl. grinding			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: It is necessary to specify the lower contact limit of the blade with the part to be ground (d2) for the purpose of monitoring the support range limits.

Related to:

MD: TRACLG_CONTACT_UPPER_LIMIT

21522	TRACLG_GRINDSPI_NR			C07	-	
-	Definition of grinding spindle for centerless grinding			BYTE	PowerOn	
-						
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	1	20	7/2	M

Description: The number of the grinding spindle is specified in this MD.

21524	TRACLG_CTRLSPI_NR			C07	-	
-	Definition of regulating spindle for centerless grinding			BYTE	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	20	7/2	M

Description: The number of the regulating spindle is specified in this MD.

21526	TRACLG_G0_IS_SPECIAL			C07	-	
-	Special logic for G0 in centerless grinding			BOOLEAN	PowerOn	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2	M

Description: This MD can be used to define how the speed of the regulating wheel must respond in the case of transitions from motion blocks with G0 and without G0 (see table).

TRACLG_G0_IS_SPECIAL = 1:

On transition from a motion block with G0 to one without G0, the speed of the regulating wheel is increased during the G0 block to the desired initial speed in the block without G0.

TRACLG_G0_IS_SPECIAL = 0:

The speed of the regulating wheel is controlled only for motion blocks without G0 (the transitions from a motion block with G0 to one without G0 are not taken into account).

1.4.3 Channel auxiliary function settings

22000	AUXFU_ASSIGN_GROUP			C04	H2,S1	
-	Auxiliary function group			DWORD	PowerOn	
-						
-	255	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,1, 1...	1	168	7/2	M

Description: See MD22010 $MC_AUXFU_ASSIGN_TYPE [n] (auxiliary function type)

22010	AUXFU_ASSIGN_TYPE			C04	H2,S1	
-	Auxiliary function type			STRING	PowerOn	
-						
-	255	"", "", "", "", "", "", "", "", "", "", "", "", "", "", "", ""...	-	-	7/2	M

Description:

```
Machine data
AUXFU_ASSIGN_TYPE[n] (auxiliary function type),
AUXFU_ASSIGN_EXTENSION[n] (auxiliary function extension),
AUXFU_ASSIGN_VALUE[n] (auxiliary function value) and
AUXFU_ASSIGN_GROUP[n] (auxiliary function group)
assign an auxiliary function type (M,S,H,T,F,D,DL), the associated
extension and the auxiliary function value to an auxiliary func-
tion group.
Example:
                              M0 = 100  =>  Group 5  (corr. M100)
Auxiliary function typeM
Auxiliary function extension  0
Auxiliary function value         100
Auxiliary function group       5
MD22010 $MC_AUXFU_ASSIGN_TYPE[0] = "M"
MD22020 $MC_AUXFU_ASSIGN_EXTENSION[0] = 0
MD22030 $MC_AUXFU_ASSIGN_VALUE[0] = 100
MD22040 $MC_AUXFU_ASSIGN_GROUP[0] = 5          ; (5th group)
M00, M01, M02, M17 and M30 are assigned to group 1 as default.
M3, M4, M5 and M70 of the master spindle are assigned to group 2 as
default.
The S functions of the master spindle are assigned to group 3 as
default.
The four machine data for assigning an auxiliary function to an
auxiliary function group must always be given the same index [n].
Special cases:
  If the value of an auxiliary function is less than 0, all auxil-
  iary functions of this type and extension are assigned to one
  group.
Example:
  S2 = -1  => group 9
        (all S values of the 2nd spindle are assigned to group 9)
Related to:
  MD11100 $MN_AUXFU_MAXNUM_GROUP_ASSIGN
```

22020	AUXFU_ASSIGN_EXTENSION			C04	H2,S1	
-	Auxiliary function extension			DWORD	PowerOn	
-						
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-1	99	7/2	M

Description: See MD22010 $MC_AUXFU_ASSIGN_TYPE[n] (auxiliary function type)

Special cases:

With the spindle functions M3, M4, M5, M19, M70, M40, M41, M42, M43, M44, M45 and S,

the spindle number is output to the PLC in the auxiliary function extension.

22030	AUXFU_ASSIGN_VALUE			C04	H2,S1	
-	Auxiliary function value			DWORD	PowerOn	
-						
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	M

Description: See MD22010 $MC_AUXFU_ASSIGN_TYPE[n] (auxiliary function type)

22035	AUXFU_ASSIGN_SPEC			C04	H2	
-	Output specification			DWORD	PowerOn	
-						
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	M

Description: Specification of the output behavior of the user-defined auxiliary functions.

Bit 0 = 1Acknowledgment "normal" after an OB1 cycle

Bit 1 = 1Acknowledgment "quick" with OB40

Bit 2 = 1No predefined auxiliary function

Bit 3 = 1No output to the PLC

Bit 4 = 1Spindle reaction after acknowledgment by the PLC

Bit 5 = 1Output before the motion

Bit 6 = 1Output during the motion

Bit 7 = 1Output at block end

Bit 8 = 1No output after block search types 1, 2, 4

Bit 9 = 1Collection during block search type 5 (SERUPRO)

Bit 10 = 1 No output during block search type 5 (SERUPRO)

Bit 11 = 1Cross-channel auxiliary function (SERUPRO)

Bit 12 = 1Output via synchronized action

Bit 13 = 1 Implicit auxiliary function

Bit 14 = 1 Active M01

Bit 15 = 1 No output during running-in test

Bit 16 = 1 Nibbling off

Bit 17 = 1 Nibbling on

Bit 18 = 1 Nibbling

22037	AUXFU_ASSIGN_SIM_TIME			C04	H2,S1	
-	Acknowledgment time			DWORD	PowerOn	
-						
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	0x7FFFFFF	7/2	M

Description: Acknowledgment time for auxiliary functions in ms.

See MD22010 $MC_AUXFU_ASSIGN_TYPE[n] (auxiliary function type)

22040	AUXFU_PREDEF_GROUP			C04	H2	
-	Predefined auxiliary function groups			DWORD	PowerOn	
-						
-	301	1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 4, 4, 4, 4, 4, 4, 3, 1, 1, 1...	0	168	7/2	M

Description: Group assignment of predefined auxiliary functions.

The predefined groups cannot be changed for indices 0, 1, 2, 3, 4, 22, 23, 24.

22050	AUXFU_PREDEF_TYPE			C04	H2	
-	Predefined auxiliary function type			STRING	PowerOn	
-						
-	301	"M", "M", "M", "M", "M", "M", "M", "M", "M", "M","M", "M", "M"...	-	-	7/2	M

Description: The address codes of the predefined auxiliary functions are fix.

This setting cannot be changed!

22060	AUXFU_PREDEF_EXTENSION			C04	H2	
-	Predefined auxiliary function extension			DWORD	PowerOn	
-						
-	301	0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0...	-1	99	7/2	M

Description: Address extension for predefined auxiliary functions:

This setting can be changed only for indices 5 to 17 and 21!

22070	AUXFU_PREDEF_VALUE			C04	H2	
-	Predefined auxiliary function value			DWORD	PowerOn	
-						
-	301	0, 1, 2, 17, 30, 6, 3, 4, 5, 19, 70, 40, 41, 42, 43, 44, 45, -1...	-	-	7/2	M

Description: Value of predefined auxiliary functions.

This setting cannot be changed!

22080	AUXFU_PREDEF_SPEC			C04	H2,K1	
-	Output specification			DWORD	PowerOn	
-						
-	301	0x81, 0x81, 0x81, 0x81, 0x81, 0x21, 0x21, 0x21, 0x21, 0x21...	-	-	7/2	M

Description: Specification of the output behavior of the predefined auxiliary functions.

Bit 0 = 1Acknowledgment "normal" after an OB1 cycle
Bit 1 = 1Acknowledgment "quick" with OB40
Bit 2 = 1No predefined auxiliary function
Bit 3 = 1No output to the PLC
Bit 4 = 1Spindle reaction after acknowledgment by the PLC
Bit 5 = 1Output before the motion
Bit 6 = 1Output during the motion
Bit 7 = 1Output at block end
Bit 8 = 1No output after block search types 1, 2, 4
Bit 9 = 1 Collection during block search type 5 (SERUPRO)
Bit 10 = 1No output during block search type 5 (SERUPRO)
Bit 11 = 1Cross-channel auxiliary function (SERUPRO)
Bit 12 = 1Output via synchronized action
Bit 13 = 1 Implicit auxiliary function
Bit 14 = 1 Active M01
Bit 15 = 1 No output during running-in test
Bit 16 = 1 Nibbling off
Bit 17 = 1 Nibbling on
Bit 18 = 1 Nibbling

22090	AUXFU_PREDEF_SIM_TIME			C04	H2,S1	
-	Acknowledgment time			DWORD	PowerOn	
-						
-	301	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	0x7FFFFFF	7/2	M

Description: Acknowledgment time for auxiliary functions in ms.

See MD22010 $MC_AUXFU_PREDEF_TYPE[n] (auxiliary function type)

22100	AUXFU_QUICK_BLOCKCHANGE			C04	H2	
-	Block change delay with quick auxiliary functions.			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: Block change is not delayed with quick auxiliary functions.

0: With the quick auxiliary function output the block change is delayed until acknowledgement by the PLC (OB40).

1: With the quick auxiliary function output to the PLC the block change is not delayed.

MD irrelevant for:

Auxiliary functions with normal acknowledgement

References:

/FBSY/, Synchronized Actions

22110	AUXFU_H_TYPE_INT		C11, C04	H2,K1	
-	Data format of H auxiliary functions (integer/real)		DWORD	PowerOn	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: 0: The values of H auxiliary functions are present in floating point format.

The maximum value range is +/-3.4028 ex 38.

1: The value of H auxiliary functions is rounded and changed to an integer.

The basic program in the PLC must interpret the value as an integer.

The maximum value range is -2147483648 to 2147483647.

22200	AUXFU_M_SYNC_TYPE		C04	H2,K1,2.4	
-	Output time of M functions		BYTE	PowerOn	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2	M

Description: Synchronization of the M auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22210	AUXFU_S_SYNC_TYPE		C04	H2,2.4	
-	Output time of S functions (see MD22200 for values)		BYTE	PowerOn	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2	M

Description: Synchronization of the S auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22220	AUXFU_T_SYNC_TYPE			C11, C04	H2,2.4	
-	Output time for T functions (see MD22200 for values)			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2	M

Description: Synchronization of the T auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22230	AUXFU_H_SYNC_TYPE			C04	H2,2.4	
-	Output time for H functions (see MD22200 for values)			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2	M

Description: Synchronization of the H auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22240	AUXFU_F_SYNC_TYPE		C04	H2,K1,V1,Z1	
-	Output time for F functions (see MD22200 for values)		BYTE	PowerOn	
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	4	7/2	M

Description: Synchronization of the F auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22250	AUXFU_D_SYNC_TYPE			C04	H2	
-	Output time for D functions (see MD22200 for values)			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2	M

Description: Synchronization of the D auxiliary functions with regard to a simultaneously programmed axis motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22252	AUXFU_DL_SYNC_TYPE		C04	H2	
-	Output time of DL functions		BYTE	PowerOn	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	4	7/2	M

Description: Synchronization of the auxiliary function with regard to a simultaneously programmed motion.

0 = Output before motion

1 = Output during motion

2 = Output at block end

3 = No output to the PLC (therefore no block change delay)

4 = Output in accordance with the predefined output specification

Notice:

An auxiliary function output specification configured by MD22080 $MC_AUXFU_PREDEF_SPEC[preIndex], MD22035 $MC_AUXFU_ASSIGN_SPEC[auxIndex] or

A group output specification configured by MD11110 $MN_AUXFU_GROUP_SPEC[groupIndex], which has a higher priority.

22254	AUXFU_ASSOC_M0_VALUE			C01, C03, C10	H2,K1	
-	Additional M function to stop a program			DWORD	PowerOn	
-						
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2	M

Description: This machine data defines an additional, predefined M function, which behaves in the same way as M0. The value of the machine data corresponds to the number of the auxiliary M function.

Predefined M numbers, such as M0, M1, M2, M3, etc., are not allowed.

Restriction:

See MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,
MD10715 $MN_M_NO_FCT_CYCLE,
MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,
MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,
MD10804 $MN_EXTERN_M_NO_SET_INT
MD10806 $MN_EXTERN_M_NO_DISABLE_INT,
MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX
MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

22256	AUXFU_ASSOC_M1_VALUE			C01, C03, C10	H2	
-	Additional M function for conditional stop			DWORD	PowerOn	
-						
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2	M

Description: This machine data defines an additional, predefined M function, which behaves in the same way as M1. The value of the machine data corresponds to the number of the auxiliary M function.

Predefined M numbers, such as M0, M1, M2, M3, etc., are not allowed.

Restriction:

See MD10715 $MN_M_NO_FCT_CYCLE

Related to:

MD10714 $MN_M_NO_FCT_EOP,
MD10715 $MN_M_NO_FCT_CYCLE,
MD20094 $MC_SPIND_RIGID_TAPPING_M_NR,
MD22254 $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:

MD10814 $MN_EXTERN_M_NO_MAC_CYCLE,
MD10804 $MN_EXTERN_M_NO_SET_INT
MD10806 $MN_EXTERN_M_NO_DISABLE_INT,
MD10800 $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
MD10802 $MN_EXTERN_CHAN_SYNC_M_NO_MAX
MD20095 $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:

MD26008 $MC_NIBBLE_PUNCH_CODE

22400	S_VALUES_ACTIVE_AFTER_RESET			C04, C03, C05	-	
-	S function active beyond RESET			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2	M

Description: 1: The last S values set in the main run are still active after a RESET.

0: The various S values are equal to 0 after a RESET and must therefore be reprogrammed.

22410	F_VALUES_ACTIVE_AFTER_RESET			C04, C03, C05	M3,V1	
-	F function active beyond RESET			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2	M

Description: 1: The last programmed F, FA, OVR and OVRA values are still active after RESET.

0: The various values are set to their default values after reset.

Related to:

MD22240 $MC_AUXFU_F_SYNC_TYPE Output time of the F functions

22420	FGROUP_DEFAULT_AXES			C11	-	
-	Default setting for FGROUP command			BYTE	PowerOn	
-						
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7	U

Description: Default setting for FGROUP command. You can specify up to 8 channel axes whose resulting velocity is equivalent to the programmed path feed.

If all eight values are zero (default), the geo axis entered in MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB are active as the default setting for the FGROUP command as previously.

22510	GCODE_GROUPS_TO_PLC			C04	K1,P3 pl,P3 sl	
-	G codes output at NCK-PLC interface on block change/RESET			BYTE	PowerOn	
-						
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	M

Description: Specification of the G code group, the G codes of which are output to the NCK/PLC interface in case of block change/ reset.

The interface is updated after each block change and reset.

Notice:

It is not guaranteed that a PLC user program has at all times a block-synchronous relation between the active NC block and the G codes present.

Example: Path mode with very short blocks

22512	EXTERN_GCODE_GROUPS_TO_PLC			C11, C04	-	
-	Send G codes of an external NC language to PLC			BYTE	PowerOn	
-						
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	M

Description: Specification of the G code group of external languages, the G codes of which are output at the NCK interface on block change/ reset.

The interface is updated at each block change and after RESET.

Notice:

It is not guaranteed that a PLC user program has at all times a block-synchronous relation between the active NC block and the G codes present. (Example: Path mode with very short blocks).

22515	GCODE_GROUPS_TO_PLC_MODE		C04	-	
-	Behavior of G group transfer to PLC		DWORD	PowerOn	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: For setting the behavior, i.e. how the G groups are to be interpreted in the PLC with regard to data.

With the current behavior (bit 0 = 0), the G group is the array index of a 64-byte field (DBB 208 - DBB 271).

Maximally the 64th G group can be reached in this way.

With the new behavior (bit 0 = 1), the data storage in the PLC consists of max. 8 bytes (DBB 208 - DBB 215).

With this procedure, the array index of this byte array is identical with the index of the MD22510 $MC_GCODE_GROUPS_TO_PLC[Index] and MD22512 $MC_EXTERN_GCODE_GROUPS_TO_PLC[Index].

Each index (0 - 7) may only be set for one of the two machine data; the value 0 must be entered for the other MD.

Bit 0(LSB) = 0:

Behavior as before, the 64-byte field is used for displaying the G codes

Bit 0(LSB) = 1:

The user specifies for which G groups the first 8 bytes are to be used

22530	TOCARR_CHANGE_M_CODE			C04	H2,W1	
-	M code at change of tool holder			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-99999999	99999999	7/2	M

Description: The absolute value of this machine data indicates the number of the M code, which is output at the VDI interface when a tool holder is activated.

- If the MD is positive, the unchanged M code is always output.
- If the MD is negative, the number of the tool holder is added to the absolute value of the machine data and the number is output.

Special cases:

N M code is output, if the number of the M code to be output or the absolute value of this MD is set to one of the values 0 to 6, 17 or 30. It is not monitored whether an M code created in this way will conflict with other functions.

References:

/FB/, H2, Auxiliary Function Output to PLC

22532	GEOAX_CHANGE_M_CODE			C04	H2,K2	
-	M code at change of geo axes			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	99999999	7/2	M

Description: Number of the M code, which is output at the VDI interface in the case of a switchover of the geometry axes.

No M code is output if this MD is set to one of the values 0 to 6, 17 or 30.

It is not monitored whether an M code created in this way will conflict with other functions.

22534	TRAFO_CHANGE_M_CODE			C04	M1,H2	
-	M code at change of transformation			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	99999999	7/2	M

Description: Number of the M code that is output at the VDI interface in the case of a transformation changeover of the geometry axes.

No M code is output if this MD is set to one of the values 0 to 6, 17 or 30.

It is not monitored whether an M code created in this way will conflict with other functions.

22550	TOOL_CHANGE_MODE			C01, C11, C04, C09	W3,K1,W1	
-	New tool compensation for M function			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: The T function is used to select a tool in the program. The setting in this machine data determines whether the new tool is loaded immediately on execution of the T function:

MD22550 $MC_TOOL_CHANGE_MODE = 0

The new tool is loaded directly with the programming of T or D. This setting is mainly used on lathes. If a D is not programmed in the block by T, then the tool offset defined in MD20270 $MC_CUTTING_EDGE_DEFAULT is active.

In this case, the function "Manual tools" is not enabled.

MD22550 $MC_TOOL_CHANGE_MODE = 1

The new tool is prepared for loading on execution of the T function. This setting is used mainly on milling machines with a tool magazine in order to bring the new tool into the tool change position without interrupting the machining process. The M function entered in MD22560 $MC_ TOOL_CHANGE_M_CODE is used to remove the old tool from the spindle and load the new tool onto the spindle. According to DIN 66025, this tool change has to be programmed with M function M06.

Related to:

MD22560 $MC_TOOL_CHANGE_M_CODE

22560	TOOL_CHANGE_M_CODE			C01, C04, C09	H2,K1,W1	
-	M function for tool change			DWORD	PowerOn	
-						
-	-	6,6,6,6,6,6,6,6,6,6,6,6,6,6,6	0	99999999	7/2	M

Description: If the T function is only used to prepare a new tool for a tool change (this setting is used mainly on milling machines with a tool magazine, in order to bring the new tool into the tool change position without interrupting the machining process), another M function must be used to trigger the tool change.

The M function entered in TOOL_CHANGE_M_CODE triggers the tool change (remove old tool from the spindle and load new tool into the spindle). This tool change is required to be programmed with M function M06, in accordance with DIN 66025.

Related to:

MD22550 $MC_TOOL_CHANGE_MODE

22562	TOOL_CHANGE_ERROR_MODE			C09	W1	
-	Response to tool change errors			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFF	7/2	M

Description:

Behavior if faults/problems occur during programmed tool change.

Bit 0=0: Standard behavior: Stop on the faulty NC block

Bit 0=1: If a fault is detected in the block with the tool change preparation, the alarm relevant to the preparation command T is delayed until the corresponding tool change command (M06) has been interpreted in the program sequence. Until then, the alarm triggered by the preparation command is not output. The operator can take corrective actions in this block. When the program continues, the faulty NC block is re-interpreted, and the preparation command is automatically executed again internally.

The value = 1 is relevant only if the setting MD22550 $MC_TOOL_CHANGE_MODE = 1 is used.

Bit 1 Only relevant with active tool management:

Bit 1=0: Standard behavior: Only tools with data assigned to a magazine are detected during tool change preparation.

Bit 1=1: Manual tools can be loaded.

A tool will also be loaded if its data are known in the NCK but have not been assigned to a magazine. In this case, the tool data is automatically assigned to the programmed tool holder.

The user is prompted to insert tools into or remove tools from the tool holder).

Bit 2 modifies the offset programming

Bit 2=0: active D no. > 0 and active T no.=0 gives offset 0

Active D no. > 0 and active D no.=0 gives total offset 0

Bit 2=1: active D no. > 0 and active T no.=0 lead to an alarm message

Active D no. > 0 and active D no.=0 lead to an alarm message

Bits 3 and 4 are only relevant with active tool management.

Function:

Control of the behavior of the init. block generation on program start if a disabled tool is on the spindle and this tool is to be activated.

See MD20112 $MC_START_MODE_MASK, MD20110 $MC_RESET_MODE_MASK

On RESET, this does not affect the behavior "Keep disabled tool on the spindle active".

Bit 3=0: Standard: If the tool on the spindle is disabled, generate a tool change command requesting a replacement tool. An alarm will be generated if there is no such replacement tool.

Bit 3=1: The disabled status of the spindle tool is ignored. The tool becomes active. The subsequent part program should be formulated so that no parts are machined with the disabled tool.

Bit 4=0: Standard: The system tries to activate the spindle tool or its replacement tool.

Bit 4=1: If the tool on the spindle is disabled, T0 is programmed in the start init block.

The combination of bits 3 and 4 produces the following statements:

0 / 0: Behavior as before, automatic change on NC start if a dis-

abled tool is in the spindle

1 / 0: No automatic change

0 / 1: A T0 is automatically generated if a disabled tool is in the spindle at NC start

1 / 1: No statement

Bit 5: Reserved

Bit 6=0: Standard: If T0 or D0, only T0 or D0 is exactly programmed. This means that MD20270 $MC_CUTTING_EDGE_DEFAULT and MD20272 $MC_SUMCORR_DEFAULT determine the value of D and DL for the programming of T0.

Example: MD20270 $MC_CUTTING_EDGE_DEFAULT=1, MD20272 $MC_SUMCORR_DEFAULT=2, MD22550 $MC_TOOL_CHANGE_MODE=0 (tool change with T programming)

N10 T0 ; T no. 0 has active numbers D1 and DL=2, which results in offset zero. If bit 2 is also set:

Programming of

a) T0; for tool deselection

b) D0; for offset deselection

generates an alarm, if

a) at least one of MD20270 $MC_CUTTING_EDGE_DEFAULT and MD20272 $MC_SUMCORR_DEFAULT is unequal to zero (The correct programming is T0 D0 DL=0).

b) MD20272 $MC_SUMCORR_DEFAULT is unequal to zero (The correct programming is D0 DL=0).

Bit 6=1: Controls the NCK behavior when x, y, z are all programmed greater than zero, if at least one of MD20270 $MC_CUTTING_EDGE_DEFAULT and MD20272 $MC_SUMCORR_DEFAULT is unequal to zero.

a) Tx Dy --> T0:

With T0, D0 or D0 DL=0 is automatically programmed in the NCK; i.e. values in MD20270 $MC_CUTTING_EDGE_DEFAULT and $MC_SUMCORR_DEFAULT unequal to zero are treated as values equal to zero.

b) Tx Dy --> T0 Dy, or T0 DL=z, or T0 Dy DL=z, or T0 D0 DL=z, explicitly programmed values of D, DL are not influenced.

c) Dy DL=z --> D0

With D0, DL=0 is automatically programmed in the NCK; i.e. values in MD20272 $MC_SUMCORR_DEFAULT unequal to zero are treated as values equal to zero.

d) Dy DL=z --> D0 DL=z

Explicitly programmed values of DL are not influenced.

If bit 2 is also set:

Only T0 / D0 have to be programmed for tool/offset deselection, and this does not generate an alarm.

The statements relating to MD20272 $MC_SUMCORR_DEFAULT or DL are valid only if the total offset function is active (see MD18080 $MN_MM_TOOL_MANAGEMENT_MASK, bit 8).

Bit 7=0: When Tx is programmed, a check is made to see whether a tool with T number x is known in the TO unit of the channel. If not, the program is stopped in this block with alarm 17190

Bit 7=1: Only if tool basic functionality is active (MD20310 $MC_TOOL_MANAGEMENT_MASK, bit 0,1=0) and (MD18102 $MN_MM_TYPE_OF_CUTTING_EDGE=0):

When Tx is programmed, an unknown Tx is intially be ignored, and the alarm relating to the preparation command (Tx) is also ignored until the D selection is interpreted in the program sequence. Only then is alarm 17191, which has been triggered by the preparation command, output. This means that the operator can take corrective actions with the D selection in this block. When the program is continued, the incorrect NC block is re-interpreted, and the preparation command is automatically executed again internally.

(This is of interest for Cutting-Edge-Default=0 or =-2 and D0 programming, otherwise the D of Cutting-Edge-Default is deselected on tool change.)

This variant is justified for programming "Tool number=Location" (revolver as tool holder) without tool management. The revolver can now positioned on a location for which a tool has not (yet) been defined.

This bit has no meaning if bit 0=1 is set.

22600	SERUPRO_SPEED_MODE			EXP	K1	
-	Speed for block search run type 5			DWORD	Immediately	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	2/2	M

Description: This machine data specifies the search run mode: SERUPRO in more detail.

SERUPRO search run is activated with PI service _N_FINDBL mode parameter = 5.

SERUPRO means SEarchRUn by PROgram test, i.e. traversing under program test from beginning of program to search target.

Note:

Program test does not move any axes/spindles.

Bit0 and Bit1:

==========

0: Under program test, the axes/spindles are traversed at the following speeds:

Axes: MD22601 $MC_SERUPRO_SPEED_FACTOR*dry run feed.

Spindles: MD22601 $MC_SERUPRO_SPEED_FACTOR*programmed speed.

Dynamic axis / spindle limitations are not taken into account.

1: Under program test, the axes/spindles are traversed at the following speeds:

Axes: at the same velocity as dry run feed.

Spindles: at the programmed speed.

Dynamic axis / spindle limitations are taken into account.

2: Under program test, the axes/spindles are traversed at the programmed velocity/speed.

Dynamic axis /spindle limitations are taken into account.

3: Not assigned.

Related to:

SD42100 $SC_DRY_RUN_FEED, MD22601 $MC_SERUPRO_SPEED_FACTOR

22601	SERUPRO_SPEED_FACTOR			EXP	K1	
-	Speed factor for search run type 5			DOUBLE	Immediately	
-						
-	-	10.0,10.0,10.0,10.0,10.0,10.0,10.0...	1.0	-	2/2	M

Description: SERUPRO means SEarch RUn by PROgram test, i.e. traversing under program test from beginning of program to search target.

Note:

Program test does not move any axes / spindles.

The machine data is relevant only if the first two bits of MD22600 $MC_SERUPRO_SPEED_MODE are 0. The machine data has the following meaning:

Axes: MD specifies the factor by which the test run feedrate is multiplied.

Spindles: MD specifies the factor by which the programmed speed is multiplied.

Dynamic limitations of axes / spindles are always ignored.

Related to:

SD42100 $SC_DRY_RUN_FEED, MD22600 $MC_SERUPRO_SPEED_MODE

22620	START_MODE_MASK_PRT			EXP, C03	M3,K1	
-	Initial setting on special starts			DWORD	Reset	
-						
-	-	0x400,0x400,0x400,0x400,0x400,0x400...	0	0xFFFF	7/2	M

Description: This machine data is activated via MD22621 $MC_ENABLE_START_MODE_MASK_PRT.

If MD22621 $MC_ENABLE_START_MODE_MASK_PRT is in its initial setting, MD22620 $MC_START_MODE_MASK_PRT is inactive.

If MD22620 $MC_START_MODE_MASK_PRT is activated for "search via program test" (abbr. SERUPRO), then MD22620 $MC_START_MODE_MASK_PRT replaces MD20112 $MC_START_MODE_MASK when "search via program test" is started.

This enables a behavior deviating from PLC start to be set at the start of the search. The meaning of the bit-by-bit assignment of MD22620 $MC_START_MODE_MASK_PRT is the same as that in MD20112 $MC_START_MODE_MASK.

22621	ENABLE_START_MODE_MASK_PRT		EXP, C03	M3,K1	
-	Enables MD22620 $MC_START_MODE_MASK_PRT		DWORD	Reset	
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2	M

Description: MD22620 $MC_START_MODE_MASK_PRT is activated via MD22621 $MC_ENABLE_START_MODE_MASK_PRT.

If MD22621 $MC_ENABLE_START_MODE_MASK_PRT is in its initial setting, MD22620 $MC_START_MODE_MASK_PRT is inactive.

Bit0 = 1:

If a "search via program test" (English abbr. SERUPRO) is started from RESET (PI service _N_FINDBL mode paramter == 5), MD22620 $MC_START_MODE_MASK_PRT replaces MD20112 $MC_START_MODE_MASK.

This method can be used to set a start behavior differing from PLC start when the search

is started.

22622	DISABLE_PLC_START			EXP	-	
-	Enable part program start via PLC			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	-	-	2/2	M

Description: Allow part program start via PLC.

This machine data will ONLY be evaluated, if "Group-Serupro" mode is switched on.

"Group-Serupro" is switched on by means of "$MC_SERUPRO_MODE BIT2".

BIT0 = 0

A part program can be started in this channel only via the PLC. Starting via the part program command "START" is interlocked.

BIT0 = 1

A part program can be started in this channel only by means of the part program command "START" from another channel. Starting via the PLC is interlocked.

22680	AUTO_IPTR_LOCK			EXP, C03	K1	
-	Disable interrupt pointer			DWORD	Reset	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3	7/2	M

Description: With MD22680 $MC_AUTO_IPTR_LOCK program areas are defined in which the individually indicated coupling types are active. If a program abort is executed in a program range that is defined as such, it will not be the currently executed part program block that is stored in the interrupt pointer (OPI module Interruption-Search),but the last block prior to activation of the coupling.

22700	TRACE_STARTTRACE_EVENT			EXP, C06	-	
-	Diagnostic data rec. starts with event TRACE_STARTTRACE_EVENT.			STRING	PowerOn	
NBUP						
-	-		-	-	2/2	M

Description: The machine data is used for diagnostics.

The recording of the diagnostic data does not start until the event (TRACE_STARTTRACE_EVENT) has occurred at the trace point (TRACE_STARTTRACE_TRACEPOINT) and in the correct step (TRACE_STARTTRACE_STEP).

22702	TRACE_STARTTRACE_STEP			EXP, C06	-	
-	Conditions for start of trace recording			STRING	PowerOn	
NBUP						
-	2	,,, ,, ,, ,, ...	-	-	2/2	M

Description: The machine data is only intended for diagnostic use.

See TRACE_STARTTRACE_EVENT

In the case of TRACE_STARTTRACE_EVENT BLOCK_CHANGE the string TRACE_STARTTRACE_STEP is interpreted as a file name and block number.

In the case of BSEVENTTYPE_SETALARM the string is interpreted as an alarm number.

22704	TRACE_STOPTRACE_EVENT			EXP, C06	-	
-	Conditions for stop of trace recording			STRING	PowerOn	
NBUP						
-	-	CLEARCANCELALARM_M,CLEARCANCELALARM_M...	-	-	2/2	M

Description: The machine data is only used for diagnostics.

The recording of the diagnostic data ends when the event (TRACE_STOP_ART_EVENT) has occurred at the trace point (TRACE_STOPTRACE_TRACEPOINT) and in the correct step (TRACE_STOPTRACE_STEP).

(After reaching the stop condition, the previously recorded diagnostic data is stored in a file "NCSCTRyy.MPF" or for NCU-LINK in "NCxxTRyy.MPF" in the MPF directory.

22706	TRACE_STOPTRACE_STEP			EXP, C06	-	
-	CommandSequenzStep with which the recording ends			STRING	PowerOn	
NBUP						
-	2	, ,, ,, ,, ,, ...	-	-	2/2	M

Description: The machine data is only intended for diagnostic use.

22708	TRACE_SCOPE_MASK			EXP, C06	-	
-	Selects the contents of the trace file			STRING	PowerOn	
NBUP						
-	-		-	-	2/2	M

Description: The machine data is only intended for diagnostic purposes.

Specific trace contents are selected with the MD datum.

The entry SETALARM records the alarm environment and the block change in the main run is also logged by means of BLOCK_CHANGE.

22710	TRACE_VARIABLE_NAME			-	-	
-	Definition of trace data			STRING	PowerOn	
NBUP						
-	10	"BL_NR", "TR_POINT", "EV_TYPE", "EV_SRC", "CS_ASTEP"...	-	-	2/2	M

Description: The machine data is only intended for diagnostic purposes.
The MD datum defines which data are recorded in the trace file.

22712	TRACE_VARIABLE_INDEX			EXP, C06	-	
-	Index for trace recording data			DWORD	PowerOn	
NBUP						
-	10	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFF	2/2	M

Description: The machine data is only intended for diagnostic use.
The MD data, together with TRACE_VARIABLE_NAME, determines which data are recorded in the trace file.
It enables access to an array element.
E.g. use as an axis index when accessing axis data.

22714	MM_TRACE_DATA_FUNCTION			EXP, C02, C06	-	
-	Activating diagnostics			DWORD	PowerOn	
NBUP						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFFF	2/2	M

Description:

```
The machine data is only intended for diagnostic purposes.
Activating diagnostics
An internal ring buffer records important events.
After a trigger event, with the 'Cancel alarm' key set as default,
the ring buffer is briefly freezed, read, and converted into an
ASCII file
in the part program directory. The file name for the 1st channel
is ncsctr01.mpf and for the 7th channel it is ncsctr07.mpf.
The data in the ring buffer is referred to as dynamic data in the
following.
In addition to the trigger event, other up-to-date data is read
from the
NCK and transferred to the ASCII file. These recordings do
NOT have a history and are referred to as static data in the fol-
lowing.
Bit no.   Significance when bit is set
-----------------------------------------------------------------
-
0 (LSB) Recording of dynamic data (see TRACE_VARIABLE_NAME)
1       Recording of block control static data
2       Recording of alarm data static data
3       Recording of process data static data
4       Recording of command sequence static data
5       Recording of tool management static data
6       Recording of the NCK version file. Static data
7       Recording of the statuses of the current block
        Various statuses of the axes and the SPARPI.  Static data
8       Recording of various statuses of the channel.  Static data
9      Error statuses in the NCK memory management are scanned dur-
ing trace generation.
        An error renames the trace file. Static data
        Possible names and their meaning:
        NCFIER.MPF   Error in the file system
        NCSLER.MPF   Error during string creation
        NCFIER.MPF   Error on New/Delete
10      All block changes in the interpreter are recorded. Dynamic
data.
11      Axial VDI signals are recorded. Dynamic data.
        Only in conjunction with MD18794 $MN_MM_TRACE_VDI_SIGNAL
12      OEM traces are activated. Dynamic data.
13      Synchronized actions are recorded. Dynamic data.
        NOTICE:  Filled in applications with intensive use of
        these trace points, other events are ignored!
        That is why this bit should remain at 0 in these cases.
14      Not assigned.
```

15 Recording of station commands. Dynamic data.
Note: Most important output of the NCK module NCSC!
16 Recording of gantry commands
17 Recording of changes in the drive's status
18 Recording of the processing of the Event-Queue and generation of command sequences
19 Recording of event destructor call

22800	TRACE_COMPRESSOR_OUTPUT			EXP, C01	-	
-	Activation of trace output for compressor			BYTE	PowerOn	
NBUP						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	0/0	S

Description: A trace output of the compressor can be activated with this machine data. With this, the polynomials created by the compressor can be output in an internal file. If this MD is active, the NCK works like a preprocessor, i.e. there is also no program execution.

The following values are possible for this MD:

0: Trace output not active.

1: Polynomials created by the compressor are output.

2: The following are also output:

- Type of continuousness of the block transitions generated by the compressor
- Compression rate (number of compressed blocks)
- Corner detection

22900	STROKE_CHECK_INSIDE			EXP, C01, C11	-	
-	Direction (inside/outside) in which prot. zone 3 is effective			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This MD defines whether protection zone 3 is a protection zone inside or outside.

Meaning:

0: Protection zone 3 is a protection zone inside, i.e. the protection zone must not entered inwardly.

1: Protection zone 3 is a protection zone outside

22910	WEIGHTING_FACTOR_FOR_SCALE			EXP, C01, C11	-	
-	Input resolution for scaling factor			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: Definition of the unit for the scaling factor P and for the axial scaling factors I, J, K.

Meaning:

0 Scale factor in 0.001

1 Scale factor in 0.00001

Related to:

SD43120 $SA_DEFAULT_SCALE_FACTOR_AXIS,
SD42140 $SC_DEFAULT_SCALE_FACTOR_P

22914	AXES_SCALE_ENABLE			EXP, C01, C11	-	
-	Activation for axial scaling factor (G51)			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This MD enables axial scaling.

Meaning:

0: Axial scaling not possible

1: Axial scaling possible -> MD DEFAULT_SCALE_FACTOR_AXIS is active

Related to:

SD43120 $SA_DEFAULT_SCALE_FACTOR_AXIS

22920	EXTERN_FIXED_FEEDRATE_F1_ON			EXP, C01, C11	-	
-	Activation of fixed feedrates F1 - F9			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: This MD is used to activate the fixed feedrates set in SD42160 $SC_EXTERN_FIXED_FEEDRATE_F1_F9[].

Meaning:

0: no fixed feedrates with F1 - F9

1: the feedrates set in SD42160 $SC_EXTERN_FIXED_FEEDRATE_F1_F9[] become active when F1 - F9 are programmed.

22930	EXTERN_PARALLEL_GEOAX			EXP, C01, C11	-	
-	Assignment of a parallel channel axis to the geometry axis			BYTE	PowerOn	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2	M

Description: Assignment table of the axes positioned parallel to the geometry axes.

This table can be used to assign channel axes positioned parallel to the geometry axes. The parallel axes can then be activated as geometry axes in ISO mode using the G functions of plane selection (G17 - G19) and the axis name of the parallel axis. The axis is then replaced by the axis defined via MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB[].

Prerequisite:

The channel axes used must be active. (list position assigned in AXCONF_MACHAX_USED). Entering zero deactivates the corresponding parallel geometry axis:

24000	FRAME_ADD_COMPONENTS			C03	K2	
-	Frame components for G58 and G59			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: Additive programmable frame components can be separately programmed and modified.

0: Additive translations which have been programmed with ATRANS are stored in the frame together with the absolute translation (prog. with TRANS).

G58 and G59 are not possible.

1: The sum of the additive translations are stored in the fine offset of the programmable frame. The absolute and the additive translations can be changed independently of one another.

G58 and G59 are possible.

24002	CHBFRAME_RESET_MASK			C03	K2	
-	Active channel-specific base frames after reset			DWORD	Reset	
-						
-	-	0xFFFF,0xFFFF,0xFFFF,0xFFFF,0xFFFF...	0	0xFFFF	7/2	M

Description: Bit mask for the reset setting of the channel-specific base frames which are included in the channel.

The following apply:

If MD20110 $MC_RESET_MODE_MASK bit0 = 1 and BIT14 = 1

the entire base frame is determined on reset by chaining the base frame field elements, whose bit is 1 in the bit mask.

If MD20110 $MC_RESET_MODE_MASK bit0 = 1 and BIT14 = 0

the entire base frame is deselected on reset.

24004	CHBFRAME_POWERON_MASK			C03	K2	
-	Reset channel-specific base frames after power on			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2	M

Description: This machine data defines whether channel-specific base frames are reset in the data management on Power On.

That is

- Offsets and rotations are set to 0,
- Scalings are set to 1.
- Mirror image machining is disabled.

The selection can be made separately for individual base frames.

Bit 0 means base frame 0, bit 1 base frame 1 etc.

Value=0: Base frame is retained on Power On

Value=1: Base frame is reset in the data management on Power On.

Related to:

MD10615 $MN_NCBFRAME_POWERON_MASK

24006	CHSFRAME_RESET_MASK			C03	K2	
-	Active system frames after reset			DWORD	Reset	
-						
-	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	0	0x00000FFF	7/2	M

Description: Bit mask used for the reset setting of the channel-specific system frames included in the channel.

Bit 0: System frame for actual value setting and scratching is active after reset.

Bit 1: System frame for external work offset is active after reset.

Bit 2: Reserved, for TCARR and PAROT see MD20150 $MC_GCODE_RESET_VALUES[].

Bit 3: Reserved, for TOROT and TOFRAME see MD20150 $MC_GCODE_RESET_VALUES[].

Bit 4: System frame for workpiece reference points is active after reset.

Bit 5: System frame for cycles is active after reset.

Bit 6: Reserved; reset behavior dependent on MD20110 $MC_RESET_MODE_MASK.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) is active after reset.

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) is active after reset.

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) is active after reset.

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) is active after reset.

Bit 11: System frame $P_RELFR is active after reset.

Related to:

MD28082 $MC_MM_SYSTEM_FRAME_MASK

24007	CHSFRAME_RESET_CLEAR_MASK			C03	K2	
-	Deletion of system frames after reset			DWORD	Reset	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x00000FFF	7/2	M

Description: Bit mask used to delete channel-specific system frames from the data management on reset.

Bit 0: System frame for actual value setting and scratching is deleted on reset.

Bit 1: System frame for exernal work offset is deleted on reset.

Bit 2: Reserved, for TCARR and PAROT, see MD20150 $MC_GCODE_RESET_VALUES[].

Bit 3: Reserved, for TOROT and TOFRAME, see MD20150 $MC_GCODE_RESET_VALUES[].

Bit 4: System frame for workpiece reference points is deleted on reset.

Bit 5: System frame for cycles is deleted on reset.

Bit 6: Reserved; reset behavior depends on MD20110 $MC_RESET_MODE_MASK.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) is deleted on reset.

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) is deleted on reset.

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) is deleted on reset.

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) is deleted on reset.

Bit 11: System frame $P_RELFR is deleted on reset.

24008	CHSFRAME_POWERON_MASK		C03	K2	
-	Reset channel system frames after power on		DWORD	PowerOn	
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x00000FFF	7/2	M

Description: This machine data defines whether channel-specific system frames are reset in the data management on Power On. That is offsets and rotations are set to 0, scalings to 1. Mirroring is disabled.

The selection can be made separately for individual system frames.

Bit 0:System frame for set actual value and scratching is deleted after Power On.

Bit 1:System frame for external work offset is deleted after Power On.

Bit 2:System frame for TCARR and PAROT is deleted after Power On.

Bit 3:System frame for TOROT and TOFRAME is deleted after Power On.

Bit 4:System frame for work piece reference points deleted after Power On.

Bit 5:System frame for cycles retained after Power On.

Bit 6:System frame for transformations deleted after Power On.

Bit 7:System frame $P_ISO1FR (ISO G51.1 Mirror) is deleted after power ON.

Bit 8:System frame $P_ISO2FR (ISO G68 2DROT) is deleted after power ON.

Bit 9:System frame $P_ISO3FR (ISO G68 3DROT) is deleted after power ON.

Bit 10:System frame $P_ISO4FR (ISO G51 Scale) is deleted after power ON.

Bit 11:System frame $P_RELFR is deleted after power ON.

Related to:

MD28082 $MC_MM_SYSTEM_FRAME_MASK

24010	PFRAME_RESET_MODE			C03	K2	
-	Reset mode for programmable frame			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: 0: Programmable frame is deleted at reset.

1: Programmable frame remains active at reset.

24020	FRAME_SUPPRESS_MODE			C03	K2	
-	Positions for frame suppression			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000003	7/2	M

Description: Bit mask for configuring the positions for frame suppressions (SUPA, G153, G53).

The following rule applies:

Bit 0: Positions for display (OPI) without frame suppression

Bit 1: Position variables without frame suppression

24030	FRAME_ACS_SET			C03	K2	
-	Adjustment of SZS coordinate system			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: 0: SZS results from the WCS transformed with $P_CYCFRAME and $P_PFRAME.

1: SZS results from the WCS transformed with the $P_CYCFRAME.

24040	FRAME_ADAPT_MODE			C03	K2	
-	Adaptation of active frames			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000007	7/2	M

Description: Bit mask for adapting the active frames or axis configuration

The following applies:

Bit 0:

Rotations in active frames that rotate coordinate axes for which there are no geometry axes are deleted from the active frames.

Bit 1:

Shear angles in active frames are orthogonalized.

Bit 2:

Scalings of all geometry axes in the active frames are set to value 1.

24050	FRAME_SAA_MODE			C03	-	
-	Saving and activating of data management frames			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000003	7/2	M

Description: Bit mask for saving and activating data handling frames.

The following applies:

Bit 0:

Data handling frames are only activated by programming the bit masks $P_CHBFRMASK, $P_NCBFRMASK and $P_CHSFRMASK. G500..G599 only activate the relevant settable frame. The reset behavior is independent of this.

Bit 1:

Data handling frames are not written implicitly by system functions such as TOROT, PAROT, ext. work offset, transformations.

24080	USER_FRAME_POWERON_MASK			N01	-	
-	Parameterize properties for settable frame			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2	M

Description: Setting the following bits activates certain properties of the settable frame:

Bit 0 = 0: default behavior.

Bit 0 = 1: if MD20152 $MC_GCODE_RESET_MODE[7] = 1, the last active settable frame is selected again according to G code group 8 after power up of the control.

1.4.4 Transformation definitions in channel

24100	TRAFO_TYPE_1			C07	F2,TE4,M1,K1,W1	
-	Definition of transformation 1 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD specifies the first available transformation in each channel.

The 4 low-value bits identify the specific transformation of a specific transformation group. The transformation group is identified by a number starting with the 5th bit.

Meaning:

0 No transformation

16 and higher

5-axis transformation with turnable tool

32 and higher

5-axis transformation with turnable workpiece

48 and higher

5-axis transformation with turnable tool and turnable workpiece

72

Generic 5-axis transformation. Type and kinematic data are determined by an associated, orientable tool carrier, see MD24582 $MC_TRAFO5_TCARR_NO_1 and MD24682 $MC_TRAFO5_TCARR_NO_2

The 4 low-value bits have the following meaning for a 5-axis transformation:

0 Axis sequence AB

1 Axis sequence AC

2 Axis sequence BA

3 Axis sequence BC

4 Axis sequence CA

5 Axis sequence CB

8 Generic orientation transformation (3- 5 axes)

256 and higher

TRANSMIT transformation

512 and higher

TRACYL transformation

1024 and higher

TRAANG transformation

2048

TRACLG: centerless transformation

From 4096 to 4098

OEM transformation

8192 and higher

TRACON: cascaded transformations

Example:

A 5-axis transformation with turnable tool and axis sequence CA (i.e. C axis turns A axis) has number 20 (= 16 + 4)

Notice:

Not all combinations of group numbers and axis sequence numbers are allowed. An error message is output if a number for a non-existent transformation is entered.

Related to:

MD24200 $MC_TRAFO_TYPE_2, MD24300 $MC_TRAFO_TYPE_3, ... MD24460 $MC_TRAFO_TYPE_8

References:

/FB/, F2, "5-Axis Transformation"

24110	TRAFO_AXES_IN_1			C07	F2,TE4,M1,K1,W1	
-	Axis assignment for the 1st transformation in the channel			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at input point of 1st transformation

The index input at the nth position states which axis is mapped internally from the transformation to axis n.

Not relevant:

No transformation

Releated to:

MD24200 $MC_TRAFO_TYPE_2, MD24300 $MC_TRAFO_TYPE_3, ...

MD24460 $MC_TRAFO_TYPE_8

References:

/FB/, F2, "5-Axis Transformation"

24120	TRAFO_GEOAX_ASSIGN_TAB_1			C07	F2,TE4,TE4,M1,K1,W1	
-	Assignment of the geometry axes to channel axes for transformation 1			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 1.

Not relevant:

No transformation

Related to:

MD20050 $MC_AXCONF_GEOAX_ASSIGN_TAB, if no transformation is active.

References:

/FB/, K2, "Coordinate Systems, Axis Types, Axis Configurations, Workpiece-Related Actual Value System, External Work Offset"

24130	TRAFO_INCLUDES_TOOL_1			C07	-	
-	Tool handling with 1st active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This machine data states for each channel whether the tool is handled during the 1st transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only the "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24200	TRAFO_TYPE_2			C07	F2,M1	
-	Definition of the 2nd transformation in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD states the second available transformation in each channel.

Same as TRAFO_TYPE_1, but for the second available transformation in the channel.

References:

/FB/, F2, "5-Axis Transformation"

24210	TRAFO_AXES_IN_2			C07	F2,M1	
-	Axis assignment for transformation 2			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: TRAFO_AXES_IN_2(n)

Axis assignment at input of 2nd to 8th transformation.

Same meaning as for TRAFO_AXES_IN_1.

24220	TRAFO_GEOAX_ASSIGN_TAB_2			C07	F2,M1	
-	Assignment of geometry axes to channel axes for transformation 2			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 2.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24230	TRAFO_INCLUDES_TOOL_2			C07	-	
-	Tool handling with active 2nd transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This machine data states for each channel whether the tool is handled during the 2nd transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24300	TRAFO_TYPE_3			C07	M1	
-	Definition of the 3rd transformation in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD states the third available transformation in each channel.

Same as TRAFO_TYPE_1, but for the third available transformation in the channel.

References:

/FB/, F2, "5-Axis Transformation"

24310	TRAFO_AXES_IN_3			C07	M1	
-	Axis assignment for transformation 3			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input point of the 3rd transformation in the channel.

Meaning is the same as TRAFO_AXES_IN_1, but for the third available transformation in the channel.

24320	TRAFO_GEOAX_ASSIGN_TAB_3			C07	M1	
-	Assignment of geometry axes to channel axes for transformation 3			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 3.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24330	TRAFO_INCLUDES_TOOL_3			C07	-	
-	Tool handling with active 3rd transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This machine data states for each channel whether the tool is handled during the 3rd transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24400	TRAFO_TYPE_4			C07	M1	
-	Definition of the 4th transformation in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD states the fourth available transformation in each channel.

Same as TRAFO_TYPE_1, but for the fourth available transformation in the channel.

References:

/FB/, F2, "5-Axis Transformation"

24410	TRAFO_AXES_IN_4			C07	F2,M1	
-	Axis assignment for the 4th transformation in the channel			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input point of the 4th transformation in the channel.

Meaning is the same as TRAFO_AXES_IN_1, but for the fourth available transformation in the channel.

24420	TRAFO_GEOAX_ASSIGN_TAB_4			C07	M1	
-	Assignment of geometry axes to channel axes for transformation 4			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 4.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24426	TRAFO_INCLUDES_TOOL_4			C07	-	
-	Tool handling with active 4th transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This machine data states for each channel whether the tool is handled during the 4th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24430	TRAFO_TYPE_5			C07	M1	
-	Type of transformation 5 in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: Type of transformation available as the fifth in the channel. See MD24100 $MC_TRAFO_TYPE_1 for explanation.

24432	TRAFO_AXES_IN_5			C07	F2	
-	Axis assignment for transformation 5			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input point of the 5th transformation. See TRAFO_AXES_IN_1 for explanation.

24434	TRAFO_GEOAX_ASSIGN_TAB_5			C07	M1	
-	Assignment of geometry axes to channel axes for transformation 5			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 5.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24436	TRAFO_INCLUDES_TOOL_5			C07	-	
-	Tool handling with active 5th transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This machine data states for each channel whether the tool is handled during the 5th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24440	TRAFO_TYPE_6			C07	-	
-	Type of transformation 6 in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: Type of transformation available as the sixth in the channel. See MD24100 $MC_TRAFO_TYPE_1 for explanation.

24442	TRAFO_AXES_IN_6			C07	-	
-	Axis assignment for transformation 6			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input point of the 6th transformation. See TRAFO_AXES_IN_1 for explanation.

24444	TRAFO_GEOAX_ASSIGN_TAB_6			C07	-	
-	Assignment of geometry axes to channel axes for transformation 6			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 6.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24446	TRAFO_INCLUDES_TOOL_6			C07	-	
-	Tool handling with active 6th transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This machine data states for each channel whether the tool is handled during the 6th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24450	TRAFO_TYPE_7			C07	-	
-	Type of transformation 7 in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: Type of transformation available as the seventh in the channel. See MD24100 $MC_TRAFO_TYPE_1 for explanation.

24452	TRAFO_AXES_IN_7			C07	-	
-	Axis assignment for transformation 7			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input point of the 7th transformation. See TRAFO_AXES_IN_1 for explanation.

24454	TRAFO_GEOAX_ASSIGN_TAB_7			C07	-	
-	Assignment of geometry axes to channel axes for transformation 7			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 7.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24456	TRAFO_INCLUDES_TOOL_7			C07	-	
-	Tool handling with active 7th transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This machine data states for each channel whether the tool is handled during the 7th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24460	TRAFO_TYPE_8			C07	F2,TE4,M1	
-	Type of transformation 8 in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: Type of transformation available as the eighth in the channel. See MD24100 $MC_TRAFO_TYPE_1 for explanation.

24462	TRAFO_AXES_IN_8			C07	F2	
-	Axis assignment for transformation 8			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input point of the 8th transformation. See TRAFO_AXES_IN_1 for explanation.

24464	TRAFO_GEOAX_ASSIGN_TAB_8			C07	-	
-	Assignment of geometry axes to channel axes for transformation 8			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 8.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

24466	TRAFO_INCLUDES_TOOL_8			C07	-	
-	Tool handling with 8th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This machine data states for each channel whether the tool is handled during the 8th transformation or externally.

This machine data is evaluated only with specific transformations.

It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition.

If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP).

The method of operation of protection zones and working area limitations varies correspondingly.

24470	TRAFO_TYPE_9			C07	M1	
-	Type of transformation 9 in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: Type of transformation available as the ninth in the channel. See MD24100 $MC_TRAFO_TYPE_1 for explanation.

24472	TRAFO_AXES_IN_9			C07	-	
-	Axis assignment for transformation 9			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input point of the 9th transformation. See TRAFO_AXES_IN_1 for explanation.

24474	TRAFO_GEOAX_ASSIGN_TAB_9			C07	-	
-	Assignment of geometry axes to channel axes for transformation 9			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 9.

24476	TRAFO_INCLUDES_TOOL_9			C07	-	
-	Treatment of tool with active 9th transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: Same as TRAFO_INCLUDES_TOOL_1, but for the 9th transformation.

24480	TRAFO_TYPE_10		C07	F2,M1	
-	Transformation 10 in channel		DWORD	NEW CONF	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: Same as TRAFO_TYPE_1, but for the tenth available transformation in the channel.

24482	TRAFO_AXES_IN_10			C07	F2,M1	
-	Axis assignment for transformation 10			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 10th transformation. See TRAFO_AXES_IN_1 for explanation.

24484	TRAFO_GEOAX_ASSIGN_TAB_10			C07	M1	
-	Assignment of geometry axes to channel axes f. transformation 10			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: Assignment table of geometry axes with transformation 10

Same as AXCONF_GEOAX_ASSIGN_TAB, but only effective when transformation 10 is active.

24486	TRAFO_INCLUDES_TOOL_10			C07	-	
-	Treatment of tool with active 10th transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: Same as TRAFO_INCLUDES_TOOL_1, but for the 10th transformation.

24500	TRAFO5_PART_OFFSET_1			C07	F2,M1	
mm	Offset vector of 5-axis transformation 1			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data designates an offset of the workpiece carrier for the first (MD24500 $MC_TRAFO5_PART_OFFSET_1) or second (MD24600 $MC_TRAFO5_PART_OFFSET_2) 5-axis transformation of a channel, and has a specific meaning for the different machine types:

Machine type 1 (two-axis swivel head for tool):

Vector from machine reference point to zero point of workpiece table. This will generally be a zero vector if both coincide.

Machine type 2 (two-axis rotary table for workpiece):

Vector from the second rotary joint of workpiece rotary table to zero point of table.

Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool):

Vector from rotary joint of workpiece table to zero point of table.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24510	TRAFO5_ROT_AX_OFFSET_1			C07	F2,M1	
degrees	Position offset of rotary axes 1/2/3 for 5-axis transformation 1			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: This machine data designates the angular offset of the first or second rotary axis in degrees for the first 5-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24520	TRAFO5_ROT_SIGN_IS_PLUS_1			C07	F2,M1	
-	Sign of rotary axis 1/2/3 for 5-axis transformation 1			BOOLEAN	NEW CONF	
-						
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7	U

Description: This machine data designates the sign with which the two rotary axes are included in the first 5-axis transformation of a channel.

MD = 0 (FALSE):

Sign is reversed.

MD = 1 (TRUE) :

Sign is not reversed and the traversing direction is defined according to MD32100 $MA_AX_MOTION_DIR.

This machine data does not mean that the rotational direction of the rotary axis concerned is to be reversed, but specifies whether its motion is in the mathematically positive or negative direction when the axis is moving in the positive direction.

The result of a change to this machine data is not therefore a change in the rotational direction, but a change in the compensatory motion of the linear axes.

However, if a directional vector and thus, implicitly, a compensatory motion is specified, the result is a change in the rotational direction of the rotary axis concerned.

On a real machine, therefore, the machine data may be set to FALSE (or zero) only if the rotary axis is turning in an anti-clockwise direction when moving in a positive direction.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24530	TRAFO5_NON_POLE_LIMIT_1			C07	F2	
degrees	Definition of pole range for 5-axis transformation 1			DOUBLE	NEW CONF	
-						
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7	U

Description: This MD designates a limit angle for the fifth axis of the first 5-axis transformation with the following properties: if the path runs below this angle past the pole, the traverse will pass through the pole.

For the 5-axis transformation, the two orientation axes of the tool form a coordinate system of length and width circles on a spherical surface. If orientation programming (that is the orientation vector lies in a plane) leads the path so close past the pole that the angle defined by the MD is undershot then there is a deviation from the defined interpolation such that the interpolation runs through the pole.

Alarm 14112 is output if this modification of the path gives a deviation greater than a tolerance defined by MD24540 TRAFO5$MC_TRAFO5_POLE_LIMIT_1.

MD irrelevant:

If the "5-Axis Transformation" option is not installed.

Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:

MD: TRAFO5_POLE_LIMIT_n

24540	TRAFO5_POLE_LIMIT_1			C07	F2,M1	
degrees	End angle tolerance with interpolation through pole for 5-axis transf.			DOUBLE	NEW CONF	
-						
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7	U

Description: This MD designates an end angle tolerance for the fifth axis of the first 5-axis transformation with the following properties:

With the interpolation through the pole point, only the fifth axis moves, the fourth axis retains its starting position. If a motion is programmed that does not run exactly through the pole point but is to run near the pole within the area given by MD: TRAFO5_NON_POLE_LIMIT_n then there is a deviation from the defined path as the interpolation runs exactly through the pole point. This results in a deviation in the position of the end point of the fourth axis (the polar axis) from the programmed value.

This MD defines the angle by which the polar axis may deviate from the programmed value with 5-axis transformation when switching from the programmed interpolation to the interpolation through the pole point.

Alarm 14112 is output if there is a greater deviation and the interpolation is not executed.

MD irrelevant:

If the "5-Axis Transformation" option is not installed.

Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:

MD2.... $MC_TRAFO5_NON_POLE_LIMIT_n

24542	TRAFO5_POLE_TOL_1			C07	-	
degrees	End angle tolerance for tool orientation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7	U

Description: End angle tolerance for interpolation through the pole for the 1st 5/6-axis transformation.

This MD is evaluated only by the generic 5/6-axis transformation.

If the programmed end orientation lies within the body cone and within the tolerance cone specified by this MD, the pole axis does not move

and retains it starting positions. The other rotary axis, however, moves to the programmed angle.

This results in the end orientation deviating from the programmed orientation.

Another function of this MD is the handling of the programmmed end orientation with

non-orthogonal kinematics. As a rule, not all tool orientations can be set with

these machine kinematics.

Alarm 14112 is output if an orientation is programmed that lies outside the

settable range of the orientation cone (the programmed orientation path is not possible).

However, if the programmed orientation still lies within the range defined by MD $MC_TRAFO5_POLE_TOL,

an alarm is not output, and the programmed orientation is accepted.

However, the programmed orientation is corrected so that the orientation remains

stationary at the edge of the settable range.

The maximum active value of this MD is the value of MD TRAFO5_POLE_LIMIT_1, which is used to define the body cone.

24550	TRAFO5_BASE_TOOL_1			C07	F2,M1,W1	
mm	Vector of base tool on activation of 5-axis transformation 1			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This MD specifies the vector of the base tool which takes effect when the first transformation is activated without a length compensation being selected. Programmed length compensations have an additive effect with respect to the base tool.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24558	TRAFO5_JOINT_OFFSET_PART_1			C07	F2,M1,W1	
mm	Vector of kinematic table offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data is only evaluated for generic 5-axis transformations with rotatable workpiece and rotatable tool (TRAFO_TYPE = 56, mixed kinematics).

It indicates the part of the vector between table and turning head assigned to the table.

Only the sum of this MD and MD TRAFO5_JOINT_OFFSET is entered in the transformation equations.

A difference results only when reading the whole tool length using the function GETTCOR. In this case, only the MD TRAFO5_JOINT_OFFSET is considered.

On a machine with mixed kinematics, this machine data can be used to assign the machine data of the 5-axis transformation and the parameters of the orientable tool holder uniquely to one another as follows:

Orientable tool holder	5-axis transformation (1st transformation)
1	TRAFO5_JOINT_OFFSET_1
2	TRAFO5_BASE_TOOL_1
3	TRAFO5_JOINT_OFFSET_PART_1
4	TRAFO5_PART_OFFSET_1

24560	TRAFO5_JOINT_OFFSET_1			C07	F2,W1	
mm	Vector of the kinem.offset of the 1st 5-axis transf. in channel			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data designates the vector between first and second rotary joint for the first transformation of a channel and has a specific meaning for the various machine types:

Machine type 1 (two-axis swivel head for tool) and:

Machine type 2 (two-axis rotary table for workpiece):

Vector between first and second rotary joint of tool rotary head or workpiece rotary table.

Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool):

Vector from machine reference point to joint of workpiece table.

MD irrelevant:

if the "5-Axis Transformation" option is not installed. The same applies for 3-axis and 4-axis transformations.

24561	TRAFO6_JOINT_OFFSET_2_3_1			C07	F2	
mm	Vector of kinematic offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 1st transformation of each channel.

24562	TRAFO5_TOOL_ROT_AX_OFFSET_1			C07	M1	
mm	Offset of swivel point of 1st rotary axis on 5-axis transform. 1			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: In the case of a 5-axis transformation with a swiveling linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 1st transformation.

MD irrelevant for:

other 5-axis transformations

Related to:

MD24662 $MC_TRAFO5_TOOL_ROT_AX_OFFSET_2

24564	TRAFO5_NUTATOR_AX_ANGLE_1			C07	M1	
degrees	Nutating head angle in 5-axis transformation			DOUBLE	NEW CONF	
-						
-	-	45.0,45.0,45.0,45.0,45.0,45.0,45.0...	-89.	89.	7/7	U

Description: Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system

MD irrelevant for: Transformation type other than "universal milling head".

Related to:

MD2.... $MC_TRAFO_TYPE_n...

24566	TRAFO5_NUTATOR_VIRT_ORIAX_1			C07	M1	
-	Virtual orientation axes			BOOLEAN	NEW CONF	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: The MD has the following values:

0: The axis angles of the orientation axes are machine axis angles.

1: Virtual orientation axes are defined that form a rectangular coordinate system and the axis angles are rotations around these virtual axes.

24570	TRAFO5_AXIS1_1			C07	F2,M1,W1	
-	Direction of 1st rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD indicates the vector that describes the direction of the first rotary axis in the general 5-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

24572	TRAFO5_AXIS2_1			C07	F2,M1,W1	
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates the vector that describes the direction of the second rotary axis in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56).

The vector can have any magnitude except zero.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

24573	TRAFO5_AXIS3_1			C07	F2	
-	Direction of the 3rd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates the vector which defines the direction of the third rotary axis in the case of the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

The vector may have any value except zero.

Example:

The same axis is defined with both (0, 1, 0) and (0, 7.21, 0) (in the direction of the 2nd geometry axis, that is as a rule Y).

Valid for the first orientation transformation of a channel.

24574	TRAFO5_BASE_ORIENT_1			C07	F2,M1	
-	Vector of the tool base orientation for 5-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates the vector of the tool orientation in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56) if this is not defined on the transformation call or read from a programmed tool.

The vector can have any magnitude except zero.

24576	TRAFO6_BASE_ORIENT_NORMAL_1			C07	F2	
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7	U

Description: Indicates a vector that is perpendicular to the tool orientation (TRAFO5_BASE_ORIENTATION_1) in the case of the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

If TRAFO6_BASE_ORIENT_NORMAL_1 and TRAFO5_BASE_ORIENTATION_1 are neither orthogonal nor parallel, then the two vectors are orthogonalized by modifying the normal vector.The two vectors must not be parallel.

The vector may have any value other than zero.

Valid for the first orientation transformation of a channel.

24580	TRAFO5_TOOL_VECTOR_1			C07	F2	
-	Direction of orientation vector for the first 5-axis transf.			BYTE	NEW CONF	
-						
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2	M

Description: Indicates the direction of the orientation vector for the first 5-axis transformation for each channel.

0: Tool vector in x direction

1: Tool vector in y direction

2: Tool vector in z direction

24582	TRAFO5_TCARR_NO_1			C07	F2	
-	TCARR number for the 1st 5-axis transformation			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: If the value of this machine data is not zero and if MD2.... $MC_TRAFO_TYPE_..., which points to the first orientation transformation, has the value 72, then the kinematics data (offsets etc.) that parameterize the first 5-axis transformation, will not be read from the machine data, but from the data of the orientable tool carrier to which this machine data refers.

24585	TRAFO5_ORIAX_ASSIGN_TAB_1			C07	F2,M1	
-	Orientation axis / channel axis assignment transformation 1			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2	M

Description: Assignment table of the orientation axes for 5-axis transformation 1

Only active with active 5-axis transformation 1.

24590	TRAFO5_ROT_OFFSET_FROM_FR_1			C01, C07	F2	
-	Offset of transformation rotary axes from WO.			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: The programmable offset for orientation axes is automatically accepted from the work offset active for the orientation axes on switch-on of an orientation transformation.

24594	TRAFO7_EXT_ROT_AX_OFFSET_1			C07	F2	
degrees	Position offset of the external rotary axes for 7-axis transformation 1			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: This machine data designates the angular offset of the external rotary axis in degrees for the first 7-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24595	TRAFO7_EXT_AXIS1_1			C07	F2	
-	Direction of the 1st external rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD indicates the vector that describes the direction of the first external rotary axis in the general 5/6-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

24600	TRAFO5_PART_OFFSET_2			C07	M1	
mm	Offset vector of the 2nd 5-axis transformation in the channel			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data designates an offset of the workpiece carrier for the first (MD24500 $MC_TRAFO5_PART_OFFSET_1) or second (MD24600 $MC_TRAFO5_PART_OFFSET_2) 5-axis transformation of a channel, and has a specific meaning for the different machine types:

Machine type 1 (two-axis swivel head for tool):

Vector from machine reference point to zero point of workpiece table. This will generally be a zero vector if both coincide.

Machine type 2 (two-axis rotary table for workpiece):

Vector from second joint of workpiece rotary table to zero point of table.

Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool):

Vector from joint of workpiece table to zero point of table.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24610	TRAFO5_ROT_AX_OFFSET_2			C07	M1	
degrees	Position offset of rotary axes 1/2/3			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: Indicates the offset for each channel of the rotary axes in degrees for the second orientation transformation.

24620	TRAFO5_ROT_SIGN_IS_PLUS_2			C07	F2,M1	
-	Sign of rotary axis 1/2/3 for 5-axis transformation 2			BOOLEAN	NEW CONF	
-						
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7	U

Description:

This machine data designates the sign with which the two rotary axes are included in the second 5-axis transformation of a channel.

MD = 0 (FALSE):

Sign is reversed.

MD = 1 (TRUE) :

Sign is not reversed and the traversing direction is defined according to MD32100 $MA_AX_MOTION_DIR.

This machine data does not mean that the rotational direction of the rotary axis concerned is to be reversed, but specifies whether its motion is in the mathematically positive or negative direction when the axis is moving in the positive direction.

The result of a change to this data is not therefore a change in the rotational direction, but a change in the compensatory motion of the linear axes.

However, if a directional vector and thus, implicitly, a compensatory motion is specified, the result is a change in the rotational direction of the rotary axis concerned.

On a real machine, therefore, the machine data may be set to FALSE (or zero) only if the rotary axis is turning in an anti-clockwise direction when moving in a positive direction.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24630	TRAFO5_NON_POLE_LIMIT_2		C07	F2,M1	
degrees	Definition of pole range for 5-axis transformation 2		DOUBLE	NEW CONF	
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	7/7	U

Description: This MD designates a limit angle for the fifth axis of the second 5-axis transformation with the following properties: if the path runs past the pole below this angle, the traverse passes through the pole.

In a 5-axis transformation, the two orientation axes of the tool form a coordinate system of length and width circles on a spherical surface. If orientation programming (that is the orientation vector lies in a plane) leads the path so closely past the pole that the angle defined by this MD is undershot, then there is a deviation from the defined interpolation such that the interpolation runs through the pole.

Alarm 14112 is output if this modification of the path results in a deviation greater than a tolerance defined by MD24640 $MC_TRAFO5_POLE_LIMIT_2.

MD irrelevant:

If the "5-Axis Transformation" option is not installed.

Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:

MD2.... $MC_TRAFO5_POLE_LIMIT_...

24640	TRAFO5_POLE_LIMIT_2		C07	F2,M1	
degrees	End angle tolerance for tool orientation		DOUBLE	NEW CONF	
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	7/7	U

Description: This MD designates an end angle tolerance for the fifth axis of the second 5-axis transformation with the following properties:

With the interpolation through the pole point, only the fifth axis moves, the fourth axis retains its starting position. If a motion is programmed that does not run exactly through the pole point but is to run near the pole within the area given by MD: TRAFO5_NON_POLE_LIMIT_n then there is a deviation from the defined path as the interpolation runs exactly through the pole point. This results in a deviation in the position of the end point of the fourth axis (the polar axis) from the programmed value.

This MD defines the angle by which the polar axis may deviate from the programmed value with 5-axis transformation when switching from the programmed interpolation to the interpolation through the pole point.

An error message (alarm 14112) is output if there is a greater deviation and the interpolation is not executed.

MD irrelevant:

If the "5-Axis Transformation" option is not installed.

Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:

MD24530 $MC_TRAFO5_NON_POLE_LIMIT_1

24642	TRAFO5_POLE_TOL_2			C07	-	
degrees	End angle tolerance for pole interpolation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7	U

Description: End angle tolerance for interpolation through the pole for the 2nd 5/6-axis transformation.

This MD is evaluated only by the generic 5/6-axis transformation.

If the programmed end orientation lies within the body cone and within the tolerance cone

specified by this MD, the pole axis does not move and retains its starting positions.

However, the other rotary axis moves to the programmed angle.

This results in the end orientation deviating

from the programmed orientation.

Another function of this MD is the handling of the programmmed end orientation with

non-orthogonal kinematics. As a rule, not all tool orientations can be set with

these machine kinematics.

Alarm 14112 is output if an orientation is programmed that lies outside the

settable range of the orientation cone (the programmed orientation path is not possible).

However, if the programmed orientation still lies within the range defined by MD $MC_TRAFO5_POLE_TOL,

an alarm is not output, and the programmed orientation is accepted.

However, the programmed orientation is corrected so that the orientation remains

stationary at the edge of the settable range.

The maximum active value of this MD is the value of MD TRAFO5_POLE_LIMIT_1, which is used to define the body cone.

24650	TRAFO5_BASE_TOOL_2			C07	M1,W1	
mm	Vector of base tool on activation of 5-axis transformation 2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This MD indicates the vector of the base tool which takes effect when the second transformation is activated without a length compensation being selected. Programmed length compensations have an additive effect with respect to the base tool.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24658	TRAFO5_JOINT_OFFSET_PART_2			C07	M1,W1	
mm	Vector of kinematic table offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Same as MD24558 $MC_TRAFO5_JOINT_OFFSET_PART_1, but for the second transformation.

24660	TRAFO5_JOINT_OFFSET_2			C07	W1	
mm	Vector of the kinem.offset of the 2nd 5-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data designates the vector between first and second rotary joint for the first transformation of a channel and has a specific meaning for the various machine types:

Machine type 1 (two-axis swivel head for tool) and:

Machine type 2 (two-axis rotary table for workpiece):

Vector between first and second rotary joint of tool rotary head or workpiece rotary table.

Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool):

Vector from machine reference point to joint of workpiece table.

MD irrelevant:

if the "5-Axis Transformation" option is not installed. The same applies for 3-axis and 4-axis transformations.

24661	TRAFO6_JOINT_OFFSET_2_3_2			C07	-	
mm	Vector of kinematic offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: As TRAFO6_JOINT_OFFSET_2_3_1 but for the second transformation.

24662	TRAFO5_TOOL_ROT_AX_OFFSET_2			C07	M1	
mm	Offset swivel point of 2nd 5-axis transformation (swivelled linear axis)			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: In the case of 5-axis transformation with swiveled linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 2nd transformation.

MD irrelevant for:

other 5-axis transformations

Related to:

MD24562 $MC_TRAFO5_TOOL_ROT_AX_OFFSET_1

24664	TRAFO5_NUTATOR_AX_ANGLE_2			C07	M1	
degrees	Nutating head angle			DOUBLE	NEW CONF	
-						
-	-	45.0,45.0,45.0,45.0,45.0,45.0,45.0...	-89.	89.	7/7	U

Description: Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system

MD irrelevant for:

Transformation type other than "universal milling head"

Related to:

MD24564 $MC_TRAFO5_NUTATOR_AX_ANGLE_1

24666	TRAFO5_NUTATOR_VIRT_ORIAX_2			C07	M1	
-	Virtual orientation axes			BOOLEAN	NEW CONF	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7	U

Description: The MD has the following values:

0: The axis angles of the orientation axes are machine axis angles.

1: Virtual orientation axes are defined that form a rectangular coordinate system and the axis angles are rotations around these virtual axes.

24670	TRAFO5_AXIS1_2			C07	F2,M1	
-	Direction of 1st rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: As for TRAFO5_AXIS1_1 but for the second orientation transformation of a channel.

24672	TRAFO5_AXIS2_2			C07	M1	
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: As for TRAFO5_AXIS2_1 but for the second transformation of a channel.

24673	TRAFO5_AXIS3_2			C07	-	
-	Direction of the 3rd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: As TRAFO5_AXIS3_1 but for the second orientation transformation of a channel.

24674	TRAFO5_BASE_ORIENT_2			C07	F2,M1	
-	Basic tool orientation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: As for TRAFO5_BASE_ORIENT_1 but for the second transformation of a channel.

24676	TRAFO6_BASE_ORIENT_NORMAL_2			C07	-	
-	Normal tool vector			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7	U

Description: As TRAFO6_BASE_ORIENT_NORMAL_1 but for the second orientation transformation

24680	TRAFO5_TOOL_VECTOR_2			C07	F2	
-	Direction of orientation vector			BYTE	NEW CONF	
-						
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2	M

Description: Indicates the direction of the orientation vector for the second 5-axis transformation for each channel.

0: Tool vector in x direction

1: Tool vector in y direction

2: Tool vector in z direction

24682	TRAFO5_TCARR_NO_2			C07	F2	
-	TCARR number for the 2nd 5-axis transformation			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: Same as TRAFO5_TCARR_NO_1, but for the second orientation transformation.

24685	TRAFO5_ORIAX_ASSIGN_TAB_2			C07	F2	
-	Orientation axis / channel axis assignment transformation 1			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2	M

Description: Assignment table of the orientation axes for 5-axis transformation 2

Only active with active 5-axis transformation 2.

24690	TRAFO5_ROT_OFFSET_FROM_FR_2			C01, C07	-	
-	Offset of transformation rotary axes from WO.			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: Same as TRAFO5_ROT_OFFSET_FROM_FR_1, but for the 2nd transformation of a channel

24694	TRAFO7_EXT_ROT_AX_OFFSET_2			C07	F2	
degrees	Position offset of the external rotary axes for 7-axis transformation 2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: This machine data designates the angular offset of the external rotary axis in degrees for the second 7-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

24695	TRAFO7_EXT_AXIS1_2			C07	F2	
-	Direction of the 1st external rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD indicates the vector that describes the direction of the second external rotary axis in the general 5/6-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

24700	TRAANG_ANGLE_1			C07	M1	
degrees	Angle between Cartesian axis and real (inclined) axis			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: Indicates for the first agreed TRAANG transformation of the channel the angle of the inclined axis in degrees between the 1st machine axis and the 1st basic axis while TRAANG is active. The angle is measured positively clockwise.

Related to:

MD24750 $MC_TRAANG_ANGLE_2

24710	TRAANG_BASE_TOOL_1			C07	M1	
mm	Vector of base tool for 1st TRAANG transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates a basic offset of the tools zero for the 1st TRAANG transformation. The offset is referenced to the geometry axes valid when TRAANG is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

MD24760 $MC_TRAANG_BASE_TOOL_2

24720	TRAANG_PARALLEL_VELO_RES_1			C07	M1	
-	Velocity margin for 1st TRAANG transformation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7	U

Description: Indicates the axis velocity reserve for jog, positioning and oscillating movements for each channel for the first TRAANG transformation which is held ready on the parallel axis (see MD2.... $MC_TRAFO_AXES_IN_...[1]) for the compensating movement.

Velocity reserve to be provided for jog, positioning and oscillating movements on the parallel axis to handle the compensating movement as a consequence of the inclined axis.

0.0 means that the control or the transformation itself determines the reserve according to the angle of the inclined axis and the velocity capacity of the inclined and parallel axes. - The criterion for this is that the same velocity limit has to be maintained in the direction of the parallel axis and the (virtual) axis at right-angles to it.

>0.0 means that a fixed reserve has been set (MD24720 $MC_TRAANG_PARALLEL_VELO_RES_1 * MD32000 $MA_MAX_AX_VELO of the parallel axis). The velocity capacity in the virtual axis is determined by this. The lower MD24720 $MC_TRAANG_PARALLEL_VELO_RES_1 has been set, the lower it is

Related to:

MD24771 $MC_TRAANG_PARALLEL_ACCEL_RES_2

24721	TRAANG_PARALLEL_ACCEL_RES_1			C07	M1	
-	Acceleration margin of parallel axis for the 1st TRAANG transf.			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7	U

Description: Indicates the acceleration margin for jog, positioning and oscillating movements for each channel for the first TRAANG transformation which is held ready on the parallel axis (see MD2.... $MC_TRAFO_AXES_IN_...[1]) for the compensating movement.

Related to:

MD24720 $MC_TRAANG_PARALLEL_VELO_RES_1

24750	TRAANG_ANGLE_2			C07	M1	
degrees	Angle between Cartesian axis and real (inclined) axis			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: Indicates for the second agreed TRAANG transformation of the channel the angle of the inclined axis in degrees between the 1st machine axis and the 1st basic axis while TRAANG is active. The angle is measured positively clockwise.

Related to:

MD24700 $MC_TRAANG_ANGLE_1

24760	TRAANG_BASE_TOOL_2			C07	M1	
mm	Vector of base tool for 2nd TRAANG transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates a basic offset of the tools zero for the 2nd TRAANG transformation. The offset is referenced to the geometry axes valid when TRAANG is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

MD24710 $MC_TRAANG_BASE_TOOL_1

24770	TRAANG_PARALLEL_VELO_RES_2			C07	M1	
-	Velocity margin for 2nd TRAANG transformation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7	U

Description: Indicates the axis velocity reserve for jog, positioning and oscillating movements for each channel for the second TRAANG transformation which is held ready on the parallel axis (see MD2.... $MC_TRAFO_AXES_IN_...[1]) for the compensating movement.

Related to:

MD24771 $MC_TRAANG_PARALLEL_ACCEL_RES_2

24771	TRAANG_PARALLEL_ACCEL_RES_2			C07	M1	
-	Acceler. margin of parallel axis for the 2nd TRAANG transform.			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7	U

Description: Indicates the axis acceleration margin for jog, positioning and oscillating movements which is held ready on the parallel axis (see MD2.... $MC_TRAFO_AXES_IN_...[1]) for the compensatory movement; MD setting applies to the second TRAANG transformation for each channel.

Related to:

$MC_TRAANG_PARALLEL_RES_1

24800	TRACYL_ROT_AX_OFFSET_1			C07	M1,K2	
degrees	Offset of rotary axis for the 1st TRACYL transformation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: Indicates the offset of the rotary axis for the first agreed TRACYL transformation in degrees in relation to the neutral position while TRACYL is active.

Related to:

MD24850 $MC_TRACYL_ROT_AX_OFFSET_2

24805	TRACYL_ROT_AX_FRAME_1		C07	M1	
-	Rotary axis offset TRACYL 1		BYTE	NEW CONF	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7	U

Description: 0: axial rotary axis offset is not considered.

1: axial rotary axis offset is considered.

2: axial rotary axis offset is considered until SZS.

SZS frames include transformed axial rotary axis offsets.

24808	TRACYL_DEFAULT_MODE_1			C07	M1	
-	TRACYL mode selection			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/7	U

Description: Default setting of TRACYL type 514:

0: without groove side offset (i.e. TRACYL type 514 - equals 512)

1: with groove side offset (i.e. TRACYL type 514 - equals 513)

MD2.... $MC_TRAFO_TYPE_... = 514 can be used to decide, via the selection parameters, whether calculation is made with or without groove side offset. The parameter defines the variable to be selected if no selection is made in the call parameters.

If MD24808 $MC_TRACYL_DEFAULT_MODE_1 = 1, it is sufficient to program TRACYL(30) in the part program instead of TRACYL(30,1,1).

24810	TRACYL_ROT_SIGN_IS_PLUS_1			C07	M1	
-	Sign of rotary axis for 1st TRACYL transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: Indicates the sign with which the rotary axis is taken into account in the TRACYL transformation for the first agreed TRACYL transformation.

Related to:

MD24860 $MC_TRACYL_ROT_SIGN_IS_PLUS_2

24820	TRACYL_BASE_TOOL_1			C07	M1	
mm	Vector of base tool for 1st TRACYL transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates a basic offset of the tools zero for the 1st TRACYL transformation. The offset is referenced to the geometry axes valid when TRACYL is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

MD24870 $MC_TRACYL_BASE_TOOL_2

24850	TRACYL_ROT_AX_OFFSET_2			C07	M1	
degrees	Offset of rotary axis for the 2nd TRACYL transformation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: Indicates the offset of the rotary axis in degrees in relation to the neutral position for the 2nd agreed TRACYL transformation for each channel.

MD irrelevant:

If no TRACYL is active

Related to:

MD24800 $MC_TRACYL_ROT_AX_OFFSET_1

24855	TRACYL_ROT_AX_FRAME_2			C07	M1,K2	
-	Rotary axis offset TRACYL 2			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7	U

Description: 0: axial rotary axis offset is not considered.

1: axial rotary axis offset is considered.

2: axial rotary axis offset is considered until SZS.

SZS frames include transformed axial rotary axis offsets.

24858	TRACYL_DEFAULT_MODE_2			C07	M1	
-	TRACYL mode selection			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/7	U

Description: Default setting of TRACYL type 514 for the 2nd TRACYL:

0: without groove side offset (i.e. TRACYL type 514 - equals 512)

1: with groove side offset (i.e. TRACYL type 514 - equals 513)

MD2.... $MC_TRAFO_TYPE_... = 514 can be used to decide, via the selection parameters, whether calculation is made with or without groove side offset. The parameter defines the variable to be selected if no selection is made in the call parameters.

If MD24858 $MC_TRACYL_DEFAULT_MODE_2 = 1, it is sufficient to program TRACYL(30,2) in the part program instead of TRACYL(30,2,1).

24860	TRACYL_ROT_SIGN_IS_PLUS_2			C07	-	
-	Sign of rotary axis for 2nd TRACYL transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: Indicates the sign with which the rotary axis is taken into account in the TRACYL transformation for the 2nd agreed TRACYL transformation for each channel.

Related to:

MD24810 $MC_TRACYL_ROT_SIGN_IS_PLUS_1

24870	TRACYL_BASE_TOOL_2			C07	M1	
mm	Vector of base tool for 2nd TRACYL transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates a basic offset of the tools zero for the 2ndTRACYL transformation. The offset is referenced to the geometry axes valid when TRACYL is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

MD24820 $MC_TRACYL_BASE_TOOL_1

24900	TRANSMIT_ROT_AX_OFFSET_1			C07	M1	
degrees	Offset of rotary axis for the 1st TRANSMIT transformation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: Indicates the offset of the rotary axis for the first agreed TRANSMIT transformation in degrees in relation to the neutral position while TRANSMIT is active.

Related to:

MD24950 $MC_TRANSMIT_ROT_AX_OFFSET_2

24905	TRANSMIT_ROT_AX_FRAME_1			C07	M1,K2	
-	Rotary axis offset TRANSMIT 1			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7	U

Description:

0: axial rotary axis offset is not considered.

1: axial rotary axis offset is considered.

2: axial rotary axis offset is considered until SZS.

SZS frames include transformed rotations around the rotary axis.

24910	TRANSMIT_ROT_SIGN_IS_PLUS_1			C07	M1	
-	Sign of rotary axis for 1st TRANSMIT transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: Indicates the sign with which the rotary axis is taken into account in the TRANSMIT transformation for the first agreed TRANSMIT transformation for each channel.

Related to:

MD24960 $MC_TRANSMIT_ROT_SIGN_IS_PLUS_2

24911	TRANSMIT_POLE_SIDE_FIX_1			C07	M1	
-	Restriction of working range in front of / behind the pole, 1. TRANSMIT			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7	U

Description: Restriction of the working area in front of/behind pole or no restriction, i.e. traversal through the pole.

The assigned values have the following meanings:

1: Working area of linear axis for positions >=0, (if tool length compensation parallel to linear axis equals 0)

2: Working area of linear axis for positions <=0, (if tool length compensation parallel to linear axis equals 0)

0: No restriction of working area. Traversal through pole.

24920	TRANSMIT_BASE_TOOL_1			C07	M1	
mm	Vector of base tool for 1st TRANSMIT transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates a basic offset of the tools zero for the 1st TRANSMIT transformation. The offset is referenced to the geometry axes valid when TRANSMIT is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

MD24970 $MC_TRANSMIT_BASE_TOOL_2

24950	TRANSMIT_ROT_AX_OFFSET_2			C07	M1	
degrees	Offset of rotary axis for the 2nd TRANSMIT transformation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: Indicates the offset of the rotary axis for the second agreed TRANSMIT transformation in degrees in relation to the neutral position while TRANSMIT is active.

Related to:

MD24900 $MC_TRANSMIT_ROT_AX_OFFSET_1

24955	TRANSMIT_ROT_AX_FRAME_2			C07	M1	
-	Rotary axis offset TRANSMIT 2			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7	U

Description:

0: axial rotary axis offset is not considered.

1: axial rotary axis offset is considered.

2: axial rotary axis offset is considered until SZS. SZS frames include transformed rotations around the rotary axis.

24960	TRANSMIT_ROT_SIGN_IS_PLUS_2			C07	M1	
-	Sign of rotary axis for 2nd TRANSMIT transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: Indicates the sign with which the rotary axis is taken into account in the TRANSMIT transformation for the second agreed TRANSMIT transformation for each channel.

Related to:

MD24910 $MC_TRANSMIT_ROT_SIGN_IS_PLUS_1

24961	TRANSMIT_POLE_SIDE_FIX_2			C07	M1	
-	Restriction of working range before/behind the pole, 2. TRANSMIT			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7	U

Description: Restriction of working area in front of/behind pole or no restriction, i.e. traversal through pole.

The assigned values have the following meanings:

1: Working area of linear axis for positions >=0,
(if tool length compensation parallel to linear axis equals 0)

2: Working area of linear axis for positions <=0,
(if tool length compensation parallel to linear axis equals 0)

0: No restriction of working area. Traversal through pole.

24970	TRANSMIT_BASE_TOOL_2			C07	M1	
mm	Vector of base tool for 2nd TRANSMIT transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates a basic offset of the tools zero for the 2nd TRANSMIT transformation. The offset is referenced to the geometry axes valid when TRANSMIT is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool.

The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes.

Related to:

MD24920 $MC_TRANSMIT_BASE_TOOL_1

24995	TRACON_CHAIN_1			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0, 0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7	U

Description: Transformation chain of the first concatenated transformation.

In the table, the numbers of the transformations which are to be concatenated are given in the order in which the transformation has to be executed from BCS into MCS.

Example:

A machine can be operated optionally either as a 5-axis machine or as a transmit machine. A linear axis is not arranged at a right-angles to the other linear axes (inclined axis).

5 transformations must be set via the machine data, e.g.

TRAFO_TYPE_1 = 16 (5-axis transformation)

TRAFO_TYPE_2 = 256 (Transmit)

TRAFO_TYPE_3 = 1024 (Inclined axis)

TRAFO_TYPE_4 = 8192 (Concatenated transformation)

TRAFO_TYPE_5 = 8192 (Concatenated transformation)

If the 4th transformation concatenates the 5-axis transformation / inclined axis and the 5th transformation concatenates the transmit / inclined axis, then (1, 3, 0, 0) is entered in the first table TRACON_CHAIN_1, and (2, 3, 0, 0) in the table TRACON_CHAIN_2. The entry 0 means no transformation.

The order in which the transformations are assigned (TRAFO_TYPE_1 to TRAFO_TYPE_20) is arbitrary. The linked transformations do not have to be the last. However, they must always stand behind all the transformations which occur in a transformation chain. In the previous example, this means that, e.g. the third and fourth transformations must not be switched.

However, it would be possible to define a further, sixth transformation, if this does not go into a linked transformation.

Transformations cannot be linked with one another at will.

The following limitations apply in SW version 5:

The first transformation in the chain must be an orientation transformation (3- , 4- , 5-axis transformation, nutator) transmit or peripheral curve transformation. The second transformation must be an inclined axis transformation.

No more than two transformations may be linked.

24996	TRACON_CHAIN_2			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7	U

Description: Transformation chain of the first concatenated transformation.

In the table, the numbers of the transformations which are to be concatenated are given in the order in which the transformation has to be executed from BCS into MCS.

Example:

A machine can be operated optionally either as a 5-axis machine or as a transmit machine. A linear axis is not arranged at a right-angles to the other linear axes (inclined axis).

Transformation chain of the second concatenated transformation.

Example: 5 transformations must be set via the machine data

```
TRAFO_TYPE_1 =   16        (5-axis transformation)
TRAFO_TYPE_2 =  256        (Transmit)
TRAFO_TYPE_3 = 1024       (Inclined axis)
TRAFO_TYPE_4 = 8192       (Concatenated transformation)
TRAFO_TYPE_5 = 8192       (Concatenated transformation)
```

If the 4th transformation concatenates the 5-axis transformation / inclined axis and the 5th transformation concatenates the transmit / inclined axis, then (1, 3, 0, 0) is entered in the first table TRACON_CHAIN_1, and (2, 3, 0, 0) in the table TRACON_CHAIN_2. The entry 0 means no transformation.

The order in which the transformations are assigned (TRAFO_TYPE_1 to TRAFO_TYPE_20) is arbitrary. The cocatenated transformations do not have to be the last. However, they must always follow all the transformations which occur in a transformation chain. In the previous example, this means that, e.g. the third and fourth transformations must not be switched.

However, it would be possible to define a further, sixth transformation, if this does not go into a concatenated transformation.

Transformations cannot be concatenated with one another at will.

The following limitations apply in SW version 5:

The first transformation in the chain must be an orientation transformation (3- , 4- , 5-axis transformation, nutator) transmit or peripheral curve transformation.

The second transformation must be an inclined axis transformation.

No more than two transformations may be concatenated.

24997	TRACON_CHAIN_3			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7	U

Description: Transformation chain of the third concatenated transformation.

See TRACON_CHAIN_1 for documentation.

24998	TRACON_CHAIN_4			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7	U

Description: Transformation chain of the fourth concatenated transformation.
See TRACON_CHAIN_1 for documentation.

25100	TRAFO_TYPE_11			C07	F2	
-	Definition of the 11th transformation in the channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 11th transformation in the channel.
Other than that it has the same meaning as TRAFO_TYPE_1.

25102	TRAFO_AXES_IN_11			C07	F2	
-	Axis assignment for transformation 11			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 11th transformation.
See TRAFO_AXES_IN_1 for explanation.

25104	TRAFO_GEOAX_ASSIGN_TAB_11			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 11			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 11.
Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25106	TRAFO_INCLUDES_TOOL_11			C07	M1,F2	
-	Tool handling with 11th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 11th transformation or externally.
Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25110	TRAFO_TYPE_12			C07	F2	
-	Definition of transformation 12 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 12th transformation in the channel.
Other than that it has the same meaning as TRAFO_TYPE_1.

25112	TRAFO_AXES_IN_12			C07	F2	
-	Axis assignment for transformation 12			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 12th transformation.
See TRAFO_AXES_IN_1 for explanation.

25114	TRAFO_GEOAX_ASSIGN_TAB_12			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 12			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 12.
Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25116	TRAFO_INCLUDES_TOOL_12			C07	M1,F2	
-	Tool handling with 12th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 12th transformation or externally.
Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25120	TRAFO_TYPE_13			C07	F2	
-	Definition of transformation 13 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 13th transformation in the channel.
Other than that it has the same meaning as TRAFO_TYPE_1.

25122	TRAFO_AXES_IN_13			C07	F2	
-	Axis assignment for transformation 13			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 13th transformation.
See TRAFO_AXES_IN_1 for explanation.

25124	TRAFO_GEOAX_ASSIGN_TAB_13			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 13			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 13.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25126	TRAFO_INCLUDES_TOOL_13			C07	M1,F2	
-	Tool handling with 13th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 13th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25130	TRAFO_TYPE_14			C07	F2	
-	Definition of transformation 14 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 14th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25132	TRAFO_AXES_IN_14			C07	F2	
-	Axis assignment for transformation 14			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 14th transformation.

See TRAFO_AXES_IN_1 for explanation.

25134	TRAFO_GEOAX_ASSIGN_TAB_14			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 14			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 14.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25136	TRAFO_INCLUDES_TOOL_14			C07	M1,F2	
-	Tool handling with 14th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 14th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25140	TRAFO_TYPE_15			C07	F2	
-	Definition of transformation 15 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 15th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25142	TRAFO_AXES_IN_15			C07	F2	
-	Axis assignment for transformation 15			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 15th transformation.

See TRAFO_AXES_IN_1 for explanation.

25144	TRAFO_GEOAX_ASSIGN_TAB_15			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 15			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 15.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25146	TRAFO_INCLUDES_TOOL_15			C07	M1,F2	
-	Tool handling with 15th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 15th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25150	TRAFO_TYPE_16			C07	F2	
-	Definition of transformation 16 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 16th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25152	TRAFO_AXES_IN_16			C07	F2	
-	Axis assignment for transformation 16			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 16th transformation.

See TRAFO_AXES_IN_1 for explanation.

25154	TRAFO_GEOAX_ASSIGN_TAB_16			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 16			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 16.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25156	TRAFO_INCLUDES_TOOL_16			C07	M1,F2	
-	Tool handling with 16th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 16th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25160	TRAFO_TYPE_17			C07	F2	
-	Definition of transformation 17 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 17th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25162	TRAFO_AXES_IN_17			C07	F2	
-	Axis assignment for transformation 17			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 17th transformation.

See TRAFO_AXES_IN_1 for explanation.

25164	TRAFO_GEOAX_ASSIGN_TAB_17			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 17			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 17.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25166	TRAFO_INCLUDES_TOOL_17			C07	M1,F2	
-	Tool handling with 17th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 17th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25170	TRAFO_TYPE_18			C07	F2	
-	Definition of transformation 18 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 18th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25172	TRAFO_AXES_IN_18			C07	F2	
-	Axis assignment for transformation 18			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 18th transformation.

See TRAFO_AXES_IN_1 for explanation.

25174	TRAFO_GEOAX_ASSIGN_TAB_18			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 18			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 18.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25176	TRAFO_INCLUDES_TOOL_18			C07	M1,F2	
-	Tool handling with 18th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 18th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25180	TRAFO_TYPE_19			C07	F2	
-	Definition of transformation 19 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 19th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25182	TRAFO_AXES_IN_19			C07	F2	
-	Axis assignment for transformation 19			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 19th transformation.

See TRAFO_AXES_IN_1 for explanation.

25184	TRAFO_GEOAX_ASSIGN_TAB_19			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 19			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 19.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25186	TRAFO_INCLUDES_TOOL_19			C07	M1,F2	
-	Tool handling with 19th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 19th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25190	TRAFO_TYPE_20			C07	F2	
-	Definition of transformation 20 in channel			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This MD defines for each channel, which transformation is available as 20th transformation in the channel.

Other than that it has the same meaning as TRAFO_TYPE_1.

25192	TRAFO_AXES_IN_20			C07	F2	
-	Axis assignment for transformation 20			BYTE	NEW CONF	
-						
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7	U

Description: Axis assignment at the input of the 20th transformation.

See TRAFO_AXES_IN_1 for explanation.

25194	TRAFO_GEOAX_ASSIGN_TAB_20			C07	F2	
-	Assignment of geometry axes to channel axes for transformation 20			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7	U

Description: This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 20.

Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.

25196	TRAFO_INCLUDES_TOOL_20			C07	M1,F2	
-	Tool handling with 20th active transformation			BOOLEAN	NEW CONF	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: This MD defines for each channel, whether the tool is treated in the 20th transformation or externally.

Other than that it has the same meaning as TRAFO_INCLUDES_TOOL_1.

25200	TRAFO5_PART_OFFSET_3			C07	F2	
mm	Offset vector of 5-axis transformation 3			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data designates an offset of the workpiece holder for the 3rd 5-axis transformation of a channel and has a special meaning for each of the various machine types:

Other than that it has the same meaning as TRAFO5_PART_OFFSET_1.

25210	TRAFO5_ROT_AX_OFFSET_3			C07	F2	
degrees	Position offset of rotary axes 1/2/3 for 5-axis transformation 3			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: This machine data designates the angular offset of the first or second rotary axis in degrees for the 3rd 5-axis transformation of a channel.

Other than that it has the same meaning as TRAFO5_ROT_AX_OFFSET_1.

25220	TRAFO5_ROT_SIGN_IS_PLUS_3			C07	F2	
-	Sign of rotary axis 1/2/3 for 5-axis transformation 3			BOOLEAN	NEW CONF	
-						
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7	U

Description: This machine data designates the sign with which the two rotary axes enter the 3rd 5-axis transformation of a channel.

Other than that it has the same meaning as TRAFO5_ROT_SIGN_IS_PLUS_1.

25230	TRAFO5_NON_POLE_LIMIT_3			C07	F2	
degrees	Definition of pole range for 5-axis transformation 3			DOUBLE	NEW CONF	
-						
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7	U

Description: This machine data designates a limit angle for the fifth axis of the 3rd 5-axis transformation.

Other than that it has the same meaning as TRAFO5_NON_POLE_LIMIT_1.

25240	TRAFO5_POLE_LIMIT_3			C07	F2	
degrees	End angle tolerance with interpolation through pole for 5-axis transf.			DOUBLE	NEW CONF	
-						
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7	U

Description: This machine data designates an end angle tolerance for the fifth axis of the 3rd 5-axis transformation with the following properties:

Other than that it has the same meaning as TRAFO5_POLE_LIMIT_1.

25242	TRAFO5_POLE_TOL_3			C07	-	
degrees	End angle tolerance for tool orientation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7	U

Description: End angle tolerance for interpolation through the pole for 5/6-axis transformation 3.

Other than that it has the same meaning as TRAFO5_POLE_TOL_1.

25250	TRAFO5_BASE_TOOL_3			C07	F2	
mm	Vector of base tool on activation of 5-axis transformation 3			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This MD indicates the vector of the base tool which takes effect when the third transformation is activated without a length compensation being selected. Programmed length compensations have an additive effect with respect to the base tool.

MD irrelevant:

if the "5-axis transformation" option is not installed.

25258	TRAFO5_JOINT_OFFSET_PART_3			C07	F2	
mm	Vector of kinematic table offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data is only evaluated in generic 5-axis tranformations with rotatable workpiece and rotatable tool (TRAFO_TYPE = 56, mixed kinematics).

Other than that it has the same meaning as TRAFO5_JOINT_OFFSET_PART_1.

25260	TRAFO5_JOINT_OFFSET_3			C07	F2	
mm	Vector of the kinem.offset of the 3rd 5-axis transf. in channel			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data designates the vector from the first to the second rotary joint for the 3rd transformation of a channel.

Other than that it has the same meaning as TRAFO5_JOINT_OFFSET_1.

25261	TRAFO6_JOINT_OFFSET_2_3_3			C07	-	
mm	Vector of kinematic offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 3rd transformation of each channel.

25262	TRAFO5_TOOL_ROT_AX_OFFSET_3			C07	F2	
mm	Offset of swivel point of the rotary axis on the 3rd 5-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: In the case of 5-axis transformation with swiveling linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 3rd transformation.

Other than that it has the same meaning as >TRAFO5_TOOL_ROT_AX_OFFSET_1.

25264	TRAFO5_NUTATOR_AX_ANGLE_3			C07	F2	
degrees	Nutating head angle in 5-axis transformation			DOUBLE	NEW CONF	
-						
-	-	45.0,45.0,45.0,45.0,45.0,45.0,45.0...	-89.	89.	7/7	U

Description: Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system

Other than that it has the same meaning as TRAFO5_NUTATOR_AX_ANGLE_1.

25266	TRAFO5_NUTATOR_VIRT_ORIAX_3			C07	-	
-	Virtual orientation axes			BOOLEAN	NEW CONF	
-						
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7	U

Description: it has the same meaning as TRAFO5_NUTATOR_VIRT_ORIAX_1.

25270	TRAFO5_AXIS1_3			C07	F2	
-	Direction of 1st rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD designates the vector that describes the direction of the first rotary axis with the general 5-axis transformation (TRAFO_TYPE_* = 24).

Other than that it has the same meaning as TRAFO5_AXIS1_1.

25272	TRAFO5_AXIS2_3			C07	F2	
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD designates the vector that describes the direction of the second rotary axis with the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56).

Other than that it has the same meaning as TRAFO5_AXIS2_1.

25273	TRAFO5_AXIS3_3			C07	-	
-	Direction of the 3rd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD designates the vector that describes the direction of the third rotary axis with the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO5_AXIS3_1.

25274	TRAFO5_BASE_ORIENT_3			C07	-	
-	Vector of the tool base orientation for 5-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates the vector of the tool orientation in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56) if this is not defined on the transformation call or not read from a programmed tool.

Other than that it has the same meaning as TRAFO5_BASE_ORIENT_1.

25276	TRAFO6_BASE_ORIENT_NORMAL_3			C07	-	
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7	U

Description: Indicates the vector that stands vertically on the tool orientation (TRAFO5_BASE_ORIENTATION_1) in general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO6_BASE_ORIENT_NORMAL_1.

25280	TRAFO5_TOOL_VECTOR_3			C07	F2	
-	Direction of orientation vector for the first 5-axis transf.			BYTE	NEW CONF	
-						
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2	M

Description: Indicates the direction of the orientation vector for the first 5-axis transformation for each channel.

Other than that it has the same meaning as TRAFO5_TOOL_VECTOR_1.1.

25282	TRAFO5_TCARR_NO_3			C07	-	
-	TCARR number for the 3rd 5-axis transformation			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: It has the same meaning as TRAFO5_TCARR_NO_1.

25285	TRAFO5_ORIAX_ASSIGN_TAB_3			C07	F2	
-	Orientation axis / channel axis assignment transformation 3			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2	M

Description: Assignment table of the orientation axes for 5-axis transformation 3

Other than that it has the same meaning as TRAFO5_ORIAX_ASSIGN_TAB_1.

25290	TRAFO5_ROT_OFFSET_FROM_FR_3			C01, C07	-	
-	Offset of transformation rotary axes from WO.			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: It has the same meaning as TRAFO5_ROT_OFFSET_FROM_FR_1.

25294	TRAFO7_EXT_ROT_AX_OFFSET_3			C07	F2	
degrees	Position offset of the external rotary axes for 7-axis transformation 3			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: This machine data designates the angular offset of the external rotary axis in degrees for the third 7-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

25295	TRAFO7_EXT_AXIS1_3			C07	F2	
-	Direction of the 1st external rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD indicates the vector that describes the direction of the first external rotary axis in the third general 5/6-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

25300	TRAFO5_PART_OFFSET_4			C07	F2	
mm	Offset vector of 5-axis transformation 4			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data designates an offset of the workpiece holder for the 4th 5-axis transformation of a channel and has a special meaning for each of the various machine types:

Other than that it has the same meaning as TRAFO5_PART_OFFSET_1.

25310	TRAFO5_ROT_AX_OFFSET_4			C07	F2	
degrees	Position offset of rotary axes 1/2/3 for 5-axis transformation 4			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: This machine data designates the angular offset of the first or second rotary axis in degrees for the 4th 5-axis transformation of a channel.

Other than that it has the same meaning as TRAFO5_ROT_AX_OFFSET_1.

25320	TRAFO5_ROT_SIGN_IS_PLUS_4			C07	F2	
-	Sign of rotary axis 1/2/3 for 5-axis transformation 4			BOOLEAN	NEW CONF	
-						
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7	U

Description: This machine data designates the sign with which the two rotary axes enter the 4th 5-axis transformation of a channel.

Other than that it has the same meaning as TRAFO5_ROT_SIGN_IS_PLUS_1.

25330	TRAFO5_NON_POLE_LIMIT_4			C07	F2	
degrees	Definition of pole range for 5-axis transformation 4			DOUBLE	NEW CONF	
-						
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7	U

Description: This machine data designates a limit angle for the fifth axis of the 4th 5-axis transformation.

Other than that it has the same meaning as TRAFO5_NON_POLE_LIMIT_1.

25340	TRAFO5_POLE_LIMIT_4			C07	F2	
degrees	End angle tolerance with interpolation through pole for 5-axis transf.			DOUBLE	NEW CONF	
-						
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7	U

Description: This machine data designates an end angle tolerance for the fifth axis of the 4th 5-axis transformation with the following proper-ties:

Other than that it has the same meaning as TRAFO5_POLE_LIMIT_1.

25342	TRAFO5_POLE_TOL_4			C07	-	
degrees	End angle tolerance for tool orientation			DOUBLE	NEW CONF	
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7	U

Description: End angle tolerance for interpolation through the pole for 5/6-axis transformation 4.

Other than that it has the same meaning as TRAFO5_POLE_TOL_1.

25350	TRAFO5_BASE_TOOL_4			C07	F2	
mm	Vector of base tool on activation of 5-axis transformation 4			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This MD indicates the vector of the base tool which takes effect when the first transformation is activated without a length com-pensation being selected. Programmed length compensations have an additive effect with respect to the base tool.

MD irrelevant:

if the "5-axis transformation" option is not installed.

25358	TRAFO5_JOINT_OFFSET_PART_4			C07	F2	
mm	Vector of kinematic table offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data is only evaluated in generic 5-axis tranformations with rotatable workpiece and rotatable tool (TRAFO_TYPE = 56, mixed kinematics).

Other than that it has the same meaning as TRAFO5_JOINT_OFFSET_PART_1.

25360	TRAFO5_JOINT_OFFSET_4			C07	F2	
mm	Vector of the kinem.offset of the 4th 5-axis transf. in channel			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: This machine data designates the vector from the first to the second rotary joint for the 4th transformation of a channel.

Other than that it has the same meaning as TRAFO5_JOINT_OFFSET_1.

25361	TRAFO6_JOINT_OFFSET_2_3_4			C07	-	
mm	Vector of kinematic offset			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 4th transformation of each channel.

25362	TRAFO5_TOOL_ROT_AX_OFFSET_4			C07	F2	
mm	Offset of swivel point of the rotary axis on the 4th 5-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: In the case of a 5-axis transformation with a swiveling linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 4th transformation.

Other than that it has the same meaning as >TRAFO5_TOOL_ROT_AX_OFFSET_1.

25364	TRAFO5_NUTATOR_AX_ANGLE_4			C07	F2	
degrees	Nutating head angle in 5-axis transformation			DOUBLE	NEW CONF	
-						
-	-	45.0,45.0,45.0,45.0,45.0,45.0,45.0...	-89.	89.	7/7	U

Description: Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system

Other than that it has the same meaning as TRAFO5_NUTATOR_AX_ANGLE_1.

25366	TRAFO5_NUTATOR_VIRT_ORIAX_4			C07	-	
-	Virtual orientation axes			BOOLEAN	NEW CONF	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: it has the same meaning as TRAFO5_NUTATOR_VIRT_ORIAX_1.

25370	TRAFO5_AXIS1_4			C07	F2	
-	Direction of 1st rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD designates the vector that describes the direction of the first rotary axis with the general 5-axis transformation (TRAFO_TYPE_* = 24).

Other than that it has the same meaning as TRAFO5_AXIS1_1.

25372	TRAFO5_AXIS2_4			C07	F2	
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD designates the vector that describes the direction of the second rotary axis with the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56).

Other than that it has the same meaning as TRAFO5_AXIS2_1.

25373	TRAFO5_AXIS3_4			C07	-	
-	Direction of the 3rd rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD designates the vector that describes the direction of the third rotary axis with the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO5_AXIS3_1.

25374	TRAFO5_BASE_ORIENT_4			C07	-	
-	Vector of the tool base orientation for 5-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: Indicates the vector of the tool orientation in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56) if this is not defined on the transformation call or not read from a programmed tool.

Other than that it has the same meaning as TRAFO5_BASE_ORIENT_1.

25376	TRAFO6_BASE_ORIENT_NORMAL_4			C07	-	
-	Normal tool vector in 6-axis transformation			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7	U

Description: Indicates the vector that stands vertically on the tool orientation (TRAFO5_BASE_ORIENTATION_1) in general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57).

Other than that it has the same meaning as TRAFO6_BASE_ORIENT_NORMAL_1.

25380	TRAFO5_TOOL_VECTOR_4			C07	F2	
-	Direction of orientation vector for the first 5-axis transf.			BYTE	NEW CONF	
-						
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2	M

Description: Indicates the direction of the orientation vector for the first 5-axis transformation for each channel.

Other than that it has the same meaning as TRAFO5_TOOL_VECTOR_1.1.

25382	TRAFO5_TCARR_NO_4			C07	-	
-	TCARR number for the 4th 5-axis transformation			DWORD	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: It has the same meaning as TRAFO5_TCARR_NO_1.

25385	TRAFO5_ORIAX_ASSIGN_TAB_4			C07	F2	
-	Orientation axis / channel axis assignment transformation 4			BYTE	NEW CONF	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2	M

Description: Assignment table of the orientation axes for 5-axis transformation 4

Other than that it has the same meaning as TRAFO5_ORIAX_ASSIGN_TAB_1.

25390	TRAFO5_ROT_OFFSET_FROM_FR_4			C01, C07	-	
-	Offset of transformation rotary axes from WO.			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: It has the same meaning as TRAFO5_ROT_OFFSET_FROM_FR_1.

25394	TRAFO7_EXT_ROT_AX_OFFSET_4			C07	F2	
degrees	Position offset of the external rotary axes for 7-axis transformation 4			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: This machine data designates the angular offset of the external rotary axis in degrees for the fourth 7-axis transformation of a channel.

MD irrelevant:

if the "5-Axis Transformation" option is not installed.

25395	TRAFO7_EXT_AXIS1_4			C07	F2	
-	Direction of the 1st external rotary axis			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7	U

Description: The MD indicates the vector that describes the direction of the first external rotary axis in the fourth general 5/6-axis transformation (TRAFO_TYPE_* = 24).

The vector can have any magnitude.

Example:

Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y).

Valid for the first transformation of a channel.

25495	TRACON_CHAIN_5			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7	U

Description: Transformation chain of the 5th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25496	TRACON_CHAIN_6			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7	U

Description: Transformation chain of the 6th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25497	TRACON_CHAIN_7			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7	U

Description: Transformation chain of the 7th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

25498	TRACON_CHAIN_8			C07	M1	
-	Transformation grouping			DWORD	NEW CONF	
-						
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	20	7/7	U

Description: Transformation chain of the 8th concatenated transformation.

See TRACON_CHAIN_1 for documentation.

1.4.5 Punching and nibbling

26000	PUNCHNIB_ASSIGN_FASTIN			C01, C09	N4	
-	Hardware assignment for input byte for stroke control			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: Assignment of the high-speed input byte for "punching and nibbling"

Bit 0-7: Number of the input byte used

Bit 8-15: Free

Bit 16-23: Inversion mask for writing the hardware byte

Bit 24-31: Free

This data defines which input byte is to be used for the signal "travel active".

= 1:

On-board inputs (4 high-speed NCK outputs) are used.

2, 3, 4, 5

The external digital NCK inputs are used

128-129:

Comparator byte (results from high-speed analog inputs or VDI specification)

Related to:

MD26006 $MC_NIBBLE_PUNCH_INMASK[n]

References:

/FB/, A4, Digital and Analog NCK I/Os

The signal is high active as default from software 3.2. That is there is wire break monitoring. If the signal is low active then, e.g., the MD must be set to the value MD ="H 0001 0001" for the outboard inputs.

26002	PUNCHNIB_ASSIGN_FASTOUT		C01, C09	N4	
-	Hardware assignment for output byte for stroke control		DWORD	PowerOn	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: This data defines which output byte is to be used for the stroke control.

Number of the high-speed output byte for "punching and nibbling"

Bit 0-7: Number of the output byte used

Bit 8-15: Free

Bit 16-23: Inversion mask for writing the hardware byte

Bit 24-31: Free

Possible inputs:

1:

840D on-board outputs (4 high-speed + 4 bits via VDI specification)

2, 3, 4, 5

External digital outputs (high-speed NCK O/I or VDI specification)

Related to:

MD26004 $MC_NIBBLE_PUNCH_OUTMASK[n]

References:

/FB/, A4, Digital and Analog NCK I/Os

26004	NIBBLE_PUNCH_OUTMASK			C01, C09	N4	
-	Mask for fast output bits			BYTE	PowerOn	
-						
-	8	1, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	M

Description: Mask for high-speed output bits for punching and nibbling.

Byte 1: Contains the bit for stroke release

Bytes 2-8: Currently free

Special cases:

Only NIBBLE_PUNCH_OUTMASK[0] is significant.

This is used to define the output bit for the signal "Release stroke".

Related to:

MD26002 $MC_PUNCHNIB_ASSIGN_FASTOUT

26006	NIBBLE_PUNCH_INMASK			C01, C09	N4	
-	Mask for fast input bits			BYTE	PowerOn	
-						
-	8	1, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	M

Description:

This data can define up to 8 byte masks for the output of the high-speed bits.

The standard assignment of this data is as follows:

NIBBLE_PUNCH_INMASK[0]=1:

2° = first bit for the first punch interface (SPIF1)

NIBBLE_PUNCH_INMASK[1]=4:

Second punch interface (SPIF2), not available as standard

NIBBLE_PUNCH_INMASK[2]=0

...

NIBBLE_PUNCH_INMASK[7]=0

Note:

-

Special cases:

Only NIBBLE_PUNCH_INMASK[0] is relevant. This is used to define the input bit for the signal "Stroke active".

Related to:

MD26000 $MC_PUNCHNIB_ASSIGN_FASTIN

26008	NIBBLE_PUNCH_CODE			C09	H2,K1	
-	Definition of M functions			DWORD	PowerOn	
-						
-	8	0,23,22, 25, 26, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2	M

Description:

```
This data defines the special M functions for punching and nib-
bling.
                                Standard value              Example
NIBBLE_PUNCH_CODE[0] =  0        20        End punching, nibbling
with M20
NIBBLE_PUNCH_CODE[1] = 23        23        End punching, nibbling
with M23
NIBBLE_PUNCH_CODE[2] = 22        22        Start nibbling
NIBBLE_PUNCH_CODE[3] = 25        25        Start punching
NIBBLE_PUNCH_CODE[4] = 26        26        Activate dwell time
NIBBLE_PUNCH_CODE[5] =122       122       Start nibbling with pre-
tension,
                                          stroke control at servo
level
NIBBLE_PUNCH_CODE[6] =125       125       Start punching with pre-
tension,
                                          stroke control at servo
level
NIBBLE_PUNCH_CODE[7] =  0         0        Not used
                                             (in preparation)
```

Special cases:

If MD26012 $MC_PUNCHNIB_ACTIVATION = 2 (M functions are interpreted directly by the software), then MD26008 $MC_NIBBLE_PUNCH_CODE[0] =20 has to be set.

Related to:

MD26012 $MC_PUNCHNIB_ACTIVATION

26010	PUNCHNIB_AXIS_MASK			C09	N4	
-	Definition of punching and nibbling axes			DWORD	PowerOn	
-						
-	-	7,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: Defines the axes involved in punching and nibbling. That is all the axes defined here must be at rest during punching and nibbling.

Related to:

MD26016 $MC_PUNCH_PARTITION_TYPE

26012	PUNCHNIB_ACTIVATION		C09	K1	
-	Activation of punching and nibbling functions		DWORD	PowerOn	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: This MD defines the ways in which punching and nibbling functions can be activated:

PUNCHNIB_ACTIVATION = 0

None of the punching or nibbling functions can be activated. The automatic path segmentation is the only exception - if it is enabled via MD26014 $MC_PUNCH_PATH_SPLITTING.

PUNCHNIB_ACTIVATION = 1

The functions are activated via language commands. If M functions are to be used, then they must be programmed using macros.

PUNCHNIB_ACTIVATION = 2

The M functions are interpreted directly by the software. Language commands can still be used.

Note:

This option is intended only as a temporary solution.

Related to:

MD26014 $MC_PUNCH_PATH_SPLITTING

MD26008 $MC_NIBBLE_PUNCH_CODE[n]

26014	PUNCH_PATH_SPLITTING			C09	N4	
-	Activation of automatic path segmentation			DWORD	PowerOn	
-						
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	-	-	7/2	M

Description: Activation data for automatic path segmentation.

Value Significance

-

0 =

Automatic path segmentation only active with punching and nibbling.

1 =

Automatic path segmentation can also be activated without punching and nibbling functions;

that is, it is programmable and be used NC internally

2 =

Automatic path segmentation can only be used NC internally;

that is it cannot be programmed.

26016	PUNCH_PARTITION_TYPE			C09	N4	
-	Behavior of individual axes with automatic path segmentation			DWORD	PowerOn	
-						
-	-	1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: This machine data defines how single axes that are also nibbling axes within the meaning of MD26010 $MC_PUNCHNIB_AXIS_MASK are to behave.

In this case, there are the following options for the behavior of the single axes during automatic path segmentation and stroke control:

PUNCH_PARTITION_TYPE = 0

No special behavior during automatic path segmentation. If the single axes are programmed together with path axes in one block, then their total traversing path is split up corresponding to the path axes. That is the pure geometric relationship between the single axes and path axes is identical to the undivided motion. If the single axes are programmed without the path axes but with SPN=<value>, then the path is divided accordng to the programmed SPN value.

PUNCH_PARTITION_TYPE = 1

In this case, the path of the single axes, if they are programmed together with path axes, are generally traversed in the first section (that is independently of the currently active type of interpolation).

PUNCH_PARTITION_TYPE = 2

In this case, the single axes behave with linear interpolation in the same way as with PUNCH_PARTITION_TYPE = 1, and with all other types of interpolation in the same way as with PUNCH_PARTITION_TYPE = 0.

Related to:

MD26010 $MC_PUNCHNIB_AXIS_MASK

26018	NIBBLE_PRE_START_TIME			C09	N4	
s	Delay time for nibbling/punching with G603			DOUBLE	PowerOn	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2	M

Description: To minimize any dead times due to the reaction time of the punching unit, it is possible to release the stroke before reaching the in-position window of the axes. The reference time for this is the interpolation end. Since there is normally a delay of some interpolation cycles after reaching the interpolation end (depending on the machine dynamics) until the axes actually come into position, the prestart time is a delay time with respect to reaching the interpolation end.

The function is therefore coupled to G603 (block change at the end of interpolation).

The time can be set via the machine data NIBBLE_PRE_START_TIME).

Example:

With an interpolation cycle of 5 ms, a stroke shall be released 2 cycles after reaching the interpolation end. In this case, the value 0.010 s must be selected for NIBBLE_PRE_START_TIME. If a value that is not integrally divisible by the set interpolation time is selected, then the stroke is initiated in the interpolation cycle following the set time.

26020	NIBBLE_SIGNAL_CHECK			C09	N4	
-	Alarm on chattering punching signal			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2	M

Description: When stroke active signal is set, for example by punch overshoots between the strokes, then the interpolation is stopped. It is also possible to generate the message "unclean punch signal" as a function of machine data NIBBLE_SIGNAL_CHECK.

0: No error message when the punching signal is irregular

1: Alarm, when the punching signal is irregular between strokes

27100	ABSBLOCK_FUNCTION_MASK			N01	K1,P1	
-	Parameterize basic blocks with absolute values			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2	M

Description: Parameterization of the "basic blocks with absolute values" function

Bit 0 = 1 :

The position values of the transverse axis are always displayed as diameter values.

Transverse axes can be applied using MD20100 $MC_DIAMETER_AX_DEF or MD30460 $MA_BASE_FUNCTION_MASK, bit 2.

27200	MMC_INFO_NO_UNIT			EXP, -	-	
-	HMI info (without physical unit)			DOUBLE	PowerOn	
-						
-	80	45., 2., 0., 1., 0., -1., 0., 1., 100., 1., 1., 0., 0., 0., 0....	-	-	0/2	S

Description: –

27201	MMC_INFO_NO_UNIT_STATUS			EXP, -	-	
-	HMI status info (without physical unit)			BYTE	PowerOn	
-						
-	80	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1...	-	-	0/2	S

Description: –

27202	MMC_INFO_POSN_LIN			EXP, -	-	
mm	HMI info (linear positions)			DOUBLE	PowerOn	
-						
-	50	0., 0., 1., 1., 0., 0., 100., 0., 0., 1000., 1., 1....	-	-	0/2	S

Description: –

27203	MMC_INFO_POSN_LIN_STATUS			EXP, -	-	
-	HMI status info (linear positions)			BYTE	PowerOn	
-						
-	50	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1...	-	-	0/2	S

Description: –

27204	MMC_INFO_VELO_LIN			EXP, -	-	
mm/min	HMI info (linear velocities)			DOUBLE	PowerOn	
-						
-	16	10., 10., 2000., 10000., 300., 1000., 1000., 10., 0.,0.,0.,0....	-	-	0/2	S

Description: –

27205	MMC_INFO_VELO_LIN_STATUS			EXP, -	-	
-	HMI status info (linear velocities)			BYTE	PowerOn	
-						
-	16	1,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0...	-	-	0/2	S

Description: –

27206	MMC_INFO_CUT_SPEED			EXP, -	-	
m/min	HMI info (cutting speed)			DOUBLE	PowerOn	
-						
-	5	100.,0.,0.,0.,0.,100.,0.,0.,0.,0....	-	-	0/2	S

Description: –

27207	MMC_INFO_CUT_SPEED_STATUS			EXP, -	-	
-	HMI status info (cutting speed)			BYTE	PowerOn	
-						
-	5	1,0,0,0,0,1,0,0,0,0,1,0,0,0,0...	-	-	0/2	S

Description: –

27208	MMC_INFO_REV_FEED			EXP, -	-	
mm/rev	HMI info (feed)			DOUBLE	PowerOn	
-						
-	10	1.,0.100,1.,1.,0.,0.,0.,0.,0.,0....	-	-	0/2	S

Description: –

27209	MMC_INFO_REV_FEED_STATUS			EXP, -	-	
-	HMI status info (feed)			BYTE	PowerOn	
-						
-	10	1,1,1,1,0,0,0,0,0,0,1,1,1,1,0,0,0,0,0,0...	-	-	0/2	S

Description: –

27400	OEM_CHAN_INFO			A01, A11	-	
-	OEM version information			STRING	PowerOn	
-						
-	3	, , ,, , ,, , ...	-	-	7/2	M

Description: A version information freely available to the user
(is indicated in the version screen)

27800	TECHNOLOGY_MODE			C09	A2,K1	
-	Mode of technology in channel			BYTE	NEW CONF	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	0/0	M

Description: This machine data can be used for stating the technology independently of the channel.

This information is used, among other things, for evaluating HMI, PLC and standard cycles.

Meaning:

MD = 0:Milling

MD = 1:Turning

MD = 2:Grinding

21:Cylindrical grinding

22:Surface grinding

MD = 3:Nibbling

MD = 4:...

(Enter additional technologies as and when required.)

27850	PROG_NET_TIMER_MODE			C09	-	
-	Impact of the program runtime net counter			DWORD	Reset	
-						
-	-	0x00,0x00,0x00,0x00,0x00,0x00,0x00...	0x00	0x03	7/2	M

Description: The program run time is measured using system variables and can be read out. It provides a means of outputting the current progress of the processing of a part program. This MD can be used to make the following settings on a channel-specific basis:

Bit 0 = 0

$AC_ACT_PROG_NET_TIME is not deleted on a jump to the start of the program with GOTOS

Bit 0 = 1

$AC_ACT_PROG_NET_TIME is deleted on a jump to the start of the program with GOTOS, the value is saved in $AC_OLD_PROG_NET_TIMES, and the program counter $AC_OLD_PROG_NET_TIME_COUNT is incremented.

Bit 1 = 0

$AC_ACT_PROG_NET_TIME ceases to be increased if override = 0 is set; in other words, the program run time is measured without the time for which the override was set to 0.

Bit 1 = 1

$AC_ACT_PROG_NET_TIME is increased if override = 0; in other words, the program run time is measured with the time for which the override was set to 0.

Bits 2 to 31

Reserved

27860	PROCESSTIMER_MODE			C09	K1	
-	Activation and impact of program runtime measurement			DWORD	Reset	
-						
-	-	0x00,0x00,0x00,0x00,0x00,0x00,0x00...	0	0x7FF	7/2	M

Description: Timers are provided as system variables under the function program runtime. While the NCK-specific timers are always activated (for time measurements since the last control power on), the channel-specific timers have to be started via this machine data.

Meaning:

Bit 0 = 0

No measurement of total operating time for any part program

Bit 0 = 1

Measurement of total operating time is active for all part programs ($AC_OPERATING_TIME)

Bit 1 = 0

No measurement of current program runtime

Bit 1 = 1

Measurement of current program runtime is active ($AC_CYCLE_TIME)

Bit 2 = 0

No measurement of tool operating time

Bit 2 = 1

Measurement of tool operating time is active ($AC_CUTTING_TIME)

Bit 3

Reserved

Bits 4,5 only when bit 0, 1, 2 = 1:

Bit 4 = 0 No measurement with active dry run feed

Bit 4 = 1 Measurement also with active dry run feed

Bit 5 = 0 No measurement with program test

Bit 5 = 1 Measurement also with program test

Bit 6 only when Bit 1 = 1:

Bit 6 = 0

Delete $AC_CYCLE_TIME also with start by ASUB and PROG_EVENTs

Bit 6 = 1

$AC_CYCLE_TIME is not deleted on start by ASUB and PROG_EVENTs.

Bit 7 only when bit 2 = 1:

Bit 7 = 0 $AC_CUTTING_TIME counts only with active tool

Bit 7 = 1 $AC_CUTTING_TIME counts irrespective of tool

Bits 8 only when bit 1 = 1

Bit 8 = 0

$AC_CYCLE_TIME is not deleted on jumping to program start with GOTOS

Bit 8 = 1

$AC_CYCLE_TIME is deleted on jumping to program start with GOTOS.

Bit 9 only when bits 0, 1 = 1:

Bit 9 = 0

$AC_OPERATING_TIME, $AC_CYCLE_TIME: No measurement with override = 0.

```
Bit 9 = 1
   $AC_OPERATING_TIME, $AC_CYCLE_TIME: Measurement also with over-
   ride = 0.
Bits 10 to 31
   Reserved
```

27880	PART_COUNTER			C09	K1	
-	Activation of workpiece counter			DWORD	Reset	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0FFFF	7/2	M

Description: The part counters can be configured with this machine data.

Note: with bit 0 = 1 and $AC_REQUIRED_PARTS smaller than 0 all workpiece counts

activated in this MD are frozen at the status reached.

Meaning of the individual bits:

Bits 0 - 3:Activating $AC_REQUIRED_PARTS

Bit 0 = 1:Counter $AC_REQUIRED_PARTS is activated

Further significance of bits 1-3 only when bit 0 =1 and $AC_REQUIRED_PARTS > 0:

Bit 1 = 0:Alarm/VDI output if $AC_ACTUAL_PARTS corresponds to $AC_REQUIRED_PARTS

Bit 1 = 1:Alarm/VDI output if $AC_SPECIAL_PARTS corresponds to $AC_REQUIRED_PARTS

Bit 2Reserved!

Bit 3Reserved!

Bits 4 - 7:Activating $AC_TOTAL_PARTS

Bit 4 = 1:Counter $AC_TOTAL_PARTS is active

Further meaning of bits 5-7 only when bit 4 =1 and $AC_REQUIRED_PARTS > 0:

Bit 5 = 0:Counter $AC_TOTAL_PARTS is incremented by 1 with a VDI output of M02/M30

Bit 5 = 1:Counter $AC_TOTAL_PARTS is incremented by 1 with output of the M command from MD PART_COUNTER_MCODE[0]

Bit 6 = 0:$AC_TOTAL_PARTS also active with program test/block search

Bit 7 = 1:counter $AC_TOTAL_PARTS is incremented by 1 when jumping back with GOTOS

Bits 8 - 11:Activating $AC_ACTUAL_PARTS

Bit 8 = 1:Counter $AC_ACTUAL_PARTS is active

Further significance of bits 9-11 only when bit 8 =1 and $AC_REQUIRED_PARTS > 0:

Bit 9 = 0:Counter $AC_ACTUAL_PARTS is incremented by 1 with a VDI output of M02/M30

Bit 9 = 1:Counter $AC_ACTUAL_PARTS is incremented by 1 with output of the M command from MD PART_COUNTER_MCODE[1]

Bit 10 = 0:$AC_ACTUAL_PARTS also active with program test/block search

Bit 10 = 1:No machining $AC_ACTUAL_PARTS with program test/block search

Bit 11 = 1:counter $AC_ACTUAL_PARTS is incremented by 1 when jumping bakc with GOTOS

Bit 12 - 15:Activating $AC_SPECIAL_PARTS

Bit 12 = 1:Counter $AC_SPECIAL_PARTS is active
Further significance of bits 13-15 only when bit 12 =1 and $AC_REQUIRED_PARTS > 0:
Bit 13 = 0:Counter $AC_SPECIAL_PARTS is incremented by 1 with a VDI output of M02/M30
Bit 13 = 1:Counter $AC_SPECIAL_PARTS is incremented by 1 with output of the M command from MD PART_COUNTER_MCODE[2]
Bit 14 = 0:$AC_SPECIAL_PARTS also active with program test/block search
Bit 14 = 1:No machining $AC_SPECIAL_PARTS with program test/block search
Bit 15 = 1:counter $AC_SPECIAL_PARTS is incremented by 1 when jumping back with GOTOS
Related to:
MD27882 $MC_PART_COUNTER_MCODE

27882	PART_COUNTER_MCODE			C09	K1	
-	Workpiece counting with user-defined M command			BYTE	PowerOn	
-						
-	3	2, 2, 2,2, 2, 2,2, 2, 2,2, 2, 2...	0	99	7/2	M

Description: If part counting is activated via MD27880 $MC_PART_COUNTER, the count pulse can be triggered by a special M command.
Only then are the values defined here taken into account:
Meaning:
The part counters are incremented by 1 in the NST signal output of the M command described, where:
MD27882 $MC_PART_COUNTER_MCODE[0] for $AC_TOTAL_PARTS
MD27882 $MC_PART_COUNTER_MCODE[1] for $AC_ACTUAL_PARTS
MD27882 $MC_PART_COUNTER_MCODE[2] for $AC_SPECIAL_PARTS

27900	REORG_LOG_LIMIT			EXP, C02	-	
-	Percentage of IPO buffer for enabling log file			BYTE	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	0/0	S

Description: The machine data defines the percentage of the IPO buffer above which data in the REORG LOG memory can be released in stages, if the block preparation has been interrupted due to an overflow of the REORG LOG data memory.

The released data are no longer available to the REORG function (References: /FB /, K1, "Mode Groups, Channels, Program Operation Mode").

A consequence of this status is that a further REORG command is cancelled with an error message.

If the status of "non-reorganizability" occurs, warning 15110 is output. The output of the warning can be suppressed by enabling the highest significant bit. The bit is set by adding the value 128 to the input value in REORG_LOG_LIMIT.

In addition to the instructions of the NC blocks, the size of the IPO buffer and the REORG data memory also affect the frequency of data release.

Related to:

MD28000 $MC_MM_REORG_LOG_FILE_MEM
(memory size for REORG)

MD28060 $MC_MM_IPO_BUFFER_SIZE
(number of blocks in the IPO buffer)

27920	TIME_LIMIT_NETTO_INT_TASK			EXP, C01	-	
s	Runtime limit of interpreter subtask			DOUBLE	PowerOn	
-						
-	-	0.005,0.005,0.005,0.005,0.005,0.005...	0.001	0.100	7/0	S

Description: With MD27920 $MC_TIME_LIMIT_NETTO_INT_TASK, the maximum runtime of the interpreter subtask is set. The interpreter subtask is started from the preprocessing task. If the interpreter task does not end on its own within the time set with MD27920 $MC_TIME_LIMIT_NETTO_INT_TASK, it will be stopped and continued after a preprocessing cycle.

1.4.6 Channel-specific memory settings

28000	MM_REORG_LOG_FILE_MEM			EXP, C02	V2,K1	
-	Memory space for REORG (DRAM)			DWORD	PowerOn	
-						
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50...	1	500	7/2	M

Description: Definition of the size (in kbyte) of the dynamic memory for the REORG-LOG data. The size of the memory determines the quantity of the data available for the function REORG.

References:

/FB/, K1, "Mode Groups, Channel, Program Operation"

28010	MM_NUM_REORG_LUD_MODULES			EXP, C02	V2,K1	
-	Number of blocks for local user variables in REORG (DRAM)			DWORD	PowerOn	
-						
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	0	SLMAXNUMBEROF_USERMODULES	7/2	M

Description: Defines the number of additional LUD data blocks available for the function REORG (see Description of Functions, Channels, Mode Groups, Program Operation (K1)).

This value can be 0 if the function REORG is not used. The CNC always opens 12 LUD data blocks, of which 8 are used for NC programs and 4 for the ASUBs.

An LUD data block is needed for each NC program and ASUB in which a local user variable is defined. This value may have to be increased for the function REORG if a large IPO buffer is present and a large number of short NC programs in which LUD variables are defined are active (prepared NC blocks of the programs are located in the IPO buffer).

An LUD data block is needed for each of these programs. The size of the reserved memory is affected by the number of LUDs per NC program and their individual memory requirements. The LUD data blocks are stored in the dynamic memory.

The memory requirement for managing the blocks for local user variables with REORG can be determined as follows:

The size of the LUD blocks depends on the number of active LUDs and their data type. The memory for the LUD blocks is limited by the MD28000 $MC_MM_REORG_LOG_FILE_MEM (memory size for REORG).

28020	MM_NUM_LUD_NAMES_TOTAL			C02	V2,K1	
-	Number of local user variables (DRAM)			DWORD	PowerOn	
-						
-	-	1200,1200,1200,1200,1200,1200,1200...	0	32000	7/2	M

Description: Defines the number of variables for the local user data (LUD) which are permitted to exist in the active sections of the program. Approximately 150 bytes of memory per variable are reserved for the names of the variables and the variable values. The memory required for the variable value is equal to the size of the data type. If the total of the local user variables from the active main program and the related subprograms is larger than the defined limit, the variables which are over the limit are not accepted during execution of the program. Dynamic memory is used for the variable names and variable values.

Overview of the memory used by the data types:

Data type	Memory used
REAL	8 bytes
INT	4 bytes
BOOL	1 byte
CHAR	1 byte
STRING	1 byte per character, 200 characters per string are possible
AXIS	4 bytes
FRAME	400 bytes

28040	MM_LUD_VALUES_MEM			C02	V2,K1	
-	Memory space for local user variables (DRAM)			DWORD	PowerOn	
-						
-	-	250,250,250,250,250,250,250,250,250...	0	32000	7/2	M

Description: This MD defines the amount of memory space available for LUD variables.

The maximum number of available LUDs is given by one of the limit values of MD28020 $MC_MM_NUM_LUD_NAMES_TOTAL or MD28040 $MC_MM_LUD_VALUES_MEM.

The memory defined here is subdivided into (MD28040 $MC_MM_LUD_VALUES_MEM * 1024) / MD18242 $MN_MM_MAX_SIZE_OF_LUD_VALUE blocks, and allocated to part programs which request memory. Each part program that contains at least one definition of an LUD variable or call parameters uses at least one such block.

It should be remembered that several part programs requiring memory can be open simultaneously in the NCK. The number depends on the type of programming, the program length, and the size of the internal NCK block memory upwards of (MD28060 $MC_MM_IPO_BUFFER_SIZE, MD28070 $MC_MM_NUM_BLOCKS_IN_PREP).

Related to:

MD28020 $MC_MM_NUM_LUD_NAMES_TOTAL
(number of local user variables (DRAM))

28050	MM_NUM_R_PARAM			C02	K1	
-	Number of channel-specific R parameters (SRAM)			DWORD	PowerOn	
-						
-	-	100,100,100,100,100,100,100,100,100...	0	32535	7/2	M

Description: Defines the number of R parameters available in the channel. A maximum of 32535 R parameters are available per channel. This machine data reserves 8 bytes of buffered user memory per R parameter.

R parameters have a considerably lower management overhead in comparison to LUD and GUD variables.

Attention:

The buffered data are lost when this machine data is changed!

28060	MM_IPO_BUFFER_SIZE			C02	B1,K1	
-	Number of NC blocks in IPO buffer (DRAM)			DWORD	PowerOn	
-						
-	-	10,10,10,10,10,10,10,10,10,10,10...	2	1000	7/2	M

Description: Defines the number of blocks for the interpolation buffer. This buffer contains prepared NC blocks available for the interpolation. A number of kbytes of the dynamic user memory are reserved for each NC block. The data also limits the number of blocks for look ahead consideration of speed limitation for the LookAhead function.

MD28060 $MC_MM_IPO_BUFFER_SIZE is set by the system.

Related to:

MD28070 $MC_MM_NUM_BLOCKS_IN_PREP
(number of blocks for block preparation)

28070	MM_NUM_BLOCKS_IN_PREP		EXP, C02	B1,K1	
-	Number of blocks for block preparation (DRAM)		DWORD	PowerOn	
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50...	20	500	7/2	M

Description: Defines the number of NC blocks available for NC block preparation. This figure is determined mainly by the system software and is used largely for optimization. Approximately 10 Kbytes of dynamic memory is reserved per NC block.

Related to:

MD28060 $MC_MM_IPO_BUFFER_SIZE
(number of NC blocks with IPO buffer)

28080	MM_NUM_USER_FRAMES			C11, C02	K1,K2	
-	Number of settable frames (SRAM)			DWORD	PowerOn	
-						
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	5	100	7/2	M

Description: Defines the number of predefined user frames. Approximately 400 bytes of backup memory are reserved per frame.

The standard system configuration provides four frames for G54 to G57 and one frame for G500.

Special cases:

The backup data are lost if this machine data is altered!

28081	MM_NUM_BASE_FRAMES			C02	M5,K2	
-	Number of base frames (SRAM)			DWORD	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	16	7/2	M

Description: Number of channel-specific base frames per channel.

The value corresponds to the number of field elements for the predefined field $P_CHBFR[].

Buffered memory is reserved for this.

28082	MM_SYSTEM_FRAME_MASK			C02	M5,K2,W1	
-	System frames (SRAM)			DWORD	PowerOn	
-						
-	-	0x21,0x21,0x21,0x21,0x21,0x21,0x21...	0	0x00000FFF	7/2	S

Description:

```
Bit mask for configuring channel-specific system frames included
in the channel.
Bit 0: System frame for setting actual value and scratching
Bit 1: System frame for external work offset
Bit 2: System frame for TCARR aund PAROT
Bit 3: System frame for TOROT and TOFRAME
Bit 4: System frame for workpiece reference points
Bit 5: System frame for cycles
Bit 6: System frame for transformations
Bit 7:System frame $P_ISO1FR for ISO G51.1 Mirror
Bit 8:System frame $P_ISO2FR for ISO G68 2DROT
Bit 9:System frame $P_ISO3FR for ISO G68 3DROT
Bit 10:System frame $P_ISO4FR for ISO G51 Scale
Bit 11:     System frame $P_RELFR for relative coordinate systems
```

28083	MM_SYSTEM_DATAFRAME_MASK			C02	-	
-	System frames (SRAM)			DWORD	PowerOn	
-						
-	-	0xF9F,0xF9F,0xF9F,0xF9F,0xF9F,0xF9F...	0	0x00000FFF	7/2	S

Description:

```
Bit mask for configuring channel-specific system frames in the
data storage (SRAM).
Bit 0: System frame for setting actual value and scratching
Bit 1: System frame for external work offset
Bit 2: System frame for TCARR aund PAROT
Bit 3: System frame for TOROT and TOFRAME
Bit 4: System frame for workpiece reference points
Bit 5: System frame for cycles
Bit 6: System frame for transformations
Bit 7:System frame $P_ISO1FR for ISO G51.1 Mirror
Bit 8:System frame $P_ISO2FR for ISO G68 2DROT
Bit 9:System frame $P_ISO3FR for ISO G68 3DROT
Bit 10:System frame $P_ISO4FR for ISO G51 Scale
Bit 11:     System frame $P_RELFR for relative coordinate systems
```

28085	MM_LINK_TOA_UNIT			C02, C09	FBW,S7	
-	Assignment of a TO unit to a channel (SRAM)			DWORD	PowerOn	
-						
-	-	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16	1	10	7/2	M

Description: The T0 area covers all tool, magazine, ... data blocks known to the NCK. The maximum nujmber of units in the TO area is equal to the number of channels.

If MD28085 $MC_MM_LINK_TOA_UNIT = default setting, then each channel is assigned a TO unit individually.

If MD28085 $MC_MM_LINK_TOA_UNIT = i, the channel is assigned TO unit i. This enables one TO unit to be assigned to multiple channels.

Notice

The uppper limit does not indicate that this value is always practical or free of conflicts. If one channel (the first) is active in a system with a maximum of 2 channels, and the other is not, the MD on channel 1 can formally be given the value 2, but the NCK cannot work with it. This setting would mean that channel 1 did not have any blocks for tool offsets, as the channel with ID=2 did not exist.

The NCK detects this conflict at Power On and restart, and responds by autonomouslöy changing the (incorrect) value to the default value of the MD.

28090	MM_NUM_CC_BLOCK_ELEMENTS			EXP, C02	TE1,TE7,TE8,K1	
-	Number of block elements for compile cycles (DRAM)			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	0	130	7/1	M

Description: The input value defines the number of block elements that can be used for compile cycles.

In the case of software version 2, approximately 1.2KB of dynamic memory is required per block element.

28100	MM_NUM_CC_BLOCK_USER_MEM			EXP, C02	TE1,TE7,TE8,K1	
-	Size of block memory for compile cycles (DRAM), in KB			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0 ,0,0,0	0	64000	7/1	M

Description: The value defines the total capacity of block memory available to the user in the dynamic memory area for the compile cycles. The memory is allocated in staggered blocks of 128 bytes.

28105	MM_NUM_CC_HEAP_MEM			EXP, C02	TE7	
-	Heap memory in kbytes for compile-cycle applications (DRAM)			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	64000	7/2	M

Description: Size of the heap memory in kbytes which can be used by the compile cycle user.

Dynamic memory is reserved.

The memory is allocated in subdivisions of 128 byte blocks.

The start address and the size of the reserved memory is made available via a binding, the management lies in the hands of the CC user.

28150	MM_NUM_VDIVAR_ELEMENTS			C02	A2,P3 pl,P3 sl	
-	Number of elements for writing PLC variables			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2	M

Description: The MD defines the number of elements which the user has available for writing PLC variables ($A_DBx=...). This number also applies to block search, but not to synchronized actions.

The memory requirement is ca. 24 bytes per element.

One element is needed for each write action when writing PLC variables in quick succession.

If more writing actions are to be performed than elements are available, block transport must be guaranteed (trigger preprocessing stop, if required)

However, the number of elements can be reduced if the accessing actions are made separately (block transport has already been accomplished). Writing accesses (var=$A_DBx) are unlimited.

28160	MM_NUM_LINKVAR_ELEMENTS			C02	B3	
-	Number of elements for writing NCU-link variables			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2	M

Description: Defines the number of elements which the user has available for programming link variables ($A_DLx=...). This number also applies to block search, but not to synchronized actions.

The memory requirement is approx. 24 bytes per element.

One element is needed for each write action when writing NCU-link variables in quick succession.

However, the number of elements can be reduced if the accessing actions are made separately (block transport has already been accomplished).

If more writing actions are to be performed than elements are available, block transport must be guaranteed (trigger preprocessing stop, if required).

28180	MM_MAX_TRACE_DATAPOINTS			EXP, C02, C06	-	
-	Length of the trace data buffer			DWORD	PowerOn	
NBUP						
-	-	100,100,100,100,100,100,100,100...	0	20000	2/2	M

Description: MM_MAX_TRACE_DATAPOINTS defines the size of an internal data buffer which contains the trace recordings.

28200	MM_NUM_PROTECT_AREA_CHAN			C02, C06, C09	A3	
-	Number of files for channel-specific protection zones (SRAM)			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2	M

Description: This machine data defines how many blocks are set up for channel-specific protection zones.

Related to:

MD28210 $MC_MM_NUM_PROTECT_AREA_ACTIVE

(number of simultaneously active protection zones)

MD18190 $MN_MM_NUM_PROTECT_AREA_NCK

(number of files for machine-related protection zones (SRAM))

References:

/FB/, A3, "Axis/Contour Tunnel Monitoring, Protection Zones"

28210	MM_NUM_PROTECT_AREA_ACTIVE			C11, C02, C06, C09	A3	
-	Number of simultaneously active protection zones in one channel			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2	M

Description: This machine data defines the number of protection zones that may be activated simultaneously for each channel.

It is not practical to enter a numerical value higher than MD18190 $MN_MM_NUM_PROTECT_AREA_NCK + MD28200 $MC_MM_NUM_PROTECT_AREA_CHAN.

Related to:

MD28200 $MC_MM_NUM_PROTECT_AREA_CHAN

(Number of blocks for channel-specific protection zones)

MD18190 $MN_MM_NUM_PROTECT_AREA_NCK

(Number of files for machine-related protection zones (SRAM))

References:

/FB1/ Function Manual Basic Functions; Axis Monitoring, Protection Zones (A3)

28212	MM_NUM_PROTECT_AREA_CONTOUR			C11, C02, C06, C09	A3	
-	Elements for active protection zones (DRAM)			DWORD	PowerOn	
-						
-	-	30,30,30,30,30,30,30,30,30,30,30,30,30...	0	50	7/2	M

Description: This machine data defines for each channel how many internal contour elements in total are held available for active protection zones.

Dynamic memory is used.

The MD affects the memory requirements for the activated protection zones.

This machine data is active only if MD28210 $MC_MM_NUM_PROTECT_AREA_ACTIVE is not equal to 0.

28240	MM_NUM_SYNC_DIAG_ELEMENTS			N05, C02	-	
-	Number of diagnostic elements for expressions in synchronized actions			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2	M

Description: The values of the variables and machine data during diagnostics of the motion-synchronous actions are saved to memory elements for storage in the control. A motion-synchronous action uses up to the number of elements for as many variables as are set with $MC_MAXNUM_SYNC_DIAG_VAR.

The following are assigned:

- 1 element for each variable
- 1 element for each index

Example:

WHEN $R1 == 1 DO $R2 = $R[AC_MARKER[1]]

R1 = 2 elements, variable with written value 1 element, index "1" an element

R2 = 2 elements, variable with written value 1 Element, index "2" an element

AC_MARKER = 2 elements, variable with read value 1 element, index "1" an element

R = 2 elements, variable with written value 1 element, index "1" an element

Total 8 elements.

28241	MAXNUM_SYNC_DIAG_VAR			N05	-	
-	Maximum number of diagnostics variables per synchronized action			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10000	7/2	M

Description: Maximum number of diagnostics variables per synchronized action.

28250	MM_NUM_SYNC_ELEMENTS			C02, -	2.8,6.1	
-	Number of elements for expressions in synchronized actions			DWORD	PowerOn	
-						
-	-	159,159,159,159,159,159,159,159,159...	0	32000	7/2	M

Description: The expressions of the motion-synchronous actions are stored in memory elements in the control. A motion-synchronous action occupies at least 4 elements.

It occupies:

- 1 element for each operand in the condition
- >= 1 element for each action
- 2 elements for each assignment
- 1 element for each further operand in complex expressions.

One element is ca 64 bytes.

The option "Synchronous actions stage 2" is required if the MD is to be changed beyond its default value.

References:

Programming Guide, Advanced

28251	MM_NUM_SAFE_SYNC_ELEMENTS			C02, -	-	
-	Number of elements for expressions in Safety synchr. actions			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2	M

Description: The expressions of motion-synchronous actions are stored in memory elements of the control. A motion-synchronous action assigns at least 4 elements.

Assignments:

Each operand in the condition:1 element

Each action:>= 1 element

Each assignment:2 elements

Each additional operand in complex expressions:1 element

Also see:

MD28250 $MC_MM_NUM_SYNC_ELEMENTS

28252	MM_NUM_FCTDEF_ELEMENTS			C02	2.4,2.8,6.1	
-	Number of FCTDEF elements			DWORD	PowerOn	
-						
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	100	7/2	M

Description: Defines the number of FCTDEF elements.

28253	MM_NUM_SYNC_STRINGS			C02, -	-	
-	Number of strings for expressions in synchronized actions			DWORD	PowerOn	
-						
-	-	100,100,100,100,100,100,100,100,100...	0	32000	7/2	M

Description: The expressions of motion-synchronous actions are saved in memory elements for storage in the control. Elements have to be reserved specifically for strings within expressions.

28254	MM_NUM_AC_PARAM			C02	-	
-	Dimension of $AC_PARAM.			DWORD	PowerOn	
-						
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50...	0	20000	7/2	M

Description: Panel size of $AC_PARAM.

28255	MM_BUFFERED_AC_PARAM			C02	2.3,6.1	
-	$AC_PARAM[] is stored in SRAM.			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: $AC_PARAM[] is stored in SRAM.

28256	MM_NUM_AC_MARKER			C02	2.3,6.1	
-	Dimension of $AC_MARKER			DWORD	PowerOn	
-						
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	0	20000	7/2	M

Description: Number of channel-specific markers $AC_MARKER for motion-synchronous actions.

DRAM or SRAM is required depending on MD28257 $MC_MM_BUFFERED_AC_MARKER.

28257	MM_BUFFERED_AC_MARKER			C02	2.3,6.1	
-	$AC_MARKER[] is stored in SRAM.			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2	M

Description: $AC_MARKER[] is stored in SRAM.

28258	MM_NUM_AC_TIMER			C02	2.3,2.4,6.1	
-	Number of time variables $AC_TIMER (DRAM)			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10000	7/2	M

Description: Number of channel-specific time variables $AC_TIMER for motion-synchronous actions (DRAM)

28260	NUM_AC_FIFO			C01	2.3,2.4,6.1	
-	Number of FIFO variable for synchronized actions			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2	M

Description: Number of FIFO variables $AC_FIFO1 - $AC_FIFO10 for motion-synchronous actions.

FIFO variables are used for product tracking. A piece of information (e.g. the product length) for each part on a conveyor belt can be temporarily stored in each FIFO variable.

FIFO variables are stored in R parameters.

MD28262 $MC_START_AC_FIFO defines the number of the R parameter as from which the FIFO variables can be stored. All R parameters with lower numbers can be used freely in the part program.

R parameters above the FIFO range cannot be written from the part program.

The number of R parameters must set via MD28050 $MC_MM_NUM_R_PARAM so that all FIFI variables can be accommodated from the start of the R parameters:

MD28050 $MC_MM_NUM_R_PARAM = MD28262 $MC_START_AC_FIFO + MD28260 $MC_NUM_AC_FIFO * (MD28264 $MC_LEN_AC_FIFO + 6)

The FIFO variables bear the names $AC_FIFO1 to $AC_FIFOn.

They are stored as arrays.

The indices 0 - 5 have special meanings:

n= 0:

A new value is stored in the FIFO when writing with index 0.

The oldest element is read and removed from the FIFO when writing with index 0.

n=1: Access to the first element read in

n=2: Access to the last element 1 read in

n=3: Sum of all FIFO elements

n=4: Number of elements available in the FIFO

n=5: Current write index relative to FIFO start

n=6: 1st element read in

28262	START_AC_FIFO			C01	2.3,2.4,6.1	
-	FIFO variables store from R parameter			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32535	7/2	M

Description: Number of the R parameter as from which FIFO variables are stored. All R parameters with lower numbers can be used freely in the part program. R parameters above the FIFO range cannot be written from the part program.

The number of R parameters must set via MD28050 $MC_MM_NUM_R_PARAM so that all FIFI variables can be accommodated from the start of the R parameters:

MD28050 $MC_MM_NUM_R_PARAM = MD28262 $MC_START_AC_FIFO + MD28260 $MC_NUM_AC_FIFO *(MD28264 $MC_LEN_AC_FIFO + 6)

The FIFO variables bear the names $AC_FIFO1 to $AC_FIFOn. They are stored as arrays.

The indices 0 - 5 have special meanings:

n= 0:

A new value is stored in the FIFO when writing with index 0.

The oldest element is read and removed from the FIFO when reading with index 0.

n=1: Access to the first element read in

n=2: Access to the last element read in

n=3: Sum of all FIFO elements

n=4: Number of elements available in the FIFO

n=5: Current write index relative to FIFO start

Related to:

MD28260 $MC_NUM_AC_FIFO

28264	LEN_AC_FIFO			C01	2.3,2.4,6.1,M5	
-	Length of FIFO variables AC_FIFO1-AC_FIFO10			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32535	7/2	M

Description: Length of the FIFO variables $AC_FIFO1 to $AC_FIFO10.

All FIFO variables are the same length.

28266	MODE_AC_FIFO			C01	2.3,2.4,6.1	
-	Mode of FIFO processing			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	-	7/2	M

Description: Mode of FIFO processing:

Bit 0 = 1:

The sum of all FIFO contents is updated at each write access.

Bit 0 = 0:

No summation

Related to:

MD28260 $MC_NUM_AC_FIFO

28274	MM_NUM_AC_SYSTEM_PARAM			EXP, C02	-	
-	Number of $AC_SYSTEM_ PARAM for motion-synchronous actions			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20000	7/2	M

Description: Number of $AC_SYSTEM_ PARAM parameters for motion-synchronous actions.

Depending on MD28255 $MC_MM_BUFFERED_AC_PARAM, DRAM or SRAM is required.

Reserved for SIEMENS applications.

28276	MM_NUM_AC_SYSTEM_MARKER			EXP, C02	-	
-	Number of $AC_SYSTEM_MARKER for motion-synchronous actions			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20000	7/2	M

Description: Number of $AC_SYSTEM_MARKER markers for motion-synchronous actions.

Depending on MD28257 $MC_MM_BUFFERED_AC_MARKER, DRAM or SRAM is required.

Reserved for SIEMENS applications.

28290	MM_SHAPED_TOOLS_ENABLE			C01, C08, C02	-	
-	Enable tool radius compensation for contour tools			BOOLEAN	PowerOn	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/0	S

Description: The function "Tool radius compensation for contour tools" is enabled with this tool.

Modification of this machine data will cause a reconfiguration of the memory.

28300	MM_PROTOC_USER_ACTIVE			C02	-	
-	Activation of logging for a user			BOOLEAN	PowerOn	
-						
-	10	TRUE, FALSE, FALSE, FALSE, FALSE, TRUE, TRUE, TRUE, FALSE...	-	-	1/1	M

Description: Activation of recording for a user.

The users 0 and 1, and 5 - 9 are reserved for system functions.

The users 2, 3 and 4 can be used by OEM.

28301	MM_PROTOC_NUM_ETP_OEM_TYP			C02	-	
-	Number of OEM event types ETP.			DWORD	PowerOn	
-						
-	10	0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	1/1	M

Description: Number of OEM event types in OPI module ETP.

28302	MM_PROTOC_NUM_ETP_STD_TYP			C02	-	
-	Number of standard event types ETP			DWORD	PowerOn	
-						
-	10	28, 0, 0, 0, 0, 20, 20, 20, 0, 3...	0	59	1/1	M

Description: Number of standard event types required in the ETP OPI block.

28400	MM_ABSBLOCK			EXP, C02	K1	
-	Activate basic blocks with absolute values			DWORD	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	512	7/2	M

Description: Value:

0: Basic blocks with absolute values deactivated.

1: Basic blocks with absolute values activated;

A display buffer of the following size is created:

(MD28257 $MC_MM_BUFFERED_AC_MARKER + MD28070 $MC_MM_NUM_BLOCKS_IN_PREP) * 256 bytes

>= 128:Basic blocks with absolute values activated.

A display buffer of the following size is created:

(MD28060 $MC_MM_IPO_BUFFER_SIZE + MD28070 $MC_MM_NUM_BLOCKS_IN_PREP) * <value>

28402	MM_ABSBLOCK_BUFFER_CONF			EXP, C02	K1	
-	Setting of upload buffer size			DWORD	PowerOn	
-						
-	2	2, 4,2, 4,2, 4,2, 4,2, 4,2, 4,2, 4...	0	32000	7/2	M

Description: Dimensioning the size of the upload buffer:

MD28402 $MC_MM_ABSBLOCK_BUFFER_CONF[0] : Number of blocks before the current block

MD28402 $MC_MM_ABSBLOCK_BUFFER_CONF[1] : Number of blocks after the current block

The machine data is tested for the following upper / lower limits during startup:

0 <= MD28402 $MC_MM_ABSBLOCK_BUFFER_CONF[0] <= 8

0 <= MD28402 $MC_MM_ABSBLOCK_BUFFER_CONF[1] <= (MD28060 $MC_MM_IPO_BUFFER_SIZE + MD28070 $MC_MM_NUM_BLOCKS_IN_PREP)

Alarm 4152 is issued when the limits are violated.

28450	MM_TOOL_DATA_CHG_BUFF_SIZE			-, C02, C06	-	
-	Buffer for tool data changes (DRAM)			DWORD	PowerOn	
-						
-	-	100,100,100,100,100,100,100,100,100...	0	2500	7/2	M

Description: Number of entries in the buffer for the OPI change service for tool data.

Dynamic memory is used.

This buffer is created only if bit 2 or bit 3 is set in MD17530 $MN_TOOL_DATA_CHANGE_COUNTER.

28500	MM_PREP_TASK_STACK_SIZE			EXP, C02	K1	
-	Stack size of preparation task (DRAM)			DWORD	PowerOn	
-						
-	-	70,70,70,70,70,70,70,70,70,70,70,70,70...	70	500	0/0	S

Description: Defines the stack size in kbytes for the preparation task. The stack is stored in the dynamic memory.

Note:

This machine data is assigned internally by the control and must not be altered by the user.

28502	MM_INT_TASK_STACK_SIZE			EXP, C02	-	
-	Stack size for interpreter subtask (kB).			DWORD	PowerOn	
-						
-	-	20,20,20,20,20,20,20,20,20,20,20,20,20...	20	40	0/0	S

Description: Definition of the stack size (kByte) for the interpreter subtask.

28520	MM_MAX_AXISPOLY_PER_BLOCK			C02	B1	
-	maximal number of axial polynomials per block			DWORD	PowerOn	
-						
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	1	5	7/2	M

Description: Maximum number of axis polynomials which can be contained in a block.

In the standard case, each block only contains one polynomial per axis, i.e. this data can immediately be set to one.

Currently, more polynomials are only needed for the new ADIS function with G643.

In this case, this data must have a minimum value of three.

28530	MM_PATH_VELO_SEGMENTS			C02	A2,B1	
-	Number of memory elements for path velocity limitation			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	100	7/2	M

Description: Number of memory elements available for limiting the path velocity and changing it in the block.

0 : Each block is limited by a maximum path velocity.

> 0 : If required, a profile of the permissible path velocity
; and its modification options is generated and monitored
; in the block.
; This results in a smoother axis velocity progression and
; a shorter travel time.
; MD28530 $MC_MM_PATH_VELO_SEGMENTS defines the average
; number of segments available in the block.
; The necessary setting essentially depends
; on the requirements.

The following values are recommended:

3: for G643, if only geometry axes are traversed

5: for G643, if geometry and rotary axes are traversed

5: for COMPCAD

5: for dyn. transformation

A value that is too low this may lead to additional velocity limitations if a sufficient number of blocks cannot be made available for interpolation.

MD28530 $MC_MM_PATH_VELO_SEGMENTS additionally increases the memory requirement of dyn. Look Ahead. Values higher than 5 are only practical in exceptional cases.

3 ... 5 :
Recommended setting.

28533	MM_LOOKAH_FFORM_UNITS			C02	-	
-	Memory for extended LookAhead			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	100000	7/2	M

Description: The machine data is used to configure the work memory for extended LookAhead.

The MD scales the value defined internally through MD28060 $MC_MM_IPO_BUFFER_SIZE, MD28520 $MC_MM_MAX_AXISPOLY_PER_BLOCK, MD28530 $MC_MM_PATH_VELO_SEGMENTS, MD28535 $MC_MM_FEED_PROFILE_SEGMENTS, MD28540 $MC_MM_ARCLENGTH_SEGMENTS).

Its practical size depends on the part program, the block lengths, the axis dynamics, and an active kinematic transformation.

The MD should only be set for those channels in which free-form surfaces are also machined.

0 : default LookAhead is active.

> 0 : extended LookAhead is active if switched on by MD20443 $MC_LOOKAH_FFORM.

The guide value for free-form surface applications is: 18..20

28535	MM_FEED_PROFILE_SEGMENTS			C02	-	
-	Number of memory element for feed profiles			DWORD	PowerOn	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	10	7/2	M

Description: Number of memory elements available for feed profile per block.

The default value 1 is adequate for a programmable feed profile (FLIN, FCUB, FPO()).

If compile cycle applications require more segments per block, this machine data must be increased accordingly.

If, for example, a feed profile is to be activated in which there is deceleration at both the beginning and the end of the block, 3 segments will be required for the feed profile in the block, i.e. this MD must have value 3.

28540	MM_ARCLENGTH_SEGMENTS			C02	B1	
-	Number of memory elements for arc length function representation			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	100	7/2	M

Description: Number of memory elements available for the arc length function for parameterizing polynomials.

If this machine data is equal to zero, a fixed interval division is used to represent the arc length function. In this case, the calculated function is only tangent-continuous. This can lead to discontinuities in the axis accelerations.

If the function G643 is used for smoothing and/or COMPCAD, this MD should be assigned a value of at least 10. In this case, the calculated function also has a constant curvature which results in a smoother progression of the path velocity, as well as the axis velocities and accelerations.

Values substantially larger than 10 are only practical in exceptional cases.

Not only the value of MD28540 $MC_MM_ARCLENGTH_SEGMENTS but also that of MD20262 $MC_SPLINE_FEED_PRECISION are crucial for the accuracy.

28560	MM_SEARCH_RUN_RESTORE_MODE			C02	K2	
-	Data restore after simulation			DWORD	PowerOn	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x00000001	7/2	M

Description: Bit mask to restore data after abort of a simulated program execution. The following applies:

Bit 0: All frames in the data storage are restored.

28580	MM_ORIPATH_CONFIG		C02	-	
-	Setting for ORIPATH path-relative orientation		BYTE	PowerOn	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	1/1	M

Description: This MD is used to configure the behavior with ORIPATH, that is path-relative interpolation of the tool orientation. Furthermore, orientation smoothing is enabled with the G codes OSD or OST.

The following options are available:

0: MD21094 $MC_ORIPATH_MODE has no effect. G codes OSD and OST have no effect.

1: The "genuine" path-relative orientation interpolation can be activated with MD21094 $MC_ORIPATH_MODE = 1. The reference of the tool orientation to the path tangent and to the vector normal to the surface programmed with LEAD/TILT is retained throughout the block.

Note:

Alarm 10980 is output if ORIPATH is programmed with MD21094 $MC_ORIPATH_MODE = 1 or OSD or OST without MD28580 $MC_MM_ORIPATH_CONFIG = 1.

28590	MM_ORISON_BLOCKS			C02	-	
-	Setting for orientation smoothing			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	-	1/1	M

Description: This MD is used to activate the function "orientation smoothing with ORISON". If this data has a value of "zero", no orientation smoothing will be possible.

The value of this machine data indicates the maximum number of blocks over which the orientation is smoothed. The value of this MD should be at least high enough that the blocks

to be averaged fit in the buffer. This is dependent upon the maximum filter length used $SC_ORISON_DIST and the average distance traversed by the programmed blocks.

Setting this MD to higher values will significantly increase the memory requirement in the DRAM.

A value of 4 should be entered as a minimum.

If this MD is < 4 and if G code ORISON is programmed, alarm 10982 will be displayed.

28600	MM_NUM_WORKAREA_CS_GROUPS			C02	-	
-	Number of coordinate system-specific operating range limits			DWORD	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2	M

Description: Number of data blocks in the channel that are created for coordinate system-specific operating range limits.

It indicates the maximum value of the 1st index of system variable $P_WORKAREA_CS...[WALimNo, Ax]. It furthermore defines the number of the programmable G functions "WALCS1, WALCS2, ... WALCS10" as well as the maximum value in system variable $AC_WORKAREA_CS_GROUP".

= 0: Function "Monitoring of coordinate system-specific operating range limits" cannot be activated.

28610	MM_PREPDYN_BLOCKS			C02	-	
-	Number of blocks for velocity preparation			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	30	1/1	M

Description: This MD is used to define the number of blocks that are considered when defining the path velocity (velocity preparation). If the value of this MD is zero, only the relevant axis motions are considered in this block in order to define the maximum path velocity of a block. If the geometry in adjacent blocks is also considered when defining the path velocity, the path velocity will be more homogenous.

1.5 Axis-specific machine data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Description: Description

1.5.1 Configuration

30100	CTRLOUT_SEGMENT_NR			EXP, A01	G2,S9	
-	Setpoint assignment: bus segment number			BYTE	PowerOn	
-						
-	1	5	5	5	-1/2	M

Description: In this MD enter the number of the bus segment through which the output is addressed.

0: Local bus (for 802D MCPA, FM357-3)

1: SIMODRIVE611D drive bus for SINUMERIK 840D/810D (1st DCM)

2: reserved (previously local P bus)

3: reserved (previously 611D bus, 2nd DCM)

4: reserved (virtual buses)

5: PROFIBUS/PROFINET (e.g. SINUMERIK 840Di)

6: reserved (same effect as 5)

30110	CTRLOUT_MODULE_NR			A01, A11, -	G2,S9	
-	Setpoint assignment: module number			BYTE	PowerOn	
-						
-	1	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16,17,18...	1	31	7/2	M

Description: Enter in this MD the number of the module within a bus segment through which the output is addressed.

For axes on the PROFIBUS/PROFINET, the number of the drive assigned with MD13050 $MN_DRIVE_LOGIC_ADDRESS must be entered here (MD30110 $MA_CTRLOUT_MODULE_NR=n consequently points to MD13050 $MN_DRIVE_LOGIC_ADDRESS[n]).

30120	CTRLOUT_NR			EXP, A01, -	G2	
-	Setpoint assignment: Setpoint output on drive submodule/ module			BYTE	PowerOn	
-						
-	1	1,1,1,1,1,1,1,1,1,1,1,1,1 ,1,1,1,1,1,1,1,1,1,1,1,1, 1...	1	3	2/2	M

Description: Number of the output on a module which is used to address the set-point output.

The value is always 1 for modular drives.

30130	CTRLOUT_TYPE			A01, A11	G2,M3,S9	
-	Output type of setpoint			BYTE	PowerOn	
-						
-	1	0	0	3	7/2	M

Description: The type of speed setpoint output is entered in this MD:

0: Simulation (no hardware required)

1: Setpoint output active (differentiated by hardware configuration)

2: stepper motor

3: reserved (previously stepper motor)

4: reserved (previously virtual axis, simulation, no hardware available

For SW 4 and higher, MD30132 $MA_IS_VIRTUAL_AX must now be used instead of the value 4.

30132	IS_VIRTUAL_AX			A01	M3,TE1,TE3	
-	Axis is a virtual axis			BOOLEAN	PowerOn	
CTEQ						
-	1	FALSE	-	-	7/2	M

Description: Virtual axis. An axis that is also interpolated in follow-up mode. (Electronic transfer technology; virtual and real master values.)

This MD is the successor to MD30130 $MA_CTRLOUT_TYPE=4. MD30130 $MA_CTRLOUT_TYPE=0 and MD30132 $MA_IS_VIRTUAL_AX=1 must now be used instead of MD30130 $MA_CTRLOUT_TYPE=4.

Related to:

MD30130 $MA_CTRLOUT_TYPE

30134	IS_UNIPOLAR_OUTPUT			A01	G2	
-	Setpoint output is unipolar			BYTE	PowerOn	
-						
-	1	0	0	2	7/2	M

Description: Only for PROFIdrive, special application of analog additional drives:

Unipolar output driver (for unipolar analog drive actuator):

Only positive set speeds are supplied to the drive, the sign of the set speed is separately output in its own digital control signal.

Input value "0":

Bipolar output with pos./neg. set speed (this is the normal case)

Input value "1":

0. Digital bit = servo enable

1. Digital bit = neg. direction of travel

Input value "2": (linking of enable and direction of travel signals):

0. Digital bit = servo enable pos. direction of travel

1. Digital bit = servo enable neg. direction of travel

30200	NUM_ENCS			A01, A02, -	G2,R1,Z1	
-	Number of encoders			BYTE	PowerOn	
-						
-	-	1	0	2	7/2	M

Description: The number of encoders of the axis or spindle is to be entered in the MD for actual position value sensing (the differentiation between direct and indirect measuring systems, i.e. the locations at which these encoders are installed, is then specified, for example, in MD31040 $MA_ENC_IS_DIRECT).

For simulation axes/spindles, MD30200 $MA_NUM_ENCS > 0 must be specified for referencing.

30210	ENC_SEGMENT_NR			EXP, A01, A02	G2	
-	Actual value assignment: bus segment number.			BYTE	PowerOn	
-						
-	2	5, 5	5	5	-1/2	M

Description: Number of the bus segment, through which the encoder is addressed.

The bus segments must be firmly assigned to the control systems.

0: local bus (FM357-3)

1: SIMODRIVE611D drive bus for SINUMERIK 840D/810D (1st DCM)

2: reserved (previously local P bus)

3: reserved (previously 611D bus, 2nd DCM)

4: reserved (virtual buses)

5: PROFIBUS/PROFINET (e.g. SINUMERIK 840Di)

6: reserved (same effect as 5)

Index [n] has the following coding [Encodernr.]: 0 or 1

30220	ENC_MODULE_NR			A01, A02, A11	G2	
-	Actual value assignment: Drive number/measuring circuit number			BYTE	PowerOn	
-						
-	2	1, 1,2, 2,3, 3,4, 4,5, 5,6, 6,7, 7...	1	31	7/2	M

Description: The number of the module within a bus segment (MD30210 $MA_ENC_SEGMENT_NR[n]) through which the encoder is addressed must be entered in the MD.

For axes on PROFIBUS/PROFINET, the number of the drive assigned via MD13050 $MN_DRIVE_LOGIC_ADDRESS must be entered here (MD30220 $MA_ENC_MODULE_NR=n consequently points to MD13050 $MN_DRIVE_LOGIC_ADDRESS[n]).

The index[n] of the machine data has the following coding:

[Encoder no.]: 0 or 1

Related to:

MD30110 $MA_CTRLOUT_MODULE_NR[n]

(setpoint assignment: drive number/module number)

30230	ENC_INPUT_NR			A01, A02, A11, -	G2,S9	
-	Actual value assignm.: Input on drive module/meas. circuit board			BYTE	PowerOn	
-						
-	2	1, 2,1, 2,1, 2,1, 2,1, 2,1, 2,1, 2...	1	2	7/2	M

Description:

```
For PROFIdrive:
Number of the encoder within the PROFIdrive message frame through
which the encoder is addressed.
For example telegram 103: 1 (=G1_ZSW etc.) or 2 (=G2_ZSW etc.).
The index[n] of the machine data has the following coding:
[Encodernr.]: 0 or 1
If an input is selected, to which no encoder is connected, alarm
300008 "Measuring circuit not available on drive" is output.
```

30240	ENC_TYPE			A01, A02, A11, -	A3,,G2,R1	
-	Encoder type of actual value sensing (actual position value).			BYTE	PowerOn	
-						
-	2	0, 0	0	5	7/2	M

Description:

```
Encoder type:
0:   Simulation
1:   Raw signal generator (high resolution)
2:   Reserved
3:   Reserved
4:   General absolute encoder (e.g. with EnDat interface)
35   Reserved
Related to:
  PROFIdrive parameter p979 (compare there)
```

30242	ENC_IS_INDEPENDENT			A02, A11, -	G2,R1	
-	Encoder is independent			BYTE	NEW CONF	
-						
-	2	0, 0	0	3	7/2	M

Description: If actual value corrections performed by the NC on the encoder selected for position control are not to influence the actual value of any other encoder defined in the same axis, then the position control encoder must be declared to be "independent".

Actual value corrections include the following:

- Modulo treatment,
- Reference point approach,
- Measuring system calibration,
- PRESET

Example:

MD30200 $MA_NUM_ENCS[AX1] = 2

MD30242 $MA_ENC_IS_INDEPENDENT[0, AX1] = 0

MD30242 $MA_ENC_IS_INDEPENDENT[1, AX1] = 1

When the VDI interface has selected the first encoder for position control, the above mentioned actual value corrections will be executed on this encoder only.

When the VDI interface has selected the second encoder for position control, the above mentioned actual value corrections will be executed on both encoders.

The machine data is therefore only valid for encoders that have not been selected by the VDI interface for positon control (passive encoders).

As from SW5, the scope of functions has been extended:

MD30242 $MA_ENC_IS_INDEPENDENT = 2

The passive encoder is dependent. The active encoder changes the actual encoder value. In combination with MD35102 $MA_REFP_SYNC_ENCS = 1, the passive encoder is adjusted to the active encoder during reference point approach, but is NOT referenced.

In reference mode MD34200 $MA_ENC_REFP_MODE = 3 (distance-coded reference marks), the passive encoder is automatically referenced with the next traversing movement after zero mark distance overtravel. This is done independently of the current mode setting.

MD30242 $MA_ENC_IS_INDEPENDENT = 3

In contrast to MD30242 $MA_ENC_IS_INDEPENDENT = 1, modulo actual value corrections are executed in the passive encoder of modulo rotary axes.

30244	ENC_MEAS_TYPE			A01, A02, A11	-	
-	Encoder measurement type			BYTE	PowerOn	
-						
-	2	1, 1	0	1	7/2	S

Description: For PROFIdrive only:

In combination with the MD13210 $MN_MEAS_TYPE = 1 (decentralized measurement), this MD can be used to set the type of axial measuring function for drives.

Encoder measurement type:

0: encoder measurement type central (global) measurement

1: encoder measurement type decentral (local) measurement

MEAS_TYPE	ENC_MEAS_TYPE	measuring sensor input used
0	0	central
0	1	central
1	0	central
1	1	decentralized

30250	ACT_POS_ABS			EXP, A02, A08	R1	
-	Internal encoder position			DOUBLE	PowerOn	
ODLD, -, -						
-	2	0.0, 0.0	-	-	7/2	I

Description: The actual position (hardware counter status only without machine reference) is stored (in internal format display) in this MD.

At power ON (or encoder activation), it acts with:

- Absolute encoders:

  To restore the current position (in combination with the position, possibly with several meanings, buffered in the encoder).

- Incremental encoders:

  To buffer the actual value beyond power OFF when the functionality is activated MD34210 $MA_ENC_REFP_STATE = 1 or. 2 (i.e. as a reference point replacement).

  To buffer the actual value beyond power OFF when the functionality is activated MD34210 $MA_ENC_REFP_STATE = 3 (i.e. as a restored position value).

Note:

This MD is changed internally by the control during traversing movements. Loading a previously saved MD data block can therefore destroy the encoder calibration (machine position reference) of absolute encoders.

For software conversions, we recommend removing the MD data block from the old software release prior to conversion and reloading it into the new software release without moving any axis in the meantime. Protection level 1 should be set for SW 3.6; protection level 2 suffices for SW 4 and higher. The encoder calibration must be explicitly verified (controlled, calibrated) after the software conversion.

30260	ABS_INC_RATIO			EXP, A01, A02	-	
-	Absolute encoder: Ratio of absolute to incremental resolution			DWORD	PowerOn	
-						
-	2	4, 4	-	-	7/2	M

Description: Absolute track resolution in relation to the incremental signal resolution.

This MD only applies for absolute encoders:

- PROFIBUS drives:

  Absolute information XIST2 related to incremental information XIST1.

  In the case of plausible drive parameters (e.g. for SIMODRIVE611U: P1042/P1043 or P1044/P1045 or corresponding entries in PROFIdrive parameter p979) the value of this MD is automatically calculated and updated from drive parameters (if parameter read-out has not been deactivated with $MN_DRIVE_FUNCTION_MASK, bit2)

Implausible drive parameters (e.g. multiplication of absolute track higher than that of the incremental signal) are rejected and replaced by the value entered in the current MD.

Implausible input values in the current MD (e.g. value=0) are reset to the default value. In addition, alarm 26025 or 26002 is output to inform the user accordingly.

30270	ENC_ABS_BUFFERING			EXP, A01, A02	R1
-	Absolute encoder: Traversing range extension			BYTE	PowerOn
-					
-	2	0, 0	0	1	7/2	M

Description:

This MD defines the way in which the absolute encoder position is buffered, and whether a traversing range extension is active on software side (exceeding the limits of the absolute value encoder range that can be displayed on the hardware).

"0" = standard = traversing range extension (compare ACT_POS_ABS) is active.

"1" = traversing range extension on software side is inactive.

When using an absolute linear scale, there will not be a traversing range overflow for mechanical reasons. This MD is therefore only valid for rotary absolute value encoders.

For rotary absolute value encoders, the traversing range that can be clearly displayed on the encoder side, is stored in MD34220 $MA_ENC_ABS_TURNS_MODULO. You can do without a traversing range extension without any problems (a hardware counter overflow that might be within the traversing range is concealed in the software via shortest-path decision):

a. in linear axes or limited rotary axes, if the actual traversing range on the load side is smaller than the traversing range on the load side that corresponds to MD34220 $MA_ENC_ABS_TURNS_MODULO.

b. in endlessly turning rotary axes (ROT_IS_MODULO = TRUE), if the absolute encoder is connected on the load side (no gear to be considered) or if "without remainder" can be calculated:

Number of rotations on the load side = ENC_ABS_TURNS_MODULO * gear ratio

(Example: ENC_ABS_TURNS_MODULO = 4096 encoder rotations, gear 25:32, i.e. number of rotations on load side = 4096*(25/32)=3200).

Notice:

If you do not meet the conditions under a. or b., you run the risk of getting a wrong absolute encoder position at next Power ON or encoder activation after parking without prewarning if the traversing range extension is not working. Therefore, the traversing range extension remains active in the standard version.

Related to:

MD30240 $MA_ENC_TYPE
MD30300 $MA_IS_ROT_AX
MD30310 $MA_ROT_IS_MODULO
MD30250 $MA_ACT_POS_ABS
MD34220 $MA_ENC_ABS_TURNS_MODULO
MD34090 $MA_REFP_MOVE_DIST_CORR

30300	IS_ROT_AX			A01, A06, A11, -	G1,K3,R2,T1,G2,K2,R1,S1,V1	
-	Rotary axis / spindle			BOOLEAN	PowerOn	
SCAL, CTEQ						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description:

1: Axis: The axis is defined as a "rotary axis".

- The special functions of the rotary axis are active or can be activated by means of additional machine data according to the type of machine required (see below).
- The unit of measurement is degrees.
- The units of the axis-specific machine and setting data are interpreted as follows with the standard control setting:

- Positions in "degrees"
- Speedsin "rev/minute"
- Accelerationin "rev/second²"
- Jerk limitationin "rev/second³"

Spindle:

The machine data should always be set to "1" for a spindle, otherwise alarm 4210 "Rotary axis declaration missing" is output.

0: The axis is defined as a "linear axis".

Special cases:

- For an axis: Alarm 4200 if the axis is already defined as a geometry axis.
- For a spindle: Alarm 4210

Related to:

The following machine data are active only after activation of MD30300 $MA_IS_ROT_AX = "1":

- MD30310 $MA_ROT_IS_MODULO "Modulo conversion for rotary axis"
- MD30320 $MA_DISPLAY_IS_MODULO "Position display is modulo"
- MD10210 $MN_INT_INCR_PER_DEG "Calculation precision for angular positions"

30310	ROT_IS_MODULO			A01, A06, A11, -	TE3,K3,R2,T1,A3,R1,R2,S1	
-	Modulo conversion for rotary axis / spindle			BOOLEAN	PowerOn	
CTEQ						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: 1: A modulo conversion is performed on the setpoints for the rotary axis. The software limit switches and the working area limitations are inactive; the traversing range is therefore unlimited in both directions. MD30300 $MA_IS_ROT_AX must be set to "1"

0: No modulo conversion

MD irrelevant for:

MD30300 $MA_IS_ROT_AX = "0" (linear axes)

Related to:

MD30320 $MA_DISPLAY_IS_MODULO "Position display is modulo 360°"

MD30300 $MA_IS_ROT_AX = 1 "Rotary axis"

MD36100 $MA_POS_LIMIT_MINUS "Software limit switch minus"

MD36110 $MA_POS_LIMIT_PLUS "Software limit switch plus"

SD43430 $SA_WORKAREA_LIMIT_MINUS "Working area limitation minus"

SD43420 $SA_WORKAREA_LIMIT_PLUS "Working area limitation plus"

30320	DISPLAY_IS_MODULO			A01, A06, A11	R2,T1,K2	
-	Modulo 360 degrees displayed for rotary axis or spindle.			BOOLEAN	PowerOn	
CTEQ						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/2	M

Description: 1: "Modulo 360 degrees" position display is active:

The position display of the rotary axis or spindle (for basic or machine coordinate system) is defined as "Modulo 360 degrees". In the case of a positive direction of rotation, the control resets the position display internally to 0.000 degrees following each cycle of 359.999 degrees. The display range is always positive and lies between 0 and 359.999 degrees.

0: Absolute position display is active:

In contrast to the modulo 360 degrees position display, absolute positions are indicated by the absolute position display, e.g. +360 degrees after 1 rotation, and +720 degrees after 2 rotations, etc in the positive direction. In this case, the display range is limited by the control in accordance with the linear axes.

MD irrelevant for:

Linear axes MD30300 $MA_IS_ROT_AX = "0"

Related to:

MD30300 $MA_IS_ROT_AX = 1 "Axis is rotary axis"

30330	MODULO_RANGE			EXP, A01, -	R2,T1,R1	
degrees	Size of modulo range.			DOUBLE	Reset	
CTEQ						
-	-	360.0	1.0	360000000.0	7/2	M

Description: Defines the size of the modulo range. Default positions are accepted and displayed within this range. Useful modulo ranges are n * 360 degrees with integer n. Other settings are equally possible in principle. Attention should be paid to having a useful relationship between the positions in the NC and the mechanics (ambiguity). Velocity definitions are not affected by settings in this MD.

30340	MODULO_RANGE_START			EXP, A01	R1,R2	
degrees	Modulo range start position			DOUBLE	Reset	
CTEQ						
-	-	0.0	-	-	7/2	M

Description: Defines the start position for the modulo range.

Example:

```
Start =    0 degree -> modulo range          0 <->360 degrees
Start =  180 degrees -> modulo range   180 <->540 degrees
Start = -180 degrees -> modulo range  -180 <->180 degrees
```

30350	SIMU_AX_VDI_OUTPUT			A01, A06	A2,G2,Z1	
-	Axis signals output for simulation axes			BOOLEAN	PowerOn	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: The machine data defines whether axis-specific interface signals are output to the PLC while an axis is being simulated.

1: The axis-specific NC/PLC interface signals for a simulated axis are output to the PLC.

This means that the user PLC program can be tested without the drives having to be available.

0: The axis-specific NC/PLC interface signals for a simulated axis are not output to the PLC.

All axis-specific NC/PLC interface signals are set to "0".

Not relevant for:

MD30130 $MA_CTRLOUT_TYPE (setpoint output type) = 1

30450	IS_CONCURRENT_POS_AX			EXP, A01	G1	
-	Default for reset: neutral/channel axis			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: For SW4.3:

If FALSE: On RESET, a neutral axis is reassigned to the NC program.

If TRUE: On RESET, a neutral axis remains in the neutral axis state and an axis assigned to the NC program becomes a neutral axis

30455	MISC_FUNCTION_MASK			A06, A10	R2,S3,R1	
-	Axis functions			DWORD	Reset	
CTEQ						
-	-	0x00	0	0x1ff	7/2	M

Description:

Bit 0 =0:

Modulo rotary axis/spindle: Programmed positions must be within the modulo range. Otherwise, an alarm is output.

Bit 0 =1:

If positions outside the modulo range are programmed, no alarm is output. The position is modulo-converted internally.

Example: B-5 is equivalent to B355, POS[A]=730 is identical to POS[A]=10, and SPOS=-360 behaves like SPOS=0 (modulo range 360 degrees)

Bit 1 =0:

Determination of reference point position of rotary, distance-coded encoders analog (1:1) in relation to the mechanical absolute position.

Bit 1 =1:

Determination of reference point position of rotary, distance-coded encoders within the configured modulo range.

For rotary axes with MD30310 $MA_ROT_IS_MODULO=0 using rotary, distance-coded encoders MD34200 $MA_ENC_REFP_MODE=3, the reference point position is determined as a function of MD30330 $MA_MODULO_RANGE and MD30340 $MA_MODULO_RANGE_START. This is automatically adapted to the motion limits of the modulo range. This bit is irrelevant for rotary axes with MD30310 $MA_ROT_IS_MODULO=1, since the reference point position is always determined within the modulo range.

Bit 2 =0:

Modulo rotary axis positioned at G90 with AC by default

Bit 2 =1:

Modulo rotary axis positioned at G90 with DC by default (shortest path)

Bit 3 =0:

With spindle/axis disable, $VA_IM, $VA_IM1, $VA_IM2 supply the setpoint value

Bit 3 =1:

With spindle/axis disable, $VA_IM, $VA_IM1, $VA_IM2 supply the actual value

Bit 4 =0:

Synchronous spindle coupling, following spindle: Cancellation of feedrate enable will decelerate the coupled group.

Bit 4 =1:

Following spindle: Feedrate enable only refers to the interpolation share of the overlaid motion (SPOS, etc.) and has no impact on the coupling.

Bit 5 = 0:

Synchronous spindle coupling, following spindle: Position control, feedforward control, and parameter block are set corresponding to the leading spindle.

Bit 5 =1:

Synchronous spindle coupling: The parameters of the following spindle are set as in the uncoupled case.

Bit 6 =0:

Programming of FA, OVRA, ACC, and VELOLIM is applied separately for spindle and axis modes. The assignment is made by the programmed axis or spindle identifier.

Bit 6 =1:

Programming of FA, OVRA, ACC, and VELOLIM is applied in concert for spindle and axis modes, irrespective of the programmed identifier.

Bit 7 = 0:

Synchronous spindle, correct synchronism error: Correction value $AA_COUP_CORR[Sn] is continuously calculated as long as the NC/PLC interface signal DB31, ... DBX31.6 (Correct synchronism) is set and setpoint-related synchronism is present.

Bit 7 = 1:

Synchronous spindle, correct synchronism error: Correction value $AA_COUP_CORR[Sn] is calculated only at the moment the NC/PLC interface signal DB31, ... DBX31.6 (Correct synchronism) is set from 0 to 1.

Bit 8 = 0:

Absolute encoders can only be readjusted in the enabled state MD34210=1.

Bit 8 = 1:

Absolute encoders can also be readjusted in the adjusted state MD34210=2.

30460	BASE_FUNCTION_MASK			A01	K5,P2,P1	
-	Axis functions			DWORD	PowerOn	
CTEQ						
-	-	0x00	0	0x1FF	7/2	M

Description: Axis-specific functions can be set by means of this MD.

The MD is bit-coded; the following bits are assigned:

Bit 0 = 0:

"Axis control" is not permissible.

Bit 0 = 1:

"Axis control" is permissible (the axis moves in the speed mode, if the NC/PLC interface signal DB31, ... DBX24.1 (Axis control) is set).

Bit 1:

Reserved for "Axis control".

Bit 2 = 0:

Axis-specific diameter programming not permitted.

Bit 2 = 1:

Axis-specific diameter programming permitted.

Bit 3:

Reserved for "Axis control"

Bit 4 = 0:

For control purposes, the axis can be used by NC and PLC.

Bit 4 = 1:

The axis is exclusively controlled by the PLC.

Bit 5 = 0:

The axis can be used by the NC and PLC.

Bit 5 = 1:

The axis is a permanently assigned PLC axis. However, the axis can be jogged and referenced.

Axis exchange between channels is not possible. The axis cannot be assigned to the NC program.

Bit 6 = 0:

The channel-specific interface signal DB21-30 DBX6.0 (feedforward disable) has an effect on the axis, even though it is a PLC-controlled axis.

Bit 6 = 1:

The channel-specific interface signal DB21-30 DBX6.0 (feedforward disable) will have no effect on the axis, if it is a PLC-controlled axis.

Bit 7 = 0:

The channel-specific interface signal DB21-30 DBX36.3 (all axes stationary) is set dependently of the axis, even though it is PLC-controlled.

Bit 7 = 1:

The channel-specific interface signal DB21-30 DBX36.3 (all axes stationary) will be set independently of the axis, if this axis is PLC-controlled.

Bit 8 = 0:

The axis is an 'interpolating (full) axis' (path/GEO/additional path axis/GEOAX()/spindle for thread cutting/tapping)

Bit 8 = 1:

The axis is a positioning axis / auxiliary spindle

30465	AXIS_LANG_SUB_MASK			N01	K1	
-	Substitution of NC language commands			DWORD	PowerOn	
-						
-	-	0x0	0x0	0x3	7/2	M

Description: MD30465 $MA_AXIS_LANG_SUB_MASK defines for the leading spindle(s) of a coupling (synchronous spindle coupling, ELG, tangential tracking, coupled motion, master value coupling, master/slave) which language constructs/functions are to be substituted by the user program set by MD15700 $MN_LANG_SUB_NAME / MD15702 $MN_LANG_SUB_PATH (default: /_N_CMA_DIR/_N_LANG_SUB_SPF).

The substitution is executed only if a coupling is active for the relevant spindle and, in the case of a gear stage change, only if a gear stage change is actually pending.

Bit 0 = 1:

Automatic (M40) and direct (M41-M45) gear stage change

Bit 1 = 1:

Spindle positioning with SPOS/SPOSA/M19

30500	INDEX_AX_ASSIGN_POS_TAB			A01, A10	T1,H1	
-	Axis is an indexing axis			BYTE	Reset	
-						
-	-	0	0	3	7/2	M

Description: The axis is declared as an indexing axis by assignment of indexing position table 1 or 2.

0: The axis is not declared as an indexing axis

1: The axis is an indexing axis. The associated indexing positions are stored in table 1 (MD10910 $MN_INDEX_AX_POS_TAB_1).

2: The axis is an indexing axis. The associated indexing positions are stored in table 2 (MD10930 $MN_INDEX_AX_POS_TAB_2).

3: Equidistant indexing with SW 4.3 and higher (840D) and SW 2.3 and higher (810D)

>3: Alarm 17090 "Value violates upper limit"

Special cases:

Several axes can be assigned to an indexing position table on the condition that all these indexing axes are of the same type (linear axis, rotary axis, modulo 360° function). If they are not, alarm 4000 is output during power-up.

Alarm 17500 "Axis is not an indexing axis"

Alarm 17090 "Value violates upper limit"

Related to:

MD10910 $MN_INDEX_AX_POS_TAB_1 (indexing position table 1)

MD10900 $MN_INDEX_AX_LENGTH_POS_TAB_1

(no. of indexing positions used in table 1)

MD10930 $MN_INDEX_AX_POS_TAB_2 (indexing position table 2)

MD10920 $MN_INDEX_AX_LENGTH_POS_TAB_2

(no. of indexing positions used in table 2)

For equidistant indexings with value 3:

MD30501 $MA_INDEX_AX_NUMERATOR Numerator

MD30502 $MA_INDEX_AX_DENOMINATOR Denominator

MD30503 $MA_INDEX_AX_OFFSET First indexing position

MD30505 $MA_HIRTH_IS_ACTIVE Hirth tooth system

30501	INDEX_AX_NUMERATOR			A01, A10	T1	
mm, degrees	Indexing axis equidistant positions numerator			DOUBLE	Reset	
-						
-	-	0.0	-	-	7/2	M

Description: Defines the value of the numerator for calculating the distances between two indexing positions when the positions are equidistant. Modulo axes ignore this value and use MD30330 $MA_MODULO_RANGE instead.

MD irrelevant for non-equidistant indexes in accordance with tables.

Related to:

MD30502 $MA_INDEX_AX_DENOMINATOR,

MD30503 $MA_INDEX_AX_OFFSET;

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB

30502	INDEX_AX_DENOMINATOR			A01, A10	T1	
-	Indexing axis equidistant positions denominator			DWORD	Reset	
-						
-	-	1	1	-	7/2	M

Description: Defines the value of the denominator for calculating the distances between two indexing positions when the positions are equidistant. For modulo axes it therefore specifies the number of indexing positions.

MD irrelevant for non-equidistant indexes in accordance with tables.

Related to:

MD30501 $MA_INDEX_AX_NUMERATOR,
MD30503 $MA_INDEX_AX_OFFSET,
MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB

30503	INDEX_AX_OFFSET			A01, A10	T1,R2	
mm, degrees	Indexing axis with equidistant positions first index position			DOUBLE	Reset	
-						
-	-	0.0	-	-	7/2	M

Description: Defines the position of the first indexing position from zero for an indexing axis with equidistant positions.

MD irrelevant for non-equidistant indexes in accordance with tables.

Related to:

MD30501 $MA_INDEX_AX_NUMERATOR, MD30502 $MA_INDEX_AX_DENOMINATOR, MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB

30505	HIRTH_IS_ACTIVE			A01, A10	T1	
-	Axis is an indexing axis with Hirth tooth system			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: Hirth tooth system is active when value 1 is set.

MD irrelevant if axis is not an indexing axis.

Related to:

MD30500 $MA_INDEX_AX_ASSIGN_POS_TAB, MD30501 $MA_INDEX_AX_NUMERATOR, MD30502 $MA_INDEX_AX_DENOMINATOR, MD30503 $MA_INDEX_AX_OFFSET

30550	AXCONF_ASSIGN_MASTER_CHAN			A01, A06, A10	K5,TE3,B3,S3,K1,R1	
-	Initial setting of channel for change of axis			BYTE	PowerOn	
-						
-	-	0	0	10	7/2	M

Description: Definition of the channel to which the axis is assigned after Power ON.

Related to:

MD20070 $MC_AXCONF_MACHAX_USED

30552	AUTO_GET_TYPE			EXP, A06, A10	K5,M3,TE6,P2,P5,2.4	
-	Automatic GET for get axis			BYTE	PowerOn	
-						
-	-	1	0	2	7/2	M

Description: 0 = No automatically created GET -> Alarm in response to incorrect programming.

1 = GET is output when GET is generated automatically.

2 = GETD is output when GET is generated automatically.

30554	AXCONF_ASSIGN_MASTER_NCU			A01, A06, A10	B3	
-	Initial setting which NCU creates setpoints for the axis			BYTE	PowerOn	
-						
-	-	0	0	16	7/2	M

Description: This machine data is evaluated only if the NCU is linked with other NCUs via the NCU link communication.

Assignment of master NCU:

If a machine axis is activated via MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB in several NCUs in an NCU cluster, then a MASTER NCU must be assigned to it. This NCU takes over the setpoint creation for the axis after the runup. For axes which are only activated in one NCU, the number of this NCU or 0 must be entered. Other entries initiate a runup interrupt.

30560	IS_LOCAL_LINK_AXIS			EXP, A01	B3	
-	Axis is a local link axis			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: An axis for which this MD is set to 1 is not addressed by the local NCU at runup. The associated drive is put into operation.

The axis is traversed by another NCU. The evaluation is made only if link communication exists.

Not relevant for:

Systems without link modules

Related to:

MD18780 $MN_MM_NCU_LINK_MASK

30600	FIX_POINT_POS			A03, A10	K1,W3	
mm, degrees	Fixed-value positions of axis with G75			DOUBLE	PowerOn	
-						
-	4	0.0, 0.0, 0.0, 0.0	-	-	7/2	I

Description: The fixed-point positions (4 max.) for each axis which can be approached when G75 is programmed or via JOG are entered in these machine data.

References:

/PA/, "Programming Guide: Fundamentals"

30610	NUM_FIX_POINT_POS			A03, A10	K1	
-	Number of fixed-value positions of an axis			DWORD	PowerOn	
-						
-	-	0	0	4	7/2	M

Description: Number of fixed point positions set, i.e. the number of valid entries in MD30600 $MA_FIX_POINT_POS.

For G75, two (2) fixed point positions are assumed in MD30600 $MA_FIX_POINT_POS for reasons of compatibility, even if '0' has been entered in this machine data.

30800	WORKAREA_CHECK_TYPE			-	A3	
-	Type of check of working area limitations.			BOOLEAN	NEW CONF	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: With this machine data you can specify whether only the working area limitations of traversing axes are to be checked (0)

or

whether the stationary axes in a traversing block are also to be checked (1).

The value 0 corresponds to the behavior up to SW5.

1.5.2 Encoder matching

31000	ENC_IS_LINEAR			A02, A11, -	G2	
-	Linear scale			BOOLEAN	PowerOn	
-						
-	2	FALSE, FALSE	-	-	7/2	M

Description: MD = 1: Encoder for position actual-value acquisition is linear (linear scale).

MD = 0: Encoder for position actual-value acquisition is rotary.

The index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31010	ENC_GRID_POINT_DIST			A02, A11, -	G2	
mm	Division period for linear scales			DOUBLE	PowerOn	
-						
-	2	0.01, 0.01	-	-	7/2	M

Description: For linear measuring system only:

The distance between the reference marks on the linear scale must be entered in this MD.

Index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31020	ENC_RESOL			A02, A11, -	G2,R1	
-	Encoder lines per revolution			DWORD	PowerOn	
-						
-	2	2048, 2048	-	-	7/2	M

Description: For rotary measuring system only:

The number of encoder lines per encoder revolution must be entered in this MD.

Index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31025	ENC_PULSE_MULT			EXP, A01, A02	-	
-	Encoder multiplication (high-resolution)			DWORD	PowerOn	
-						
-	2	2048, 2048	-	-	7/2	M

Description: For PROFIdrive only:

This MD describes the measuring system multiplication on PROFIBUS/ PROFINET.

Default value 2048 means: changing by just one encoder line can be seen in bit11 of the actual PROFIdrive value XIST1, that is, the actual encoder value is multiplied by 2 to the power of 11= 2048.

31030	LEADSCREW_PITCH			A02, A11, -	G2,A3	
mm	Pitch of leadscrew			DOUBLE	PowerOn	
-						
-	-	10.0	-	-	7/2	M

Description: The ball screw lead must be entered in the MD (see data sheet: mm/ rev or inch/rev).

Special meaning for hydraulic linear drives:

If a hydraulic linear drive (HLA) is configured as rotary axis, it must be specified in this MD, which drive feedrate in mm corresponds to a programmed revolution (360 degrees).

31040	ENC_IS_DIRECT			A02, A11, -	G2,S1	
-	Direct measuring system (no compilation to load position)			BOOLEAN	PowerOn	
-						
-	2	FALSE, FALSE	-	-	7/2	M

Description: MD = 1:

Encoder for actual position value sensing is attached directly to the machine (without an intermediate gear unit).

MD = 0:

Encoder for actual position value sensing is attached to the motor (MD31060 $MA_DRIVE_AX_RATIO_NUMERA and MD31050 $MA_DRIVE_AX_RATIO_DENOM are included in the encoder valuation).

The index[n] of the machine data has the following coding:

[encoder no.]: 0 or 1

Special cases:

An incorrect entry may result in an incorrect encoder resolution, as, for example, the gear ratios would be calculated incorrectly.

31044	ENC_IS_DIRECT2			A02, -	G2,S1		
-	Encoder mounted on the additional gearbox			BOOLEAN	NEW CONF		
-							
-	2	FALSE, FALSE	-	-	7/2	M	

Description: When using a load intermediate gearbox (for example for rotating tools, compare MD31066 $MA_DRIVE_AX_RATIO2_NUMERA and MD31064 $MA_DRIVE_AX_RATIO2_DENOM), the encoder installation location can be defined as "on the output" of this load intermediate gearbox:

Encoder installation "on the output of the load intermediate gear-box" is configured by MD31040 $MA_ENC_IS_DIRECT=1 and MD31044 $MA_ENC_IS_DIRECT2=1 at the same time.

Encoder installation "on the input of the load intermediate gear-box" is configured by MD31040 $MA_ENC_IS_DIRECT=1 together with MD31044 $MA_ENC_IS_DIRECT2=0.

A parameterization alarm will be output if MD31044 $MA_ENC_IS_DIRECT2=1 is set without MD31040 $MA_ENC_IS_DIRECT=1 (this combination has not been defined).

31050	DRIVE_AX_RATIO_DENOM			A02, A11, -	A2,A3,G2,S1,V1		
-	Denominator load gearbox			DWORD	PowerOn		
-							
-	6	1, 1, 1, 1, 1, 1	1	2147000000	7/2	M	

Description: The load gearbox denominator is entered in this MD.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

31060	DRIVE_AX_RATIO_NUMERA			A02, A11, -	A2,A3,G2,S1,V1		
-	Numerator load gearbox			DWORD	PowerOn		
-							
-	6	1, 1, 1, 1, 1, 1	-2147000000	2147000000	7/2	M	

Description: The load gearbox numerator is entered in this MD.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

31064	DRIVE_AX_RATIO2_DENOM			A02, -	G2,S1	
-	Denominator additional gearbox			DWORD	NEW CONF	
-						
-	-	1	1	2147000000	7/2	M

Description: Intermediate gearbox denominator

This MD together with MD31066 $MA_DRIVE_AX_RATIO2_NUMERA defines an intermediate gearbox that acts as a multiplier to the motor/ load gearbox (described by MD31060 $MA_DRIVE_AX_RATIO_NUMERA and MD31050 $MA_DRIVE_AX_RATIO_DENOM).

The load intermediate gearbox is inactive with the default values 1:1.

Please consider MD31044 $MA_ENC_IS_DIRECT2 for encoder installation.

When the Safety Integrated functionality (see MD36901 $MA_SAFE_FUNCTION_ENABLE) is active, the intermediate gearbox can be used, if

- the effectively active gear ratio from the motor to the tool is considered in the safety-relevant machine data and if
- the safety-relevant supplementary conditions for gear ratios are considered.

For more detailed information see the Safety Integrated Description of Functions.

31066	DRIVE_AX_RATIO2_NUMERA			A02, -	G2,S1	
-	Numerator additional gearbox			DWORD	NEW CONF	
-						
-	-	1	-2147000000	2147000000	7/2	M

Description: Intermediate gearbox numerator

Related to:

MD31064 $MA_DRIVE_AX_RATIO2_DENOM

31070	DRIVE_ENC_RATIO_DENOM			A02, A11, -	A3,G2,S1	
-	Denominator measuring gearbox			DWORD	PowerOn	
-						
-	2	1, 1	1	2147000000	7/2	M

Description: The measuring gearbox denominator is entered in this MD.

The index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31080	DRIVE_ENC_RATIO_NUMERA			A02, A11, -	A3,G2,S1	
-	Numerator measuring gearbox			DWORD	PowerOn	
-						
-	2	1, 1	1	2147000000	7/2	M

Description: The measuring gearbox numerator is entered in this MD.

The index [n] of the machine data has the following coding:

[encoder no.]: 0 or 1

31090	JOG_INCR_WEIGHT			A01, A12	H1,G2	
mm, degrees	Evaluation of an increment with INC/handwheel			DOUBLE	Reset	
CTEQ						
-	2	0.001, 0.00254	-	-	7/2	M

Description: The value entered in this MD defines the path of an increment which applies when an axis is traversed with the JOG keys in incremental mode or with the handwheel.

The path traveled by the axis on each increment each time the traversing key is pressed or for each handwheel detent position is defined by the following parameters:

- MD31090 $MA_JOG_INCR_WEIGHT
  (Weighting of an increment of a machine axis for INC/handwheel)
- Selected increment size (INC1, ..., INCvar)

The possible increment stages are defined globally for all axes in MD11330 $MN_JOG_INCR_SIZE_TAB [n] and in SD41010 $SN_JOG_VAR_INCR_SIZE.

Entering a negative value reverses the direction of evaluation of the traverse keys and the handwheel rotation.

Related to:

MD11330 $MN_JOG_INCR_SIZE_TAB
SD41010 $SN_JOG_VAR_INCR_SIZE

31100	BERO_CYCLE			A02, EXP, A01	G2	
-	Steps for rotation monitoring			DWORD	PowerOn	
CTEQ						
-	2	2000, 2000	10	10000000	-1/2	M

Description: Repetition cycle from BERO in steps

31110	BERO_EDGE_TOL			A02, A01, A12	H1,G2	
-	Step tolerance for rotation monitoring			DWORD	NEW CONF	
CTEQ						
-	2	50, 50	10	10000000	-1/2	M

Description: BERO edge tolerance in steps

31122	BERO_DELAY_TIME_PLUS			A02, A06	S1,R1	
s	BERO delay time Plus			DOUBLE	NEW CONF	
-						
-	2	0.000110, 0.000110	-	-	7/2	M

Description: This machine data in combination with the setting in MD34200 $MA_ENC_REFP_MODE (referencing mode) = 7 causes a signal runtime compensation in the positive direction of movement at a position determined by a BERO (zero mark).

The typical total delay time of the BERO message path for over-travel in the positive direction of movement is entered.

This time includes:

- the BERO edge delay time
- the time for digitizing the signal
- the time for processing the measured value, etc.

The periods of time depend on the hardware used. The default value is typical for SIEMENS products. Adjustment by the customer is only required in exceptional cases.

Input of the minimum value "0.0" deactivates the compensation (only active in combination with MD34200 $MA_ENC_REFP_MODE = 7).

The machine data is available for all encoders.

Related to:

MD34200 $MA_ENC_REFP_MODE (referencing mode)

MD34040 $MA_REFP_VELO_SEARCH_MARKER[n]
(reference point creep velocity [Enc. no.])

31123	BERO_DELAY_TIME_MINUS			A02, A06	S1,R1	
s	BERO delay time minus			DOUBLE	NEW CONF	
-						
-	2	0.000078, 0.000078	-	-	7/2	M

Description: This machine data in combination with the setting in MD34200 $MA_ENC_REFP_MODE (referencing mode) = 7 causes a signal runtime compensation in the negative direction of movement at a position determined by a BERO (zero mark).

The typical total delay time of the BERO message path for over-travel in the negative direction of movement is entered.

The time includes:

- the BERO edge delay time
- the time for digitizing the signal
- the time for processing the measured value, etc.

The periods of time depend on the hardware used. The default value is typical for SIEMENS products. Adjustment by the customer is only required in exceptional cases.

Input of the minimum value "0.0" deactivates the compensation (only active in combination with MD34200 $MA_ENC_REFP_MODE = 7).

The machine data is available for all encoders.

Related to:

MD34200 $MA_ENC_REFP_MODE (referencing mode)

MD34040 $MA_REFP_VELO_SEARCH_MARKER[n]

(creep velocity [Enc. no.])

31200	SCALING_FACTOR_G70_G71			EXP, A01	G2	
-	Factor for converting values while G70/G71 is active			DOUBLE	PowerOn	
CTEQ						
-	-	25.4	1.e-9	-	7/2	M

Description: The inch/metric conversion factor by which the programmed geometry of an axis (position, polynomial coefficients, radius for circular programming,...) is multiplied when the programmed value for G code group G70/G71 differs from the initial setting value (set in MD20150 $MC_GCODE_RESET_VALUES[n]) is entered in this MD.

The factor can be set for each axis individually, so that pure positioning axes are not dependent on G70/G71. The factors within the three geometry axes should not be different.

The data influenced by G70/G71 are described in the Programming Guide.

Related to:

MD20150 $MC_GCODE_RESET_VALUES[n] (G group initial setting).

31350	FREQ_STEP_LIMIT			EXP, A01	G2	
-	Maximum frequency of stepper motor			DOUBLE	PowerOn	
CTEQ						
-	1	75000.0	1000.0	2000000.0	-1/2	M

Description: Maximum frequency in Hz permitted for a stepper motor, MD is applied on stepper motor drive

31400	STEP_RESOL			EXP, A01	G2	
-	Steps per stepper motor revolution			DWORD	PowerOn	
CTEQ						
-	1	1000	100	100000	-1/2	M

Description: Steps per stepper motor revolution

31600	TRACE_VDI_AX			EXP, N06	-	
-	Trace-specification for axial VDI signals			BOOLEAN	PowerOn	
NBUP						
-	-	FALSE	-	-	2/2	M

Description: This machine data determines whether the axial VDI signals for this axis are recorded in the NCSC trace (according to MD18794 $MN_MM_TRACE_VDI_SIGNAL).

1.5.3 Closed-loop control

32000	MAX_AX_VELO			A11, A04	M3,TE1,TE3,W6,Z3,H1,K3,M1,P2,A3,B2,G2,H2,S1,V1,W1	
mm/min, rev/min	maximum axis velocity			DOUBLE	NEW CONF	
CTEQ						
-	-	10000.,10000.,10000.,10000.,10000....	1.e-9	-	7/2	M

Description: Maximum velocity at which the axis can permanently travel. The value limits both the positive and the negative axis velocity. The axis traverses at this velocity, if rapid traverse has been programmed.

Depending on the MD30300 $MA_IS_ROT_AX, the maximum rotary or linear axis velocity has to be entered.

In the machine data, the dynamic behavior of the machine and drive and the limit frequency of the actual value acquisition must be taken into account.

32010	JOG_VELO_RAPID			A11, A04, -	H1	
mm/min, rev/min	Rapid traverse in jog mode			DOUBLE	Reset	
CTEQ						
-	-	10000.,10000.,10000.,10000.,10000....	-	-	7/2	M

Description: The axis velocity entered applies when the rapid traverse override key is pressed in JOG mode and when the axial feedrate override is set to 100%.

The value entered must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

This machine data is not used for the programmed rapid traverse G0.

MD irrelevant to:

Operating modes AUTOMATIC and MDI

Related to:

MD32000 $MA_MAX_AX_VELO (maximum axis velocity)

MD32040 $MA_JOG_REV_VELO_RAPID

(revolutional feedrate for JOG with rapid traverse override)

NC/PLC interface signal DB21-30 DBX12.5, DBX16.5, DBX20.5 (Rapid traverse override)

NC/PLC interface signal DB21-30 DBB4 (Feedrate override A-H)

32020	JOG_VELO			A11, A04, -	H1	
mm/min, rev/min	Jog axis velocity			DOUBLE	Reset	
CTEQ						
-	-	2000.,2000.,2000.,2000.,2000.,2000....	-	-	7/2	M

Description: The velocity entered applies to traversing in JOG mode when the axial feedrate override switch position is 100%.

This velocity is only used when general SD41110 $SN_JOG_SET_VELO = 0 for linear axes, and linear feedrate is selected (SD41100 $SN_JOG_REV_IS_ACTIVE = 0) or SD41130 $SN_JOG_ROT_AX_SET_VELO = 0 for rotary axes.

If this is the case, the axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel jogging

The value entered must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

If DRF is active, the axis velocity for JOG must be reduced with MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR.

Spindles in JOG mode:

This machine data can also be used to define the JOG mode speed for specific spindles (if SD41200 $SN_JOG_SPIND_SET_VELO = 0). However, the speed can be modified with the spindle override switch.

Related to:

MD32000 $MA_MAX_AX_VELO

(maximum axis velocity)

MD32050 $MA_JOG_REV_VELO

(revolutional feedrate for JOG)

MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR

(ratio of JOG velocity to handwheel velocity (DRF))

SD41110 $SN_JOG_SET_VELO

(JOG velocity for G94)

SD41130 $SN_JOG_ROT_AX_SET_VELO

(JOG velocity for rotary axes)

NC/PLC interface signal DB21-30 DBB4 (Feedrate override A-H)

32040	JOG_REV_VELO_RAPID			A11, A04	H1,P2,R2,T1,V1,Z1	
mm/rev	Revolutional feedrate in JOG with rapid traverse override			DOUBLE	Reset	
CTEQ						
-	-	2.5,2.5,2.5,2.5,2.5,2.5,2.5,2.5,2.5...	-	-	7/2	M

Description: The value entered defines the revolutional feedrate of the axis in JOG mode with rapid traverse override in relation to the revolutions of the master spindle. This feedrate is active when SD41100 $SN_JOG_REV_IS_ACTIVE = 1. (Revolutional feedrate active with JOG)

MD irrelevant for:

SD41100 $SN_JOG_REV_IS_ACTIVE = "0"

Related to:

SD41100 $SN_JOG_REV_IS_ACTIVE (revolutional feedrate with JOG active)

MD32050 $MA_JOG_REV_VELO (revolutional feedrate with JOG)

32050	JOG_REV_VELO			A11, A04	H1,P2,R2,T1,V1,Z1	
mm/rev	Revolutional feedrate in JOG			DOUBLE	Reset	
CTEQ						
-	-	0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5...	-	-	7/2	M

Description: The value entered defines the revolutional feedrate of the axis in JOG mode in relation to the revolutions of the master spindle.

This feedrate is active when SD41100 $SN_JOG_REV_IS_ACTIVE= 1 (revolutional feedrate active with JOG).

MD irrelevant for:

Linear feedrate; i.e. SD41100 $SN_JOG_REV_IS_ACTIVE = 0

Related to:

SD41100 $SN_JOG_REV_IS_ACTIVE

(revolutional feedrate for JOG active)

MD32040 $MA_JOG_REV_VELO_RAPID

(JOG revolutional feedrate with rapid traverse override)

32060	POS_AX_VELO			A12, A04	H1,P2,K1,V1,2.4,6.2	
mm/min, rev/min	Initial setting for positioning axis velocity			DOUBLE	Reset	
CTEQ						
-	-	10000.,10000.,10000.,10000.,10000....	-	-	7/2	M

Description: If a positioning axis is programmed in the part program without specifying the axis-specific feedrate, the feedrate entered in MD32060 $MA_POS_AX_VELO is automatically used for this axis. The feedrate in MD32060 $MA_POS_AX_VELO applies until an axis-specific feedrate is programmed in the part program for this positioning axis.

MD irrelevant for:

MD32060 $MA_POS_AX_VELO is irrelevant for all axis types other than positioning axis.

Special cases:

If a ZERO velocity is entered in MD32060 $MA_POS_AX_VELO, the positioning axis does not traverse if it is programmed without feed. If a velocity is entered in MD32060 $MA_POS_AX_VELO that is higher than the maximum velocity of the axis (MD32000 $MA_MAX_AX_VELO), the velocity is automatically restricted to the maximum rate.

32070	CORR_VELO		A04	2.4,6.2	
%	Axis velocity for override		DOUBLE	Reset	
CTEQ					
-	- 50.0	-	-	7/2	M

Description: Limitation of axis velocity for handwheel override, external zero offset, continuous dressing, distance control $AA_OFF via synchronized actions related to the JOG velocity

MD32020 $MA_JOG_VELO,

MD32010 $MA_JOG_VELO_RAPID,

MD32050 $MA_JOG_REV_VELO,

MD32040 $MA_JOG_REV_VELO_RAPID.

The maximum permissible velocity is the maximum velocity in MD32000 $MA_MAX_AX_VELO. Velocity is limited to this value.

The conversion into linear or rotary axis velocity is made according to MD30300 $MA_IS_ROT_AX.

32074	FRAME_OR_CORRPOS_NOTALLOWED			A01	K5,K2,2.4,6.2	
-	Frame or tool length compensation are not permissible			DWORD	PowerOn	
CTEQ						
-	-	0	0	0xFFF	7/2	M

Description: This machine data is used to define the effectiveness of the frames and tool length compensations for indexing axes, PLC axes and command axes started from synchronized actions.

Bit assignment:

Bit 0 = 0:
  Programmable zero offset (TRANS) allowed for indexing axis

Bit 0 = 1:
  Programmable zero offset (TRANS) forbidden for indexing axis

Bit 1 = 0:
  Scale modification (SCALE) allowed for indexing axis

Bit 1 = 1:
  Scale modification (SCALE) forbidden for indexing axis

Bit 2 = 0:
  Direction change (MIRROR) allowed for indexing axis

Bit 2 = 1:
  Direction change (MIRROR) forbidden for indexing axis

Bit 3 = 0:
  DRF offset allowed for axis

Bit 3 = 1:
  DRF offset forbidden for axis

Bit 4 = 0:
  External zero offset allowed for axis

Bit 4 = 1:
  External zero offset forbidden for axis

Bit 5 = 0:
  Online tool compensation allowed for axis

Bit 5 = 1:
  Online tool compensation forbidden for axis

Bit 6 = 0:
  Synchronized action offset allowed for axis

Bit 6 = 1:
  Synchronized action offset forbidden for axis

Bit 7 = 0:
  Compile cycles offset allowed for axis

Bit 7 = 1:
  Compile cycles offset forbidden for axis

Bit 8 = 0:
  Axial frames and tool length compensation are NOT considered for PLC axes (bit evaluation so for compatibility reasons)

Bit 8 = 1:
  Axial frames are considered for PLC axes, and the tool length compensation is considered for PLC axes which are geometry axes.

Bit 9 = 0:
  Axial frames are considered for command axes, and the tool length compensation is considered for command axes which are

geometry axes.

Bit 9 = 1:

Axial frames and tool length compensation are NOT considered for command axes

Bit 10 = 0:

In JOG mode, too, traversing of a geometry axis as a PLC or command axis is NOT allowed with active rotation.

Bit 10 = 1:

In JOG mode, traversing of a geometry axis as a PLC axis or command axis (static synchronized action) is allowed with active rotation (ROT frame). Traversing must be terminated prior to returning to AUTOMATIC mode (neutral axis state), as otherwise alarm16908 would be output when the mode is changed.

Bit 11 = 0:

In the 'Program interrupted' status, repositioning to the interrupt position (AUTO - JOG) takes place when changing from JOG to AUTO.

Bit 11 = 1:

Prerequisite: Bit 10 == 1 (PLC or command axis motion with active rotation in JOG mode).

In the 'Program interrupted' status, the end point of the PLC or command axis motion is taken over when changing from JOG to AUTOMATIC and the geometry axes are positioned according to the rotation

32080	HANDWH_MAX_INCR_SIZE			A05, A10	H1	
mm, degrees	Limitation of selected increment			DOUBLE	Reset	
CTEQ						
-	-	0.0	-	-	7/2	M

Description: > 0: Limitation of size of selected increment $MN_JOG_INCR_SIZE <Increment/VDI signal>Ü or SD41010 $SN_JOG_VAR_INCR_SIZE for the associated machine axis

0: No limitation

32082	HANDWH_MAX_INCR_VELO_SIZE			A05, A10, A04	-	
mm/min, rev/min	Limitation for velocity override			DOUBLE	Reset	
CTEQ						
-	-	500.0,500.0,500.0,500.0,500.0,500.0...	-	-	7/2	M

Description: For the velocity override of positioning axes:

>0: Limitation of size of selected increment $MN_JOG_INCR_SIZEL<Increment/VDI signal> 0 or SD41010 $SN_JOG_VAR_INCR_SIZE for the associated machine axis

0: No limitation

32084	HANDWH_STOP_COND			EXP, A10	H1	
-	Handwheel travel behavior			DWORD	Reset	
CTEQ						
-	-	0xFF	0	0x7FF	7/2	M

Description: Definition of the response of the handwheel travel to axis-specific VDI interface signals or a context-sensitive interpolator stop:

Bit = 0:

Interruption or collection of the distances preset via the handwheel.

Bit = 1:

Cancellation of the traversing motion or no collection.

Bit assignment:

Bit 0: feedrate override

Bit 1: spindle speed override

Bit 2: feedrate stop/spindle stop or context-sensitive interpolator stop

Bit 3: clamping procedure running (= 0 no effect)

Bit 4: servo enable

Bit 5: pulse enable

For machine axis:

Bit 6 = 0

For handwheel travel, the maximum velocity at which the relevant machine axis can be traversed is the feedrate set in MD32020 $MA_JOG_VELO.

Bit 6 = 1

For handwheel travel, the maximum velocity at which the relevant machine axis can be traversed is the feedrate set in MD32000 $MA_MAX_AX_VELO.

Bit 7 = 0

The override is active in handwheel travel.

Bit 7 = 1

The override is always assumed to be 100% for handwheel travel, regardless of how the override switch is set.

Exception: override 0% is always active.

Bit 8 = 0

The override is active with DRF

Bit 8 = 1

The override is always assumed to be 100% for DRF, regardless of how the override switch is set.

Exception: override 0% is always active.

Bit 9 = 0

For handwheel travel, the maximum possible velocity with revolutional feedrate is

- with the feedrate in SD41120 $SN_JOG_REV_SET_VELO or
- the feedrate in MD32050 $MA_JOG_REV_VELO or
- in the case of rapid traverse with MD32040 $MA_JOG_REV_VELO_RAPID

of the relevant machine axis calculated with the spindle or rotary axis feedrate.

Bit 9 = 1

For handwheel travel, the maximum possible velocity is with the revolutional feedrate in MD32000 $MA_MAX_AX_VELO of the relevant machine axis. (see also bit 6)

Bit 10 = 0

For overlaid motions, $AA_OVR is not active.

Bit 10 = 1

For overlaid motions (DRF, $AA_OFF, external work offset, online tool offset), the override $AA_OVR settable via synchronized actions is active.

Bit 11 = 0

With the VDI interface signal "driveReady" (= 0) missing, paths defined by the handwheel are not collected, but a traversing request is displayed. Start of a continuous JOG motion in continuous mode ($SN_JOG_CONT_MODE_LEVELTRIGGRD 41050 = 0) or an incremental JOG motion in continuous mode ($MN_JOG_INC_MODE_LEVELTRIGGRD 11300 = 0) is displayed as a traversing request. With "driveReady" = 1, however, the tool is not traversed, but the procedure is aborted and must be started again.

Bit 11 = 1

With the VDI interface "driveReady" missing, the paths defined by the handwheel are collected. Start of a continuous JOG motion in continuous mode ($SN_JOG_CONT_MODE_LEVELTRIGGRD 41050 = 0) or an incremental JOG motion in continuous mode ($MN_JOG_INC_MODE_LEVELTRIGGRD 11300 = 0) is displayed and saved as a traversing request. With "driveReady" = 1 the traversing motion is started.

32090	HANDWH_VELO_OVERLAY_FACTOR			A10, A04	H1	
-	Ratio of JOG velocity to handwheel velocity (DRF)			DOUBLE	Reset	
CTEQ						
-	-	0.5	-	-	7/2	M

Description: The velocity active with the handwheel in DRF can be reduced from the JOG velocity with this machine data.

The following applies to linear axes for the velocity active with DRF:

vDRF = SD41110 $SN_JOG_SET_VELO * MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR

or when SD41110 $SN_JOG_SET_VELO = 0:

vDRF = MD32020 $MA_JOG_VELO * MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR

The velocity setting in SD41130 $SN_JOG_ROT_AX_SET_VELO applies for DRF on rotary axes instead of the value in SD41110 $SN_JOG_SET_VELO.

MD irrelevant for:

JOG handwheel

Related to:

MD32020 $MA_JOG_VELO (JOG axis velocity)

SD41110 $SN_JOG_SET_VELO (JOG velocity for G94)

SD41130 $SN_JOG_ROT_AX_SET_VELO (JOG velocity for rotary axes)

32100	AX_MOTION_DIR			A07, A03, A11, -	G1,TE3,G2	
-	Traversing direction (not control direction)			DWORD	PowerOn	
-						
-	-	1	-1	1	7/2	M

Description: The direction of movement of the machine can be reversed with this MD.

The control direction is, however, not destroyed; i.e. closed-loop control remains stable.

-1: Direction reversal

0, 1: No direction reversal

Note:

In the case of SINAMICS drives, we recommend that the direction of motion is reversed in the drive (see P1821).

32110	ENC_FEEDBACK_POL			A07, A02, A11	G2	
-	Sign actual value (control direction)			DWORD	PowerOn	
-						
-	2	1, 1	-1	1	7/2	M

Description: The evalution direction of the shaft encoder signals is entered in the MD.

-1: Actual value reversal

0, 1: No actual value reversal

The index[n] of the machine data is encoded as follows:

[Encoder no.]: 0 or 1

Special cases:

The axis can run off if an incorrect control direction is entered.

Depending on the setting of the corresponding limit values, one of the following alarms is displayed:

Alarm 25040 "Standstill monitoring"

Alarm 25050 "Contour monitoring"

Alarm 25060 "Speed setpoint limitation"

If an uncontrolled setpoint step change occurs on connection of a drive, the control direction might be incorrect.

Note:

In the case of SINAMICS drives, we recommend that the direction of motion is reversed in the drive (see P410).

This is obligatory if you are using DSC (see also MD32640 $MA_STIFFNESS_CONTROL_ENABLE).

32200	POSCTRL_GAIN			A07, A11	G1,TE1,TE9,K3,S3,A2,A3,D1,G2,S1,V1	
1000/min	Servo gain factor			DOUBLE	NEW CONF	
CTEQ						
-	6	16.66666667, 16.66666667, 16.66666667, 16.66666667, 16.66666667...	0	2000.	7/2	M

Description: Position controller gain, or servo gain factor.

The input/output unit for the user is [(m/min)/mm].

I.e. MD32200 $MA_POSCTRL_GAIN[n] = 1 corresponds to a 1 mm following error at V = 1m/min.

The following machine data have default settings for adapting the standard selected input/output unit to the internal unit [rev/s].

- MD10230 $MN_SCALING_FACTORS_USER_DEF[9] = 16.666667S
- MD10220 $MN_SCALING_USER_DEF_MASK = 0x200; (bit no 9 as hex value).

If the value "0" is entered the position controller is opened.

When entering the servo gain factor it is important to take into account that the gain factor of the whole position control loop is still dependent on other parameters of the controlled system. A distinction should be made between a "desired servo gain factor" (MD32200 $MA_POSCTRL_GAIN) and an "actual servo gain factor" (produced by the machine). Only when all the parameters of the control loop are matched will these servo gain factors be the same.

Other factors are:

- Speed setpoint adjustment (MD32260 $MA_RATED_VELO, MD32250 $MA_RATED_OUTVAL)

or automatic speed setpoint interface adjustment (with MD32250 $MA_RATED_OUTVAL = 0 etc.)

- Correct actual value recording of the position encoder (no. of encoder marks, high resolution, encoder mounting location, gear etc.)
- Correct actual speed recording on the drive (standardization, possibly tacho compensation, tacho generator)

Note:

Axes which interpolate together and are to perform a machining operation, must either have the same gain setting (i.e. have the identical following error = 45° slope at the same velocity) or they must be matched via MD32910 $MA_DYN_MATCH_TIME.

The actual servo gain factor can be checked by means of the following error (in the service display).

In the case of analog axes, a drift compensation must be performed prior to the control.

The index [n] of the machine data has the following coding:

[control parameter set no.]: 0-5

32210	POSCTRL_INTEGR_TIME			A07	G2	
s	Position controller integral time			DOUBLE	NEW CONF	
-						
-	-	1.0	0	10000.0	7/2	M

Description: Position controller integral action time for the integral component in s

The MD is only active if MD32220 $MA_POSCTRL_INTEGR_ENABLE = TRUE.

A value of the MD less than 0.001 disables the integral component of the PI controller. The controller is then a P controller, which works with disabled manipulated variable clamping (see also MD32230 $MA_POSCTRL_CONFIG, bit0 = 1).

32220	POSCTRL_INTEGR_ENABLE			A07	G2	
-	Enable integral component position controller			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: Enable of the integral component position controller; the position controller is then a PI controller in which the manipulated variable clamping is disabled (s.a. MD32230 $MA_POSCTRL_CONFIG, bit0 = 1).

Position overshoots may occur if the integral component is used. For this reason, this functionality may only be used in special cases.

32230	POSCTRL_CONFIG			A07	TE1	
-	Configuration of the position controller structure			BYTE	PowerOn	
-						
-	-	0	0	17	7/2	M

Description: Configuration of the position controller structure:

Bit0 = 1: Manipulated variable clamping inactive

Bit4 = 1: Accelerated exact stop signal active

32250	RATED_OUTVAL			A01, A11	A3,D1,G2	
%	Rated output voltage			DOUBLE	NEW CONF	
CTEQ						
-	1	0.0	0.0	200	7/2	M

Description: a.)

Scaling of the manipulated variable with analog drives:

The value of the speed setpoint in percent is to be entered in this MD, in relation to the maximum speed setpoint at which the motor speed specified in MD32260 $MA_RATED_VELO[n] is reached.

Related to:

MD32250 $MA_RATED_OUTVAL[n] only makes sense in combination with MD32260 $MA_RATED_VELO[n].

Example:

1. At a voltage of 5V, the drive reaches a speed of 1875 rev/min ==> RATED_OUTVAL = 50%, RATED_VELO = 11250 [degrees/s]
2. At a voltage of 8V, the drive reaches a speed of 3000 rev/min ==> RATED_OUTVAL = 80%, RATED_VELO = 18000 [degrees/s]
3. At a voltage of 1.5V, the drive reaches a speed of 562.5 rev/min ==> RATED_OUTVAL = 15%, RATED_VELO = 3375 [degrees/s]

All three examples are possible for one and the same drive/converter. The ratio of the two values is decisive; it is the same in all three examples.

MD32250 $MA_RATED_OUTVAL and MD32260 $MA_RATED_VELO describe physical characteristics of converter and drive; they can therefore only be determined by means of a measurement or commissioning instructions (converter, drive).

b.)

Scaling of the manipulated variable with digital PROFIdrive drives:

Default value "0" declares MD32250 $MA_RATED_OUTVAL and MD32260 $MA_RATED_VELO as invalid. Scaling of the manipulated variable is automatically determined and adjusted from the drive parameters instead.

Otherwise (MD32250 $MA_RATED_OUTVAL unequal to zero), the scaling of the manipulated variable is not determined from the drive (for example non-Siemens PROFIdrive drives), but set with RATED_VELO and RATED_OUTVAL, even in the case of these, irrespective of the scaling active on the drive side. In this case, the following applies:

Scaling of the manipulated variable on the drive = RATED_VELO / RATED_OUTVAL

In the case of simultaneous operation of analog and PROFIdrive drives, the settings for the analog axes must be adjusted as described in a.).

32260	RATED_VELO			A01, A11	A3,D1,G2	
rev/min	Rated motor speed			DOUBLE	NEW CONF	
CTEQ						
-	1	3000.0	-	-	7/2	M

Description: Only applies when:

MD32250 $MA_RATED_OUTVAL is set greater than 0.

The drive speed (scaled on the drive) that is reached with the percentual speed setpoint specified in MD32250 $MA_RATED_OUTVAL[n] must be entered in the MD.

Related to:

MD32260 $MA_RATED_VELO[n] only makes sense in combination with MD32250 $MA_RATED_OUTVAL[n].

32300	MAX_AX_ACCEL			A11, A04, -	M3,TE6,Z3,H1,K3,M1,A3,B1,B2,K1,V1,2.4	
m/s², rev/s²	maximum axis acceleration			DOUBLE	NEW CONF	
CTEQ						
-	5	1.0, 1.0, 1.0, 1.0, 1.0,1.0, 1.0, 1.0, 1.0, 1.0...	1.0e-3	-	7/2	M

Description: Maximum acceleration, i.e. change in setpoint velocity, which is to act upon the axis. The value limits both positive and negative axis acceleration.

The maximum angular or linear axis acceleration must be entered dependent upon machine data MD30300 $MA_IS_ROT_AX.

In the case of linear interpolation of the axes in a grouping, the grouping is limited in such a way that no axis is overloaded. With regard to contour accuracy, the control dynamic behavior has to be taken into account.

Not relevant for error states that lead to quick stop.

Each field element corresponds to a G code in the 59th G code group.

Related to:

MD32210 $MA_MAX_ACCEL_OVL_FACTOR
MD32434 $MA_G00_ACCEL_FACTOR
MD32433 $MA_SOFT_ACCEL_FACTOR
MD20610 $MC_ADD_MOVE_ACCEL_RESERVE
MD20602 $MC_CURV_EFFECT_ON_PATH_ACCEL

32301	JOG_MAX_ACCEL			A11, A04, -	-	
m/s², rev/s²	Maximum acceleration in JOG mode			DOUBLE	NEW CONF	
CTEQ						
-	-	0.0	-	-	0/0	S

Description: MD32301 $MA_JOG_MAX_ACCEL is effective only in JOG mode.

It ensures that the acceleration set in the MD is not exceeded when the axis/spindle is in JOG mode.

MD32301 $MA_JOG_MAX_ACCEL = 0 disables the limit. The actual acceleration value of the axis/spindle is then effective.

Related to:

MD32300 $MA_MAX_AX_ACCEL (axis acceleration)

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL (acceleration of spindle in speed control mode)

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL (acceleration of spindle in position control mode)

MD35212 $MA_GEAR_STEP_POSCTRL_ACCEL2 (acceleration of spindle in position control mode, tapping)

32310	MAX_ACCEL_OVL_FACTOR			A04	B1	
-	Overload factor for axial velocity steps			DOUBLE	NEW CONF	
CTEQ						
-	5	1.2, 1.2, 1.2, 1.2, 1.2	-	-	7/7	U

Description: The overload factor limits the velocity jump of the machine axis on block transition. The value entered is related to the value of MD32300 $MA_MAX_AX_ACCEL (axis acceleration) and states by how much the maximum acceleration can be exceeded for one IPO cycle.

Related to:

MD32300 $MA_MAX_AX_ACCEL (axis acceleration)

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO (interpolator clock)

Each field element corresponds to a G code in the 59th G group.

32320	DYN_LIMIT_RESET_MASK			A05, A06, A10, A04	-	
-	Reset behavior of dynamic response limitation.			DWORD	Reset	
CTEQ						
-	-	0	0	0x03	7/2	M

Description: MD32320 $MA_DYN_LIMIT_RESET_MASK is used to set the reset response of functions limiting dynamic response.

These functions are ACC / VELOLIM / JERKLIM for basic motion and ACCLIMA / VELOLIMA / JERKLIMA for coupling.

The MD is bit-coded; currently only bit 0 (LSB) and bit 1 are assigned.

Bit 0 == 0:

Programmed ACC / VELOLIM / JERKLIM is reset to 100% with channel reset/M30. (Compatibility: Responds as before.)

Bit 0 == 1:

Programmed ACC / VELOLIM / JERKLIM is retained beyond channel reset/M30.

Bit 1 == 0:

Programmed ACCLIMA / VELOLIMA / JERKLIMA is reset to 100% with channel reset/M30. (Compatibility: Responds as before.)

Bit 1 == 1:

Programmed ACCLIMA / VELOLIMA / JERKLIMA is retained beyond channel reset//M30.

32400	AX_JERK_ENABLE			A07, A04, -	B2	
-	Axial jerk limitation			BOOLEAN	NEW CONF	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: Enables the function of an axial jerk limitation.

The limitation is set via a time constant; it is always active.

The limitation works independently of the limitations "path-related maximum jerk", "knee-shaped acceleration characteristic" and the axial jerk limitation of the axes that are operated in JOG mode or positioning axis mode.

Related to:

MD32410 $MA_AX_JERK_TIME (time constant for axial jerk limitation)

32402	AX_JERK_MODE			A07, A04	B2,G2,B3	
-	Filter type for axial jerk limitation			BYTE	PowerOn	
CTEQ						
-	-	1	1	3	7/2	M

Description: Filter type for axial jerk limitation:

1: 2nd order filter (as in SW 1 through 4)

2: Moving averaging (SW 5 and higher)

3: Bandstop filter (SW 6 and higher)

Type 2 requires more computing time, but causes smaller contour errors for the same smoothing effect, or smoother movements at the same accuracy.

Type 2 is recommended; type 1 is set as a default value for reasons of compatibility.

The maximum jerk is set in the time constant MD32410 $MA_AX_JERK_TIME.

Recommended values for type 1:

Min. 0.03 s; max. 0.06s.

Recommended values for type 2:

Min. 1 position-control cycle; max. 16 position-control cycles

At a position-control cycle of 2ms, this corresponds to 0.002 to 0.032 seconds.

Type 3 requires the setting of MD32410 $MA_AX_JERK_TIME, MD32412 $MA_AX_JERK_FREQ and MD32414 $MA_AX_JERK_DAMP.

To parameterize a simple bandstop filter, we recommend setting MD32410 $MA_AX_JERK_TIME=0, which automatically sets "denominator frequency = numerator frequency = blocking frequency = MD32412 $MA_AX_JERK_FREQ".

However, MD32410 $MA_AX_JERK_TIME>0 is used to set a specific denominator frequency, which makes it possible to implement a bandstop filter with amplitude increase for frequencies beyond the blocking frequency.

MD32402 $MA_AX_JERK_MODE is only active if MD32400 $MA_AX_JERK_ENABLE has been set to 1.

Special cases, errors:

The machine data must be same for all axes of an axis container.

Related to:

MD32400 $MA_AX_JERK_ENABLE

MD32410 $MA_AX_JERK_TIME

and for type 3: MD32412 $MA_AX_JERK_FREQ and MD32414 $MA_AX_JERK_DAMP

32410	AX_JERK_TIME			A07, A04	G1,TE1,S3,B2,G2	
s	Time constant for axial jerk filter			DOUBLE	NEW CONF	
-						
-	-	0.001	-	-	7/2	M

Description: Time constant of the axial jerk filter which causes a smoother axis setpoint characteristic. The jerk filter will only be active, if the time constant is higher than a position control cycle.

Not active in case of errors that cause a change in follow-up mode (for example EMERGENCY STOP99:

Special cases:

Machine axes that are supposed to be interpolating with one another, must have the same effective jerk filtering (for example the same time constant for tapping without compensating chuck).

Related to:

MD32400 $MA_AX_JERK_ENABLE (axial jerk limitation)

32412	AX_JERK_FREQ			A07, A04	-	
-	Blocking frequency of axial jerk filter			DOUBLE	NEW CONF	
-						
-	-	10.0	-	-	7/2	M

Description: Blocking frequency of axial jerk filter bandstop MD is only active if MD32402 $MA_AX_JERK_MODE = 3

32414	AX_JERK_DAMP			A07, A04	-	
-	Damping of axial jerk filter			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	M

Description: Damping of axial jerk filter bandstop:

Input value 0 means complete blocking with MD32412 $MA_AX_JERK_FREQ, input values >0 can attenuate the blocking effect.

MD is only active if MD32402 $MA_AX_JERK_MODE = 3

32420	JOG_AND_POS_JERK_ENABLE			A04	G1,H1,P2,S3,B2	
-	Default setting of axis jerk limitation			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: Enables the function of the axis-specific jerk limitation for the operating modes JOG, REF and positioning axis mode.

1: Axial jerk limitation for JOG mode and positioning axis mode

0: No jerk limitation for JOG mode and positioning axis mode

The maximum jerk occurring is defined in MD32430 $MA_JOG_AND_POS_MAX_JERK.

Related to:

MD32430 $MA_JOG_AND_POS_MAX_JERK (axial jerk)

32429	MAX_JERK_STOP			A04	B1	
m/s³, rev/s³	Reserved: Maximum axial emergency jerk			DOUBLE	NEW CONF	
-						
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	-	-1/3	I

Description: Reserved for maximum axial jerk in emergency situations. A value of 0 has the same effect as MAX_AX_JERK.

Each field element corresponds to a G code in the 59th G code group.

32430	JOG_AND_POS_MAX_JERK			A04	G1,P2,S3,B2	
m/s³, rev/s³	Axial jerk			DOUBLE	NEW CONF	
CTEQ						
-	-	1000.0,1000.0,1000.0,1000.0,1000.0...	1.e-9	-	7/2	M

Description: The jerk limit value limits the rate of change of axis acceleration in JOG and REF modes as well as in positioning axis mode with $MN_POS_DYN_MODE=0.

The setting and time calculation are made as for MD20600 $MC_MAX_PATH_JERK (path-related maximum jerk).

Not relevant for:

- Path interpolation
- Error states that lead to quick stop.

Related to:

MD32420 $MA_JOG_AND_POS_JERK_ENABLE (initial setting of axial jerk limitation)

MD18960 $MN_POS_DYN_MODE

32431	MAX_AX_JERK			A04	B1,B2	
m/s³, rev/s³	maximum axial jerk for path movement			DOUBLE	NEW CONF	
-						
-	5	1.e6, 1.e6, 1.e6, 1.e6, 1.e6...	1.e-9	-	3/3	I

Description: Maximum axial jerk for path motion

Each field element corresponds to a G code in the 59th G code group.

32432	PATH_TRANS_JERK_LIM			A04	B1,B2	
m/s³, rev/s³	maximum axial jerk at block transition in continuous-path mode			DOUBLE	NEW CONF	
CTEQ						
-	5	1.e6, 1.e6, 1.e6, 1.e6, 1.e6...	-	-	3/3	I

Description: The control limits the jerk (acceleration jump) at a block transition between contour sections of different curvature to the value set with active jerk limitation.

Not relevant for:

Exact stop

There is an entry for each G code from the 59th G code group (dynamic G code group).

Related to:

Path control, SOFT type of acceleration

32433	SOFT_ACCEL_FACTOR			A04, -	TE9,B1,B2	
-	Scaling of acceleration limitation with SOFT			DOUBLE	NEW CONF	
-						
-	5	1., 1., 1., 1., 1.	1e-9	-	3/3	I

Description: Scaling of acceleration limitation with SOFT.

Relevant axial acceleration limitation for SOFT =:

(MD32433 $MA_SOFT_ACCEL_FACTOR[..] * MD32300 $MA_MAX_AX_ACCEL[..])

Each field element corresponds to a G code in the 59th G code group.

32434	G00_ACCEL_FACTOR			A04, -	TE9,B1,B2	
-	Scaling of acceleration limitation with G00.			DOUBLE	NEW CONF	
-						
-	-	1.	1e-9	-	3/3	I

Description: Scaling of the acceleration limitation with G00.

Relevant axial acceleration limitation for G00 =:

(MD32433 $MA_G00_ACCEL_FACTOR[..] * MD32300 $MA_MAX_AX_ACCEL[..])

32435	G00_JERK_FACTOR			A04	B1,B2	
-	Scaling of jerk limitation with G00.			DOUBLE	NEW CONF	
-						
-	-	1.	1e-9	-	3/3	I

Description: Scaling of the jerk limitation with G00.

Relevant axial jerk limitation for G00 =:

(MD32435 $MA_G00_JERK_FACTOR[..] * MD32431 $MA_MAX_AX_JERK[..])

32436	JOG_MAX_JERK			A04	-	
m/s³, rev/s³	Maximum axial jerk during JOG motion			DOUBLE	NEW CONF	
CTEQ						
-	-	0.0	-	-	0/0	S

Description: The jerk limit value limits the change of axis acceleration in JOG mode only .

The behavior of the MD is analog to:

MD32430 $MA_JOG_AND_POS_MAX_JERK

It therefore also communicates with:

MD32420 $MA_JOG_AND_POS_JERK_ENABLE

(default of the axial jerk limitation)

32437	AX_JERK_VEL0			A04	B1	
mm/min, rev/min	Velocity threshold for linear jerk adjustment			DOUBLE	NEW CONF	
-						
-	5	3000, 3000, 3000, 3000, 3000...	-	-	3/3	I

Description: Velocity at and above which the permissible jerk of an axis increases in a linear fashion.

Jerk adjustment only becomes active if MD $MA_MAX_AX_JERK_FACTOR is > 1.0.

There is an entry for each dynamic G code group.

See also MD $MA_AX_JERK_VEL1 and $MA_MAX_AX_JERK_FACTOR.

32438	AX_JERK_VEL1			A04	B1	
mm/min, rev/min	Velocity threshold for linear jerk adjustment			DOUBLE	NEW CONF	
-						
-	5	6000, 6000, 6000, 6000, 6000...	-	-	3/3	I

Description: Velocity at and above which the permissible jerk of an axis switches from increasing in a linear fashion

to the saturation defined in MD $MA_MAX_AX_JERK_FACTOR.

The value of this velocity must be greater than the value set with MD $MA_AX_JERK_VEL0.

Jerk adjustment becomes active only if MD $MA_MAX_AX_JERK_FACTOR is > 1.0.

There is an entry for each dynamic G code group.

See also MD $MA_AX_JERK_VEL0 and $MA_MAX_AX_JERK_FACTOR

32439	MAX_AX_JERK_FACTOR			A04	B1	
-	Factor for jerk adjustment at high velocities			DOUBLE	NEW CONF	
-						
-	5	1.0, 1.0, 1.0, 1.0, 1.0	1.0	-	3/3	I

Description: Factor for setting adaptive jerk adjustment for an axis.

Jerk adjustment becomes active only if the value of this MD is greater than 1.

There is an entry for each dynamic G code group.

See also MD $MA_AX_JERK_VEL0 and $MA_AX_JERK_VEL1.

32440	LOOKAH_FREQUENCY			EXP, A04	B1	
-	Smoothing frequency for Look Ahead			DOUBLE	NEW CONF	
-						
-	-	10.	-	-	7/2	M

Description: Acceleration procedures in continuous-path mode with Look Ahead which execute with a higher frequency than that parameterized in this MD are smoothed as a function of the parameterization in MD20460 $MC_LOOKAH_SMOOTH_FACTOR.

It is always the minimum of all the axes participating in the path which is determined.

If vibrations are aroused in the mechanics of this axis and if their frequency is known, then this MD should be set to a lower value than this frequency.

32450	BACKLASH			A09	K3,G2	
mm, degrees	Backlash			DOUBLE	NEW CONF	
-						
-	2	0.0, 0.0	-	-	7/2	I

Description: Backlash on reversal between positive and negative travel directions.

Input of the compensation value is

- positive, if the encoder is leading the machine part (normal situation)
- negative, if the encoder is behind the machine part.

Backlash compensation is not active when 0 is entered.

Backlash compensation is always active after reference point approach in all operating modes.

Special cases:

A specific backlash on reversal must be entered for each measuring system.

Related to:

MD30200 $MA_NUM_ENCS (number of measuring systems)

MD36500 $MA_ENC_CHANGE_TOL

(Maximum tolerance at actual position value change)

32452	BACKLASH_FACTOR			A09	K3,G2,S1,V1	
-	Evaluation factor for backlash			DOUBLE	NEW CONF	
-						
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	0.01	100.0	7/2	I

Description: Evaluation factor for backlash.

The machine data enables the backlash defined in MD32450 $MA_BACKLASH to be changed as a function of the parameter set, in order to take a gear stage dependent backlash into account, for example.

Related to:

MD32450 $MA_BACKLASH[n]

32490	FRICT_COMP_MODE			A09	K3	
-	Type of friction compensation			BYTE	PowerOn	
-						
-	1	1	0	2	7/2	M

Description: 0: No friction compensation

1: Friction compensation with constant injection value or adaptive characteristic

2: Friction compensation with learned characteristic via neural network

32500	FRICT_COMP_ENABLE			A09	K3,G2	
-	Friction compensation active			BOOLEAN	NEW CONF	
-						
-	-	FALSE	-	-	7/2	M

Description:

1: Friction compensation is enabled for this axis.

Depending on the setting of MD32490 $MA_FRICT_COMP_MODE, either "friction compensation with constant modulation factor" or "QEC with neural networks" becomes active.

In the case of neural QEC, the machine data should not be set to "1" until a valid characteristic has been "learnt".

During the learning stage, the compensation values are added on independently of the contents of this machine data.

0: Friction compensation is not enabled for this axis.

Thus, no friction compensation values are entered.

Related to:

MD32490 $MA_FRICT_COMP_MODE

Friction compensation type

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

MD38010 $MA_MM_QEC_MAX_POINTS

Number of interpolation points for QEC with neural networks

32510	FRICT_COMP_ADAPT_ENABLE			EXP, A09	K3	
-	Adaptation friction compensation active			BOOLEAN	NEW CONF	
-						
-	1	FALSE	-	-	7/2	M

Description: 1: Friction compensation with amplitude adaptation is enabled for the axis. Quadrant errors on circular contours can be compensated with friction compensation.

The amplitude of the friction compensation value required to be added on is frequently not constant over the entire acceleration range. That is, a lower compensation value needs to be entered for optimum friction compensation for higher accelerations than for lower accelerations.

The parameters of the adaptation curve have to be determined, and entered in the machine data.

0: Friction compensation with amplitude adaptation is not enabled for the axis.

MD irrelevant for:

MD32500 $MA_FRICT_COMP_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32520	FRICT_COMP_CONST_MAX			EXP, A09	K3	
mm/min, rev/min	Maximum friction compensation value			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	M

Description:

```
If adaptation is inactive (MD32510=0), the maximum friction com-
pensation is applied throughout the entire acceleration range.
If adaptation is active (MD32510=1), the maximum friction compen-
sation is applied in accordance with the adaptation curve.
In the 1st acceleration range (           a <  MD32550), the
switching amplitude = MD32520 * (a/MD32550).
In the 2nd acceleration range (MD32550 <= a <= MD32560), the
switching amplitude = MD32520.
In the 3rd acceleration range (MD32560 <  a <  MD32570), the
switching amplitude = MD32520 + (MD32530-MD32520)/(MD32570-
MD32560) * (a - MD32560).
In the 4th acceleration range (MD32570 <= a           ), the
switching amplitude = MD32530.
Not relevant for:
   MD32500 $MA_FRICT_COMP_ENABLE = 0
   MD32490 $MA_FRICT_COMP_MODE = 2 (neural QEC)
Related to:
   MD32500 $MA_FRICT_COMP_ENABLE
   Friction compensation active
   MD32510 $MA_FRICT_COMP_ADAPT_ENABLE
   Friction compensation adaptation active
   MD32530 $MA_FRICT_COMP_CONST_MIN
   Minimum friction compensation value
   MD32550 $MA_FRICT_COMP_ACCEL1
   Adaptation acceleration value 1
   MD32560 $MA_FRICT_COMP_ACCEL2
   Adaptation acceleration value 2
   MD32570 $MA_FRICT_COMP_ACCEL3
   Adaptation acceleration value 3
   MD32540 $MA_FRICT_COMP_TIME
   Friction compensation time constant
```

32530	FRICT_COMP_CONST_MIN			EXP, A09	K3	
mm/min, rev/min	Minimum friction compensation value			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	M

Description: The minimum friction compensation value is active only if "Friction compensation with adaptation" (MD32510 $MA_FRICT_COMP_ADAPT_ENABLE=1) is active.

The amplitude of the friction compensation value is entered in the 4th acceleration range (MD32570 $MA_FRICT_COMP_ACCEL3 <= a).

MD irrelevant for:

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2 (neural QEC)

Special cases:

In special cases, the value for FRICT_COMP_CONST_MIN may be even higher than for MD32520 $MA_FRICT_COMP_CONST_MAX.

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32540	FRICT_COMP_TIME			EXP, A09	K3	
s	Friction compensation time constant			DOUBLE	NEW CONF	
-						
-	1	0.015	-	-	7/2	M

Description: The friction compensation value is entered via a DT1 filter.

The add-on amplitude decays in accordance with the time constant.

MD irrelevant for:

MD32500 $MA_FRICT_COMP_ENABLE = 0

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

32550	FRICT_COMP_ACCEL1			EXP, A09	K3	
m/s², rev/s²	Adaptation acceleration value 1			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	M

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

The adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 ranges, in each of which a different friction compensation value applies.

For the 1st range (a < MD32550), the add-on amplitude = a * MD32520/ MD32550

MD irrelevant for:

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32560	FRICT_COMP_ACCEL2			EXP, A09	K3	
m/s^2, rev/s^2	Adaptation acceleration value 2			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	M

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

Adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 ranges, in each of which a different friction compensation value applies.

In the 1st acceleration range (a < MD32550), the switching amplitude = MD32520 * (a/MD32550).

In the 2nd acceleration range (MD32550 <= a <= MD32560), the switching amplitude = MD32520.

In the 3rd acceleration range (MD32560 < a < MD32570), the switching amplitude = MD32520 + (MD32530-MD32520)/(MD32570-MD32560) * (a - MD32560).

In the 4th acceleration range (MD32570 <= a   ), the switching amplitude = MD32530.

Not relevant for:

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32570 $MA_FRICT_COMP_ACCEL3

Adaptation acceleration value 3

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32570	FRICT_COMP_ACCEL3			EXP, A09	K3	
m/s², rev/s²	Adaptation acceleration value 3			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	M

Description: The adaptation acceleration value is only required if "Friction compensation with adaptation" (MD32510=1) is active.

Adaptation acceleration values 1 to 3 are interpolation points for defining the adaptation curve. The adaptation curve is subdivided into 4 ranges, in each of which a different friction compensation value applies.

In the 1st acceleration range (a < MD32550), the switching amplitude = MD32520 * (a/MD32550).

In the 2nd acceleration range (MD32550 <= a <= MD32560), the switching amplitude = MD32520.

In the 3rd acceleration range (MD32560 < a < MD32570), the switching amplitude = MD32520 + (MD32530-MD32520)/(MD32570-MD32560) * (a - MD32560).

In the 4th acceleration range (MD32570 <= a), the switching amplitude = MD32530.

Not relevant for:

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE = 0

MD32490 $MA_FRICT_COMP_MODE = 2

Related to:

MD32500 $MA_FRICT_COMP_ENABLE

Friction compensation active

MD32510 $MA_FRICT_COMP_ADAPT_ENABLE

Friction compensation adaptation active

MD32520 $MA_FRICT_COMP_CONST_MAX

Maximum friction compensation value

MD32530 $MA_FRICT_COMP_CONST_MIN

Minimum friction compensation value

MD32550 $MA_FRICT_COMP_ACCEL1

Adaptation acceleration value 1

MD32560 $MA_FRICT_COMP_ACCEL2

Adaptation acceleration value 2

MD32540 $MA_FRICT_COMP_TIME

Friction compensation time constant

32580	FRICT_COMP_INC_FACTOR			A09	K3	
%	Weighting factor of friction comp. value w/ short trav. movem.			DOUBLE	NEW CONF	
-						
-	1	0.0	0	100.0	7/2	M

Description: The optimum friction compensation value determined by the circularity test can cause overcompensation of this axis if compensation is activated and axial positioning movements are short.

In such cases, a better setting can be achieved by reducing the amplitude of the friction compensation value and acts on all positioning blocks that are made within an interpolation cycle of the control.

The factor that has to be entered can be determined empirically and can be different from axis to axis because of the different friction conditions. The input range is between 0 and 100% of the value determined by the circularity test.

The default setting is 0; so that no compensation is performed for short traversing movements.

Related to:

MD32500 $MA_FRICT_COMP_ENABLE Friction compensation active

32610	VELO_FFW_WEIGHT			A07, A09	G1,TE1,K3,S3,A3,G2,S1,V1	
-	Feedforward control factor f. velocity/speed feedforward control			DOUBLE	NEW CONF	
-						
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	-	-	7/2	M

Description: Weighting factor for feedforward control. Is normally = 1.0 on digital drives, since these keep the setpoint speed exactly .

On analog drives, this factor can be used to compensate the gain error of the drive actuator, so that the actual speed becomes exactly equal to the setpoint speed (this reduces the following error with feedforward control).

On both drive types, the effect of the feedforward control can be continuously reduced with a factor of < 1.0, if the machine moves too abruptly and other measures (e.g. jerk limitation) are not to be used. This also reduces possibly existing overshoots; however, the error increases on curved contours, e.g. on a circle. With 0.0, you have a pure position controller without feedforward control.

Contour monitoring takes into account factors < 1.0.

In individual cases, it can, however, become necessary to increase MD CONTOUR_TOL.

32620	FFW_MODE			A07, A09	G1,K3,S3,G2,S1	
-	Feedforward control mode			BYTE	Reset	
-						
-	-	3	0	4	7/2	M

Description: FFW_MODE defines the feedforward control mode to be applied on an axis-specific basis:

0 = No feedforward control

1 = Speed feedforward control with PT1 balancing

2 = Torque feedforward control (only for SINAMICS) with PT1 balancing

3 = Speed feedforward control with Tt balancing

4 = Torque feedforward control (only for SINAMICS) with Tt balancing

The high-level language instructions FFWON and FFWOF are used to activate and deactivate feedforward control for specific channels on all axes.

To prevent feedforward control from being affected by these instructions on individual axes, you can define that it is always activated or always deactivated in machine data FFW_ACTIVATION_MODE (see also FFW_ACTIVATION_MODE).

Torque feedforward control must be activated via the global option data $ON_FFW_MODE_MASK.

If a feedforward control mode is selected (speed or torque feedforward control), MD32630 $MA_FFW_ACTIVATION_MODE can be used to program in addition whether feedforward control can be activated or deactivated by the part program.

Note for SINAMICS drives with torque feedforward control selected:

Alarm 26016 refers to the current machine data if

the telegram used (see $MN_DRIVE_TELEGRAM_TYPE) does not support the torque feedforward control function. Remedy: Use telegram 136.

Torque feedforward control is an option that must be activated.

Related to:

MD32630 $MA_FFW_ACTIVATION_MODE

MD32610 $MA_VELO_FFW_WEIGHT

MD32650 $MA_AX_INERTIA

32630	FFW_ACTIVATION_MODE			A07, A09	K3,G2	
-	Activate feedforward control from program			BYTE	Reset	
CTEQ						
-	-	1	0	2	7/2	M

Description: MD32630 $FFW_ACTIVATION_MODE can be used to define whether the feedforward control for this axis/spindle can be switched on and off by the part program.

0 = The feedforward control cannot be switched on or off by the high-level language elements FFWON and FFWOF respectively.

For the axis/spindle, the state specified by MD32620 $MA_FFW_MODE is therefore always effective.

1 = The feedforward control can be switched on and off by the part program with FFWON and FFWOF respectively.

The instruction FFWON/FFWOF becomes active immediately

2 = The feedforward control can be switched on and off by the part program with FFWON and FFWOF respectively.

The instruction FFWON/FFWOF does not become active until the next axis standstill

The default setting is specified by the channel-specific MD20150 $MC_GCODE_RESET_VALUES. This setting is valid even before the first NC block is executed.

Notes:

The last valid state continues to be active even after Reset (and therefore also with JOG).

As the feedforward control of all axes of the channel is switched on and off by FFWON and FFWOF respectively, MD32630 $MA_FFW_ACTIVATION_MODE should be set identically for axes interpolating with one naother.

Switching feedforward control on or off while the axis/spindle is traversing may cause compensation operations in the control loop. Interpolating axes are therefore stopped by the part program if such switching operations occur (internal stop Stop G09 is triggered).

Related to:

MD32620 $MA_FFW_MODE

MD20150 $MC_GCODE_RESET_VALUES

32640	STIFFNESS_CONTROL_ENABLE			A01, A07	TE3,G2	
-	Dynamic stiffness control			BOOLEAN	NEW CONF	
CTEQ						
-	1	FALSE	-	-	7/2	M

Description: Dynamic stiffness control is active when the bit is set.

Higher servo gain factors are possible if stiffness control is active (MD32200 $MA_POSCTRL_GAIN).

Notes:

The availability of this function is determined by the drive used (the drive has to support the DSC function).

Note on PROFIdrive drives:

Alarm 26017 refers to this machine data if:

a. The PROFIdrive telegram used (see $MN_DRIVE_TELEGRAM_TYPE) does not support the DSC function. Remedy: Use a sufficiently powerful telegram (e.g. tel. 106, 116).

b. Specifically for SINAMICS drives, if inversion of the encoder signal is parameterized in $MA_ENC_FEEDBACK_POL=-1 with active DSC. Remedy: Remove inversion of the encoder signal from $MA_ENC_FEEDBACK_POL, and enter it in SINAMICS parameter p410 instead.

32642	STIFFNESS_CONTROL_CONFIG			A01, A07	-	
-	Dynamic stiffness control configuration (DSC)			BYTE	NEW CONF	
CTEQ						
-	1	0	0	1	7/2	M

Description: Configuration of the dynamic stiffness control (DSC):

0: DSC in drive works with indirect measuring system, i.e. motor measuring system (default scenario).

1: DSC in drive works with direct measuring system.

Notes:

The availability of this function is determined by the drive used (the drive must support the DSC function).

With SINAMICS (P1193 not equal to 0), the value of this machine data must be set to 0.

32644	STIFFNESS_DELAY_TIME			A01, A07	-	
s	dynamic stiffness control: Delay			DOUBLE	PowerOn	
CTEQ						
-	1	0.0	-0.02	0.02	7/2	M

Description: Configuration of compensation dead time of the dynamic stiffness control (DSC) with optimized PROFIBUS/PROFINET cycle, unit: seconds

32650	AX_INERTIA			EXP, A07, A09	G1,K3,S3,G2	
kgm²	Inertia for torque feedforward control			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	M

Description: Only with SINAMICS:

Inertia of axis. Used for torque feedforward control.

With torque feedforward control, an additional current setpoint proportional to the torque is directly injected at the input of the current controller. This value is formed using the acceleration and the moment of inertia. The equivalent time constant of the current control loop must be defined for this purpose and entered in MD32800 $MA_EQUIV_CURRCTRL_TIME.

The total moment of inertia of the axis (drive + load) must also be entered in MD32650 $MA_AX_INERTIA (total moment of inertia referred to motor shaft according to data supplied by machine manufacturer).

When MD32650 $MA_AX_INERTIA and MD32800 $MA_EQUIV_CURRCTRL_TIME are set correctly, the following error is almost zero even during acceleration (check this by looking at the "following error" in the service display).

The torque feedforward control is deactivated if MD32650 $MA_AX_INERTIA is set to 0. However, because the calculations are performed anyway, torque feedforward control must always be deactivated with MD32620 $MA_FFW_MODE = 0 or 1 or 3 (recommended). Because of the direct current setpoint injection, torque feedforward control is only possible on digital drives.

MD irrelevant for:

MD32620 $MA_FFW_MODE = 0 or 1 or 3

Related to:

MD32620 $MA_FFW_MODE

MD32630 $MA_FFW_ACTIVATION_MODE

MD32800 $MA_EQUIV_CURRCTRL_TIME

32652	AX_MASS			EXP, A07, A09	-	
kg	Axis mass for torque feedforward control			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	M

Description: SINAMICS only:

Mass of axis for torque feedforward control.

The MD is used on linear drives (MD13040 $MN_DRIVE_TYPE=3 or MD13080 $MN_DRIVE_TYPE_DP=3) instead of MD32650 $MA_AX_INERTIA.

32700	ENC_COMP_ENABLE				A09	K3	
-	Encoder/spindle error compensation.				BOOLEAN	NEW CONF	
-							
-	2	FALSE, FALSE	-	-		7/2	M

Description: 1: LEC (leadscrew error compensation) is activated for the measuring system.

This enables leadscrew and measuring system errors to be compensated.

The function is not enabled internally until the relevant measuring system has been referenced (NC/PLC interface signal DB31, ... DBX60.4 / 60.5 (Referenced/synchronized 1 or 2) = 1).

write protect function (compensation values) active.

0: LEC is not active for the axis/measuring system.

Related to:

MD38000 $MA_MM_ENC_COMP_MAX_POINTS number of interpolation points with LEC

NC/PLC interface signal DB31, ... DBX60.4 (Referenced/synchronized 1)

NC/PLC interface signal DB31, ... DBX60.5 (Referenced/synchronized 2)

32710	CEC_ENABLE				A09	K3	
-	Enable of sag compensation				BOOLEAN	NEW CONF	
-							
-	-	FALSE	-	-		7/2	M

Description: 1: Sag compensation is enabled for this axis.

Inter-axis machine geometry errors (e.g. sag and angularity errors) can be compensated with sag compensation.

The function is not activated until the following conditions have been fulfilled:

- The "Interpolatory compensation" option is set
- The associated compensation tables have been loaded into the NC user memory and enabled (SD41300 $SN_CEC_TABLE_ENABLE[t] = 1)
- The relevant position measuring system is referenced (NC/PLC interface signal DB31, ... DBX60.4 / 60.5 = 1 (Referenced/synchronized 1 or 2)):

0: Sag compensation is not enabled for the compensation axis.

Related to:

MD18342 $MN_MM_CEC_MAX_POINTS[t]

Number of interpolation points for sag compensation

SD41300 $SN_CEC_TABLE_ENABLE[t]

Enable evaluation of sag compensation table t

NC/PLC interface signal DB31, ... DBX60.4 / 60.5

(referenced/synchronized 1 or 2)

32711	CEC_SCALING_SYSTEM_METRIC			A09	K3,G2	
-	Measuring system of sag compensation			BOOLEAN	NEW CONF	
-						
-	-	TRUE	-	-	7/2	M

Description: Compensation data exist in:

0: inch system

1: metric system

32720	CEC_MAX_SUM			A09	K3	
mm, degrees	Maximum compensation value for sag compensation			DOUBLE	NEW CONF	
-						
-	-	1.0	0	10.0	7/2	M

Description: In sag compensation, the absolute value of the total compensation value (sum of compensation values of all active compensation relations) is monitored axially with machine data value CEC_MAX_SUM.

If the determined total compensation value is larger than the maximum value, alarm 20124 is triggered. Program processing is not interrupted. The compensation value output as the additional setpoint is limited to the maximum value.

MD irrelevant to:

- MSEC
- Backlash compensation
- Temperature compensation

Related to:

MD32710 $MA_CEC_ENABLE

Enable sag compensation

SD41300 $SN_CEC_TABLE_ENABLE[t]

Enable evaluation of sag compensation table t

NC/PLC interface signal DB31, ... DBX60.4 / 60.5

(referenced/synchronized 1 or 2)

32730	CEC_MAX_VELO			EXP, A09, A04	K3	
%	Change in velocity at CEC			DOUBLE	NEW CONF	
-						
-	-	10.0	0	100.0	7/2	M

Description:

In sag compensation, modification of the total compensation value (sum of the compensation values of all active compensation relations) is limited axially. The maximum change value is defined in this machine data as a percentage of MD32000 $MA_MAX_AX_VELO (maximum axis velocity).

If the change in the total compensation value is greater than the maximum value, alarm 20125 is output. Program processing is however continued. The path not covered because of the limitation is made up as soon as the compensation value is no longer subject to limitation.

MD irrelevant to:

- MSEC
- Backlash compensation
- Temperature compensation

Related to:

MD32710 $MA_CEC_ENABLE
Enable sag compensation
MD32000 $MA_MAX_AX_VELO
Maximum axis velocity
SD41300 $SN_CEC_TABLE_ENABLE[t]
Enable evaluation of sag compensation table t
NC/PLC interface signal DB31, ... DBX60.4 / 60.5
(referenced/synchronized 1 or 2)

32750	TEMP_COMP_TYPE			A09	K3,W1	
-	Temperature compensation type			BYTE	PowerOn	
CTEQ						
-	-	0	0	7	7/2	M

Description: The type of temperature compensation applicable to the machine axis is activated in MD32750 $MA_TEMP_COMP_TYPE.

A distinction is made between the following types:

0: No temperature compensation active

1: Position-independent temperature compensation active
(compensation value with SD43900 $SA_TEMP_COMP_ABS_VALUE)

2: Position-dependent temperature compensation active
(compensation value with SD43910 $SA_TEMP_COMP_SLOPE and SD43920 TEMP_COMP_REF_POSITION)

3: Position-dependent and position-independent temperature compensation active
(compensation values with SD according to types 1 and 2)

Temperature compensation is an option that must be enabled.

Related to:

SD43900 $SA_TEMP_COMP_ABS_VALUE
Position-dependent temperature compensation value
SD43920 $SA_TEMP_COMP_REF_POSITION
Reference point for position-dependent temperature compensation
SD43910 $SA_TEMP_COMP_SLOPE
Gradient for position-dependent temperature compensation
MD32760 $MA_COMP_ADD_VELO_FACTOR
Excessive velocity due to compensation

32760	COMP_ADD_VELO_FACTOR			EXP, A09, A04	K3	
-	Excessive velocity due to compensation			DOUBLE	NEW CONF	
CTEQ						
-	-	0.01	0.	0.10	7/2	M

Description:

```
The maximum distance that can be traversed because of temperature
compensation in one IPO cycle can be limited by the axial MD32760
$MA_COMP_ADD_VELO_FACTOR.
If the resulting temperature compensation value is above this max-
imum, it is traversed over several IPO cycles. There is no alarm.
The maximum compensation value per IPO cycle is specified as a
factor referring to the maximum axis velocity (MD32000
$MA_MAX_AX_VELO).
The maximum gradient of the temperature compensation tanbmax is
also limited with this machine data.
Example of calculation of the maximum gradient tanb(max):
1.   Calculation of the interpolator cycle time (see Description
of Functions Velocities, Setpoint/Actual Value Systems, Cycle
Times (G2))
   Interpolator cycle time = Basic system clock rate * factor for
   interpolation cycle
   Interpolator cycle time = MD10050 $MN_SYSCLOCK_CYCLE_TIME ^
   MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO
   Example:
   MD10050 $MN_SYSCLOCK_CYCLE_TIME = 0.004 [s]
   MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO = 3
   -> Interpolator cycle time = 0.004 * 3 = 0.012 [s]
2.   Calculation of the maximum velocity increase resulting from a
change made to the temperature compensation parameter DvTmax
   DvTmax = MD32000 $MA_MAX_AX_VELO * MD32760
   $MA_COMP_ADD_VELO_FACTOR
   Example: MD32000 $MA_MAX_AX_VELO = 10 000 [mm/min]
                 MD32760 $MA_COMP_ADD_VELO_FACTOR = 0.01
        -> DvTmax = 10 000 * 0.01 = 100 [mm/min]
3.   Calculation of the traverse distances per interpolator cycle
                                             0.012
     S1 (at vmax)      = 10 000 x  --------- = 2.0 [mm]
                                               60
                                              0.012
     ST (at DvTmax) =       100 x  --------- = 0.02 [mm]
                                                60
4.   Calculation of tanbmax
                         ST      0.02
             tanbmax  =  ----  = ------  = 0.01 (corresponds to
value for
                         S1        2
COMP_ADD_VELO_FACTOR)
              -> bmax = arc tan 0.01 = 0.57 degrees
   With larger values of SD43910 $SA_TEMP_COMP_SLOPE, the maximum
   gradient (here 0.57 degrees) for the position-dependent temper-
   ature compensation value is used internally. There is no alarm.
Note:
```

Any additional excessive velocity resulting from temperature compensation must be taken into account when defining the limit value for velocity monitoring (MD36200 $MA_AX_VELO_LIMIT).

MD irrelevant for:

MD32750 $MA_TEMP_COMP_TYPE = 0, sag compensation, LEC, backlash compensation

Related to:

MD32750 $MA_TEMP_COMP_TYPE

Temperature compensation type

SD43900 $SA_TEMP_COMP_ABS_VALUE

Position-independent temperature compensation value

SD43910 $SA_TEMP_COMP_SLOPE

Gradient for position-dependent temperature compensation

MD32000 $MA_MAX_AX_VELO

Maximum axis velocity

MD36200 $MA_AX_VELO_LIMIT

Threshold value for velocity monitoring

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO

Ratio of basic system clock rate to IPO cycle

MD10050 $MN_SYSCLOCK_CYCLE_TIME

Basic system clock rate

32800	EQUIV_CURRCTRL_TIME			EXP, A07, A09	G1,K3,S3,A2,A3,G2,S1,V1	
s	Equiv. time const. current control loop for feedforward control			DOUBLE	NEW CONF	
-						
-	6	0.0005, 0.0005, 0.0005, 0.0005, 0.0005, 0.0005	-	-	7/2	M

Description: The time constant is used for parameterizing the torque feedforward control and for calculating the dynamic following error model (contour monitoring).

In order to set the torque feedforward control correctly, the equivalent time constant of the current control loop must be determined exactly by measuring the step response of the current control loop.

Closed-loop control free of following errors can be set by inputting negative values when MD32620 $MA_FFW_MODE=4 (but positioning overshoots may then occur).

Delay values taken into account automatically by the software internally are thus compensated again until the actually active minimum symmetrizing time "0" is reached.

Any other negative input values have no further effect.

Negative values input when MD32620 $MA_FFW_MODE=2 are automatically converted internally to the input value "0", which means that they are not active in this case.

Related to:

MD32620 $MA_FFW_MODE

Type of feedfoward control

MD32650 $MA_AX_INERTIA

Moment of inertia for torque feedforward control

or MD32652 $MA_AX_MASS

Axis mass for torque feedforward control

MD36400 $MA_CONTOUR_TOL

Tolerance band contour monitoring

32810	EQUIV_SPEEDCTRL_TIME			A07, A09	G1,K3,S3,A2,A3,G2,S1,V1	
s	Equiv. time constant speed control loop for feedforward control			DOUBLE	NEW CONF	
-						
-	6	0.003, 0.003, 0.003, 0.003, 0.003...	-	-	7/2	M

Description: This time constant must be equal to the equivalent time constant of the closed current control loop.

It is used for parameterizing the speed feedforward control and for calculating the dynamic following error model (contour monitoring).

In addition, this MD determines the time behavior of the closed-loop speed control circuit for simulated drives (MD30130 $MA_CTRLOUT_TYPE 0).

In order to set the speed feedforward control correctly, the equivalent time constant of the current control loop must be determined exactly by measuring the step response of the current control loop.

Closed-loop control free of following errors can be set by inputting negative values when MD32620 $MA_FFW_MODE=3 (but positioning overshoots may then occur).

Delay values taken into account automatically by the software internally are thus compensated again until the actually active minimum symmetrizing time "0" is reached.

Any other negative input values have no further effect.

Negative values input when MD32620 $MA_FFW_MODE=1 are automatically converted internally to the input value "0", which means that they are not active in this case.

Related to:

MD32620 $MA_FFW_MODE (type of feedfoward control)

MD32610 $MA_VELO_FFW_WEIGHT (moment of inertia for speed feedforward control)

MD36400 $MA_CONTOUR_TOL (tolerance band contour monitoring)

32900	DYN_MATCH_ENABLE			A07	G21,S3,G2	
-	Dynamic response adaptation			BOOLEAN	NEW CONF	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: With dynamic response adaptation, axes with different servo gain factors can be set to the same following error with MD32910 $MA_DYN_MATCH_TIME.

1: Dynamic response adaptation active.

0: Dynamic response adaptation inactive.

Related to:

MD32910 $MA_DYN_MATCH_TIME[n]
(time constant of dyamic response adaptation)

32910	DYN_MATCH_TIME			A07	G1,K3,S3,A2,A3,G2,S1,V1	
s	Time constant of dynamic response adaptation			DOUBLE	NEW CONF	
-						
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2	M

Description: The time constant of the dynamic response adaptation of an axis has to be entered in this MD.

Axes interpolating with each other but having different dynamic responses can be adapted to the "slowest" control loop by means of this value.

The difference of the equivalent time constant of the "slowest" control loop to the individual axis has to be entered here as the time constant of the dynamic response adaptation.

The MD is only active if MD32900 $MA_DYN_MATCH_ENABLE = 1.

Related to:

MD32900 $MA_DYN_MATCH_ENABLE (dynamic response adaptation)

32920	AC_FILTER_TIME			A10	-	
s	Smoothing filter time constant for adaptive control			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/2	M

Description: In the case of PROFIdrive drives (provided that they transport the following drive actual values in the PROFIdrive message frame, e.g. MD13060 $MN_DRIVE_TELEGRAM_TYPE = 116):

With the main run variables $AA_LOAD, $AA_POWER, $AA_TORQUE, and $AA_CURR, the following drive actual values can be measured:

- Drive utilization
- Drive active power
- Drive torque setpoint value
- Current actual value of the axis or spindle

To compensate any peaks, the measured values can be smoothed with a PT1 filter. The filter time constant is defined with MD32920 $MA_AC_FILTER_TIME (filter smoothing time constant for adaptive control).

When measuring the drive torque setpoint value or the current actual value, the filter is active in addition to the filters available in the drive. The two filters are connected in series, if both signifcantly and slightly smoothed values are required in the system. The filter is switched off when a smoothing time of 0 seconds is entered.

32930	POSCTRL_OUT_FILTER_ENABLE			A07	G2	
-	Activation of low-pass filter at position controller output			BOOLEAN	NEW CONF	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: Activation of low-pass filter at position controller output.

Activation of the low-pass filter is only enabled when the dynamic stiffness control is inactive MD32640=0.

32940	POSCTRL_OUT_FILTER_TIME			A07	G2	
s	Time constant of low-pass filter at position controller output			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	M

Description: Time constant of low-pass filter at position controller output

Related to:

MD32640 $MA_STIFFNESS_CONTROL_ENABLE (dynamic stiffness control)

32950	POSCTRL_DAMPING			EXP, A07	G2	
%	Damping of the speed control circuit.			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	-1/2	M

Description: Application:

Attenuation of an oscillating axis by means of the additional switching of a rotational speed difference, which is determined from the difference between the two measuring systems.

Condition: The axis must have two measuring systems, with one encoder being connected directly and the other indirectly.

Explanation of normalization:

An input value of "100%" means: An additional torque is switched on in accordance with the drive MD if:

- A positional deviation of 1 mm exists in the case of linear motors
- A load-side positional deviation of 360 degrees exists in the case of rotary axes
- A positional deviation corresponding to MD31030 $MA_LEADSCREW_PITCH (e.g. 10 mm as a standard) exists in the case of linear axes (rot. drive).

32990	POSCTRL_DESVAL_DELAY_INFO			EXP, A01, A07	B3	
s	Actual setpoint position delay			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/RO	S

Description: This MD shows the additional setpoint value delay of the position controller in the current controller structure. It is set automatically for NCU link with different position controller cycles and can be changed via MD10065 $MN_POSCTRL_DESVAL_DELAY for the entire NCU.

In index 0, the value is displayed without feedforward control.

In index 1, the value is displayed with speed feedforward control.

In index 2, the value is displayed with torque feedforward control.

Related to:

MD10065 $MN_POSCTRL_DESVAL_DELAY

33000	FIPO_TYPE			EXP, A07	G1,G3,S3,G2	
-	Fine interpolator type			BYTE	PowerOn	
CTEQ						
-	-	2	1	3	7/2	M

Description: The type of the fine interpolator has to be entered in this MD:

1: differential FIPO

2: cubic FIPO

3: cubic FIPO, optimized for operation with feedforward control

Calculation time required and contour quality increase with increasing type of FIPO.

- The default setting is the cubic FIPO.
- If no feedforward control is used in the position control loop, the use of the differential FIPO reduces the calculation time while slightly increasing the contour error.
- If the position control cycle and the interpolation cycle are identical, fine interpolation does not take place, i.e. the different types of fine interpolator do not have different effects.

33050	LUBRICATION_DIST			A03, A10	A2,Z1	
mm, degrees	Traversing path for lubrication from PLC			DOUBLE	NEW CONF	
-						
-	-	1.0e8	-	-	7/2	I

Description: After the traversing path defined in the MD has been covered, the state of the axial interface signal "Lubrication pulse" is inverted, this can activate an automatic lubrication device.

The traversing path is summated after Power on.

The "Lubrication pulse" can be used with axes and spindles.

Application example(s):

The machine bed lubrication can be carried out as a function of the relevant traversed path.

Note:

When 0 is entered, the NC/PLC interface signal DB31, ... DBX76.0 (Lubrication pulse) is set in every cycle.

Related to:

NC/PLC interface signal DB31, ... DBX76.0 (Lubrication pulse)

33060	MAINTENANCE_DATA			A10	W6,2.4,6.2	
-	Configuration of maintenance data recording			DWORD	Reset	
-						
-	-	1	-	-	7/2	M

Description: Configuration of axis maintenance data recording:

Bit 0:

Recording the entire traversing path, entire traversing time and number of axis traversing procedures

Bit 1:

Recording the entire traversing path, entire traversing time and number of traversing procedures at high axis speed

Bit 2:

Recording the total sum of axis jerks, the time in which the axis is traversed with jerk, and the number of traversing procedures with jerk.

33100	COMPRESS_POS_TOL			A10	F2,B1,K1	
mm, degrees	Maximum deviation during compression			DOUBLE	NEW CONF	
CTEQ						
-	-	0.1	1.e-9	-	7/7	I

Description: The value specifies the maximum permissible path deviation for each axis with compression.

The higher the value, the more short blocks can be compressed into a long block.

Not relevant for:

Active programmable contour/orientation tolerance (CTOL, OTOL, ATOL)

33120	PATH_TRANS_POS_TOL			A10	K1,PGA	
mm, degrees	Maximum deviation for smoothing with G645			DOUBLE	NEW CONF	
CTEQ						
-	-	0.005	1.e-9	-	7/7	U

Description: The value specifies the maximum permitted path deviation for smoothing with G645.

This is only relevant to tangential block transitions that are not acceleration-continuous.

For smoothing of corner with G645 tolerance MD33100 $MA_COMPRESS_POS_TOL becomes active like with G642.

1.5.4 Reference point approach

34000	REFP_CAM_IS_ACTIVE			A03, A11	G1,R1	
-	Axis with reference point cam			BOOLEAN	Reset	
-						
-	-	TRUE	-	-	7/2	M

Description: 1: There is at least one reference point cam for this axis

0: This axis does not have a reference point cam (e.g. rotary axis)

The referencing cycle starts immediately with phase 2 (see documentation)

Machine axes that have only one zero mark over the whole travel range or rotary axes that have only one zero mark per revolution do not require an additional reference cam that selects the zero mark (select MD34000 $MA_REFP_CAM_IS_ACTIVE = 0).

The machine axis marked this way accelerates to the velocity specified in MD34040 $MA_REFP_VELO_SEARCH_MARKER (reference point creep velocity) when the plus/minus traversing key is pressed, and synchronizes with the next zero mark.

34010	REFP_CAM_DIR_IS_MINUS			A03, A11	G1,R1	
-	Approach reference point in minus direction			BOOLEAN	Reset	
-						
-	-	FALSE	-	-	7/2	M

Description: 0: MD34010 $MA_REFP_CAM_DIR_IS_MINUS Reference point approach in plus direction

1: MD34010 $MA_REFP_CAM_DIR_IS_MINUS Reference point approach in minus direction

For incremental measuring systems:

If the machine axis is positioned in front of the reference cam, it accelerates, depending on the plus/minus traversing key pressed, to the velocity specified in MD34020 $MA_REFP_VELO_SEARCH_CAM (reference point approach velocity) in the direction specified in MD34010 $MA_REFP_CAM_DIR_IS_MINUS. If the wrong traversing key is pressed, reference point approach is not started.

If the machine axis is positioned on the reference cam, it accelerates to the velocity specified in MD34020 $MA_REFP_VELO_SEARCH_CAM and travels in the direction opposite to that specified in MD34010 $MA_REFP_CAM_DIR_IS_MINUS.

For linear measuring systems with distance-coded reference marks:

If the machine axis has a reference cam (linear measuring systems with distance-coded reference marks do not necessarily require a reference cam) and the machine axis is positioned on the reference cam, it accelerates, irrespectively of the plus/minus traversing key pressed, to the velocity specified in MD34040 $MA_REFP_VELO_SEARCH_MARKER (reference point creep velocity) in the direction opposite to that specified in MD34010 $MA_REFP_CAM_DIR_IS_MINUS.

34020	REFP_VELO_SEARCH_CAM			A03, A11, A04	G1,R1	
mm/min, rev/min	Reference point approach velocity			DOUBLE	Reset	
-						
-	-	5000.00,5000.00,5000.00,5000.00...	-	-	7/2	M

Description: The reference point approach velocity is the velocity at which the machine axis travels in the direction of the reference cam after the traversing key has been pressed (phase 1). This value should be set at a magnitude large enough for the axis to be stopped to 0 before it reaches a hardware limit switch.

MD irrelevant for:

Linear measuring systems with distance-coded reference marks

34030	REFP_MAX_CAM_DIST			A03, A11	G1,R1	
mm, degrees	Maximum distance to reference cam			DOUBLE	Reset	
-						
-	-	10000.0	-	-	7/2	M

Description: If the machine axis travels a maximum distance defined in MD34030 $MA_REFP_MAX_CAM_DIST from the starting position in the direction of the reference cam, without reaching the reference cam (NC/PLC interface signal DB31, ... DBX12.7 (Reference point approach delay) is reset), the axis stops and alarm 20000 "Reference cam not reached" is output.

Irrelevant to:

Linear measuring systems with distance-coded reference marks

34040	REFP_VELO_SEARCH_MARKER			A03, A11, A04	G1,R1,S1	
mm/min, rev/min	Creep velocity			DOUBLE	Reset	
-						
-	2	300.00, 300.00,300.00, 300.00...	-	-	7/2	M

Description: 1) For incremental measuring systems:

This is the velocity at which the axis travels during the time between initial detection of the reference cam and synchronization with the first zero mark (phase 2).

Traversing direction: Opposite to the direction specified for the cam search (MD34010 $MA_REFP_CAM_DIR_IS_MINUS)

If MD34050 $MA_REFP_SEARCH_MARKER_REVERSE (direction reversal on reference cam) is enabled, then if the axis is synchronized with a rising reference cam signal edge on the cam, the axis traverses at the velocity defined in MD34020 $MA_REFP_VELO_SEARCH_CAM.

2) Indirect measuring system with BERO on the load-side (preferred for spindles):

At this velocity, a search is made for the zero mark associated with the BERO (zero mark selection per VDI signal). The zero mark is accepted if the actual velocity lies within the tolerance range defined in MD35150 $MA_SPIND_DES_VELO_TOL as a deviation from the velocity specified in MD34040 $MA_REFP_VELO_SEARCH_MARKER[n].

3) For linear measuring systems with distance-coded reference marks:

The axis crosses the two reference marks at this velocity. The maximum velocity must be low enough to ensure that the time required to travel the smallest possible reference mark distance [(x(minimum)] on the linear measuring system is longer than one position controller cycle.

```
The formula
                        Basic dist.                  Meas.length
[x(minimum)] [mm] = ----------- * Grad.cycle - --------------
                             2                       Basic dist.
with    Basic distance [multiple of graduation cycle]
          Graduation cycle [mm]
          Measuring length [mm]     yields:
                              x(minimum) [mm]
    max. velocity [m/s] = ---------------------------------
                              Position controller cycle  [ms]
```

This limiting value consideration also applies to the other measuring systems.

Traversing direction:

- as defined in MD34010 $MA_REFP_CAM_DIR_IS_MINUS;
- if the axis is already positioned on the cam, the axis is traversed in the opposite direction

34050	REFP_SEARCH_MARKER_REVERSE			A03, A11	G1,R1	
-	Direction reversal to reference cam			BOOLEAN	Reset	
-						
-	2	FALSE, FALSE	-	-	7/2	M

Description: This MD can be used to set the direction of search for the zero mark:

MD34050 $MA_REFP_SEARCH_MARKER_REVERSE = 0

Synchronization with falling reference cam signal edge

The machine axis accelerates to the velocity specified in MD34040 $MA_REFP_VELO_SEARCH_MARKER (reference point creep velocity) in the opposite direction to that specified in MD34010 $MA_REFP_CAM_DIR_IS_MINUS (reference point approach in minus direction).

If the axis leaves the reference cam (NC/PLC interface signal DB31, ... DBX12.7 (Reference point approach delay) is reset) the control is synchronized with the first zero mark.

MD34050 $MA_REFP_SEARCH_MARKER_REVERSE = 1

Synchronization with rising reference cam signal edge

The machine axis accelerates to the velocity defined in MD34020 $MA_REFP_VELO_SEARCH_CAM (reference point creep velocity) in the opposite direction to that specified in the MD34010 $MA_REFP_CAM_DIR_IS_MINUS. If the axis leaves the reference cam (NC/PLC interface signal DB31, ... DBX12.7 (Reference point approach delay) is reset), the machine axis decelerates to a halt and accelerates in the opposite direction towards the reference cam at the velocity specified in MD34040: $MA_REFP_VELO_SEARCH_MARKER. When the reference cam is reached (NC/PLC interface signal DB31, ... DBX12.7 (Reference point approach delay) is enabled) the control is synchronized with the first zero mark.

MD irrelevant to:

Linear measuring systems with distance-coded reference marks

34060	REFP_MAX_MARKER_DIST			A03, A11	G1,R1,S1	
mm, degrees	maximum distance to reference mark			DOUBLE	Reset	
-						
-	2	20.0, 20.0,20.0, 20.0,20.0, 20.0...	-	-	7/2	M

Description: For incremental measuring systems:

If, after leaving the reference cam (NC/PLC interface signal DB31, ... DBX12.7 (Reference point approach delay) is reset), the machine axis travels a distance defined in MD34060: $MA_REFP_MAX_MARKER_DIST without detecting the zero mark, the axis stops and alarm 20002 "Zero mark missing" is output.

For linear measuring systems with distance-coded reference marks:

If the machine axis travels a distance defined in MD34060 $MA_REFP_MAX_MARKER_DIST from the starting position without crossing two zero marks, the axis stops and alarm 20004 "Reference mark missing" is output.

34070	REFP_VELO_POS			A03, A11, A04	G1,R1	
mm/min, rev/min	Reference point positioning velocity			DOUBLE	Reset	
-						
-	-	10000.00,10000.00,10000.00,10000.00...	-	-	7/2	M

Description: For incremental measuring systems:

The axis travels at this velocity between the time of synchronization with the first zero mark and arrival at the reference point.

For linear measuring systems with distance-coded reference marks:

The axis travels at this velocity between the time of synchronization (crossing two zero marks) and arrival at the target point.

34080	REFP_MOVE_DIST			A03, A11	G1,R1,S1,S3,G2	
mm, degrees	Reference point distance			DOUBLE	NEW CONF	
-						
-	2	-2.0, -2.0	-1e15	1e15	7/2	I

Description: 1. Standard measuring system (incremental with equidistant zero marks)

Reference point positioning movement: 3rd phase of the reference point approach:

The axis traverses from the position at which the zero mark is detected with the velocity REFP_AX_VELO_POS along the path REFP_MOVE_DIST + REFP_MOVE_DIST_CORR (relative to the marker).

REFP_SET_POS is set as the current axis position at the target point.

2. Irrelevant for distance-coded measuring system.

Override switch and selection jog/continuous mode (MD JOG_INC_MODE_IS_CONT) are active.

34090	REFP_MOVE_DIST_CORR			A03, A02, A08, A11	G1,R1,S1,S3,G2	
mm, degrees	Reference point offset/absolute offset			DOUBLE	NEW CONF	
-, -						
-	2	0.0, 0.0	-1e12	1e12	7/2	I

Description:

- Incremental encoder with zero mark(s):

After detection of the zero mark, the axis is positioned away from the zero mark by the distance specified in MD34080 $MA_REFP_MOVE_DIST + MD34090 $MA_REFP_MOVE_DIST_CORR. After traversing this distance, the axis has reached the reference point. MD34100 $MA_REFP_SET_POS is transferred into the actual value.

During traversing by MD34080 $MA_REFP_MOVE_DIST + MD34090 $MA_REFP_MOVE_DIST_CORR, the override switch and MD11300 $MN_JOG_INC_MODE_LEVELTRIGGRD (jog/continuous mode) are active.

- Distance-coded measuring system:

MD34090 $MA_REFP_MOVE_DIST_CORR acts as an absolute offset. It describes the offset between the machine zero and the first reference mark of the measuring system.

- Absolute encoder:

MD34090 $MA_REFP_MOVE_DIST_CORR acts as an absolute offset.

It describes the offset between the machine zero and the zero point of the absolute measuring system.

Note:

In conjunction with absolute encoders, this MD is modified by the control during calibration processes and modulo offset.

With rotary absolute encoders (on linear and rotary axes), the modification frequency also depends on the setting of MD34220 $MA_ENC_ABS_TURNS_MODULO.

Manual input or modification of this MD via the part program should therefore be followed by a Power ON Reset to activate the new value and prevent it from being lost.

The following applies to an NCU-LINK:

If a link axis uses an absolute encoder, every modification of MD34090 $MA_REFP_MOVE_DIST_CORR on the home NCU (servo physically available) is updated only locally and not beyond the limits of the NCU. The modification is therefore not visible to the link axis. Writing MD34090 $MA_REFP_MOVE_DIST_CORR through the link axis is rejected with alarm 17070.

34092	REFP_CAM_SHIFT			A03, A11	G1,R1	
mm, degrees	electronic cam offset for incremental measuring systems			DOUBLE	Reset	
-						
-	2	0.0, 0.0	-	-	7/2	I

Description: Electronic cam offset for incremental measuring systems with equidistant zero marks.

When the reference cam signal occurs, the zero mark search does not start immediately but is delayed until after the distance from REFP_CAM_SHIFT.

This ensures the reproducibility of the zero mark search through a defined selection of a zero mark, even with temperature-dependent expansion of the reference cam.

Because the reference cam offset is calculated by the control in the interpolation cycle, the actual cam offset is at least REFP_CAM_SHIFT and at most REFP_CAM_SHIFT+(MD34040 $MA_REFP_VELO_SEARCH_MARKER*interpolation cycle)

The reference cam offset is effective in the search direction of the zero mark.

The reference cam offset is only active if existing cam MD34000 $MA_REFP_CAM_IS_ACTIVE=1.

34093	REFP_CAM_MARKER_DIST			A03, A11	R1	
mm, degrees	Reference cam/reference mark distance			DOUBLE	PowerOn	
-						
-	2	0.0, 0.0	-	-	7/RO	I

Description: The value displayed corresponds to the distance between exiting the reference cam and the occurrence of the reference mark. If the values are too small, there is a risk of not being able to determine the reference point due to temperature reasons or varying operating times of the cam signal. The distance travelled may serve as a clue for setting the electronic reference cam offset.

This machine data is a display data and can therefore not be changed.

34100	REFP_SET_POS			A03, A11	G1,S3,G2,R1,S1	
mm, degrees	Reference point for incremental system			DOUBLE	Reset	
-						
-	4	0., 0., 0., 0.	-45000000	45000000	7/2	I

Description:

- Incremental encoder with zero mark(s):

  The position value which is set as the current axis position after detection of the zero mark and traversal of the distance REFP_MOVE_DIST + REFP_MOVE_DIST_CORR (relative to zero mark). REFP_SET_POS of the reference point number, which is set at the instant that the edge of the reference cam signal rises (NC/PLC interface signal DB31, _DBX2.4 - 2.7 (Reference point value 1 to 4)), is set as the axis position.

- Distance-coded measuring system:

Target position which is approached when MD34330 $MA_REFP_STOP_AT_ABS_MARKER is set to 0 (FALSE) and two zero marks have been crossed.

- Absolute encoder:

MD34100 $MA_REFP_SET_POS corresponds to the correct actual value at the calibration position.

The reaction on the machine depends on the status of MD34210 $MA_ENC_REFP_STATE: When MD34210 $MA_ENC_REFP_STATE = 1, the value of MD34100 $MA_REFP_SET_POS is transferred as the absolute value.

When MD34210 $MA_ENC_REFP_STATE = 2 and MD34330 $MA_REFP_STOP_AT_ABS_MARKER = 0 (FALSE), the axis approaches the target position stored in MD34100 $MA_REFP_SET_POS.

The value of MD34100 $MA_REFP_SET_POS that has been set via NC/PLC interface signal DB31, _DBX2.4 - 2.7 (Reference point value 1 to 4) is used.

Related to:

NC/PLC interface signal DB31, _DBX2.4 - 2.7 (Reference point value 1 to 4)

34102	REFP_SYNC_ENCS			A03, A02	R1,Z1	
-	Calibration of measuring systems			BYTE	Reset	
-						
-	-	0	0	1	7/2	M

Description: Calibrating the measuring system to the reference measuring system can be activated for all measuring systems of this axis with this machine data.

The calibration procedure is made during reference point approach or when calibrated absolute encoders selected for the closed-loop control are switched on.

Values:

0: No measuring system calibration, measuring systems must be referenced individually

1: Calibration of all measuring systems of the axis to the position of the reference measuring system

In combination with MD30242 $MA_ENC_IS_INDEPENDENT = 2, the passive encoder is calibrated to the active encoder but NOT referenced.

34104	REFP_PERMITTED_IN_FOLLOWUP			A03, A02	R1	
-	Enable referencing in follow-up mode			BOOLEAN	Reset	
-						
-	-	FALSE	-	-	7/2	M

Description: An axis can also be referenced in the follow-up mode under JOG+REF mode by means of an external motion.

34110	REFP_CYCLE_NR			A03	G1,TE3,D1,R1,Z1	
-	Sequence of axes in channel-specific referencing			DWORD	PowerOn	
-						
-	-	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16,17,18...	-1	31	7/2	M

Description:

MD34110 $MA_REFP_CYCLE_NR = 0 -----> axis-specific referencing

Axis-specific referencing is started separately for each machine axis with the NC/PLC interface signal DB31, ... DBX4.7 / 4.6 (Plus/minus travel keys).

Up to 8 axes (840D) can be referenced simultaneously.

The following alternatives are provided for referencing the machine axes in a specific sequence:

- The operator has to observe the correct sequence on startup.
- The PLC checks the sequence on startup or defines the sequence itself.
- The channel-specific referencing function is used.

MD34110 $MA_REFP_CYCLE_NR = 1 -----> channel-specific referencing

Channel-specific referencing is started with the NC/PLC interface signal DB21-30 DBX1.0 (Activate referencing). The control acknowledges a successful start with the NC/PLC interface signal DB21-30 DBX33.0 (Referencing active). Each machine axis assigned to the channel can be referenced with channel-specific referencing (this is achieved internally on the control by simulating the plus/minus traversing keys). The axis-specific MD34110 $MA_REFP_CYCLE_NR can be used to define the sequence in which the machine axes are referenced:

-1 means:

The machine axis is not started by channel-specific referencing, and NC start is possible without referencing this axis.

0 means:

The machine axis is not started by channel-specific referencing, and NC start is not possible without referencing this axis.

1 means:

The machine axis is started by channel-specific referencing.

2 means:

The machine axis is started by channel-specific referencing if all machine axes identified by a 1 in MD34110 $MA_REFP_CYCLE_NR are referenced.

3 means:

The machine axis is started by channel-specific referencing if all machine axes identified by a 2 in MD34110 $MA_REFP_CYCLE_NR are referenced.

4 to 8 :

As above for further machine axes.

Setting the channel-specific MD20700 $MC_REF_NC_START_LOCK (NC start disable without reference point) to zero has the effect of entering -1 for all the axes of a channel.

MD irrelevant to:

Axis-specific referencing

Related to:

NC/PLC interface signal DB21-30 DBX1.0 (Activate referencing)

NC/PLC interface signal DB21-30 DBX33.0 (Referencing active)

34200	ENC_REFP_MODE		A03, A02	G1,R1,S1	
-	Referencing mode		BYTE	PowerOn	
-					
-	2	1, 1	0	8	7/2	M

Description: The mounted position measuring systems can be classified for referencing as follows with MD34200 $MA_ENC_REFP_MODE:

- MD34200 $MA_ENC_REFP_MODE = 0

  If an absolute encoder is available: MD34100 $MA_REFP_SET_POS is taken over

  Other encoders: Reference point approach not possible (SW2.2 and higher)
- MD34200 $MA_ENC_REFP_MODE = 1

  Referencing of incremental, rotary or linear measuring systems:

  Zero pulse on the encoder track

  Referencing of absolute, rotary measuring systems:

  Replacement zero pulse based on the absolute information
- MD34200 $MA_ENC_REFP_MODE = 3

  Referencing on linear measuring systems with distance-coded reference marks:

  Linear measuring system with distance-coded reference marks (as specified by Heidenhain)
- MD34200 $MA_ENC_REFP_MODE = 4 :

  Reserved (BERO with 2-edge evaluation)
- MD34200 $MA_ENC_REFP_MODE = 8

  Referencing for linear measuring systems with distance-coded reference marks:

  Linear measuring system with distance-coded reference marks over 4 zero marks (increased safety).

34210	ENC_REFP_STATE			A07, A03, A02	R1	
-	Adjustment status of absolute encoder			BYTE	Immediately	
-						
-	2	0, 0	0	3	7/4	I

Description:

- Absolute encoder:

  This machine data contains the absolute encoder status

0: Encoder is not calibrated

1: Encoder calibration enabled (but not yet calibrated)

2: Encoder is calibrated

Default setting for recommissioning: Encoder is not calibrated.

3: No significance, has the same effect as "0"

- Incremental encoder:

  This machine data contains the "Referenced status", which can be saved beyond Power On:

0: Default setting: No automatic referencing

1: Automatic referencing enabled, but encoder not yet referenced

2: Encoder is referenced and at exact stop, automatic referencing becomes active at the next encoder activation

3: The last axis position buffered before switch off is restored, no automatic referencing

Default setting for recommissioning: No automatic referencing

34220	ENC_ABS_TURNS_MODULO			A03, A02	R1	
-	Modulo range for rotary absolute encoder			DWORD	PowerOn	
-						
-	2	4096, 4096	1	100000	7/2	M

Description: Number of encoder revolutions a rotary absolute encoder is able to resolve (see also the maximum multiturn information of the absolute encoder, see encoder data sheet or PROFIdrive parameter p979).

The absolute position of a rotary axis is reduced to this resolvable range when an absolute encoder is switched on:

In other words, a MODULO transformation takes place if the actual position sensed is larger than the position permitted by MD ENC_ABS_TURNS_MODULO.

0 degrees <= position <= n*360 degrees (with n = ENC_ABS_TURNS_MODULO)

Note:

With SW 2.2, the position is reduced to this range when the control/encoder is switched on. With SW 3.6 and higher, half of this value represents the maximum permissible travel distance with the control swiched off/the encoder inactive.

Special cases:

For PROFIdrive, any integer value is permissible.

This MD is relevant only for rotary encoders (on linear and rotary axes).

Related to:

PROFIdrive parameter p979

34230	ENC_SERIAL_NUMBER			A02	R1	
-	Encoder serial number			DWORD	PowerOn	
-						
-	2	0, 0	-	-	7/2	I

Description: The encoder serial number (EnDat encoders) can be read out here.

It is updated at PowerOn or when parking is deselected.

"0" is supplied for encoders which do not have a serial number available.

Manipulating this MD normally causes automatic absolute encoder maladjustment ($MA_ENC_REFP_MODE returns to "0").

34232	EVERY_ENC_SERIAL_NUMBER			A02	R1	
-	Range of encoder serial number			BOOLEAN	PowerOn	
-						
-	2	TRUE, TRUE	-	-	7/2	M

Description: 0 = only valid encoder serial number are entered in the MD, i.e. when the drive supplies a "0" (which corresponds to invalid or unknown) the last valid encoder serial number is retained in the MD (e.g. for add-on axes that are not permanently connected to the machine).

1 = (default, upward compatible): the value supplied by the drive for the encoder serial number is taken over into the MD with every control runup. A validity check is not carried out.

Note for PROFIdrive drives:

As not every drive can supply the relevant parameters at all or in good time, the functionality is coded permanently corresponding to "0" for the PROFIdrive drive. A "1" setting is therefore ineffective on the PROFIBUS.

34300	ENC_REFP_MARKER_DIST			A03, A02	R1	
mm, degrees	Basic distance of reference marks of distance-coded encoders.			DOUBLE	PowerOn	
-						
-	2	10.0, 10.0	-	-	7/2	M

Description: In addition to the incremental encoder track, a further encoder track is available with distance-coded measuring systems for determining the absolute encoder position. This encoder track has reference marks at defined, different distances. The basic distance between the fixed reference marks (which are the reference marks that are always the same distance from one another) can be taken from the data sheet, and directly transferred into machine data MD34300 $MA_ENC_REFP_MARKER_DIST.

With the basic distance between the fixed reference marks (MD34300 $MA_ENC_REFP_MARKER_DIST), the distance between two reference marks (MD34310 $MA_ENC_MARKER_INC), and the number of encoder marks (MD31020 $MA_ENC_RESOL) on angular measuring systems or the graduation cycle (MD31010 $MA_ENC_GRID_POINT_DIST) on linear measuring systems, the absolute encoder position can be determined once two successive reference marks have been crossed.

MD34300 $MA_ENC_REFP_MARKER_DIST is also used for a plausibility check of reference mark distances.

Examples of application:

For example: Heidenhain LS186 C

MD 31010 = 0.02mm (graduation cycle)

MD 34300 = 20.00mm (basic distance between the reference marks)

MD 34310 = 0.02mm (distance between two reference marks corresponds to one graduation cycle).

34310	ENC_MARKER_INC			A03, A02	R1	
mm, degrees	Interval between two reference marks for distance-coded scales			DOUBLE	Reset	
-						
-	2	0.02, 0.02	-	-	7/2	M

Description: The distances between two reference marks are defined variably, so that the position of the crossed reference marks can be determined accurately in linear measuring systems with distance-coded reference marks.

The difference between two reference mark distances is entered in MD34310 $MA_ENC_MARKER_INC.

MD irrelevant for:

Incremental measuring systems

Special cases:

On linear measuring systems with distance-coded reference marks supplied by Heidenhain, the interval between two reference marks is always equal to one graduation cycle.

34320	ENC_INVERS			A03, A02	G2,R1	
-	Length measuring system inverse to axis movement.			BOOLEAN	Reset	
-						
-	2	FALSE, FALSE	-	-	7/2	M

Description:

- In the case of a distance-coded measuring system:

When setting a reference point, the actual position (determined by the distance-coded reference marks) on the linear measuring system is assigned to an exact machine axis position (referred to the machine zero point). The absolute offset between the machine zero point and the position of the 1st reference mark on the linear measuring system must therefore be entered in MD34090 $MA_REFP_MOVE_DIST_CORR (reference point/absolute offset). In addition, MD34320 $MA_ENC_INVERS must be used to set whether the linear measuring system is connected in the same or the opposite direction to the machine system.

MD irrelevant to:

Incremental encoders without distance-coded reference marks.

34330	REFP_STOP_AT_ABS_MARKER			A03	G1,R1	
-	Distance-coded linear measuring system without target point			BOOLEAN	Reset	
-						
-	2	TRUE, TRUE	-	-	7/2	M

Description:

• Distance-coded measuring system:

REFP_STOP_AT_ABS_MARKER = 0:

At the end of the reference cycle, the position entered in MD34100 $MA_REFP_SET_POS is approached (normal case for phase 2).

REFP_STOP_AT_ABS_MARKER = 1:

The axis is braked after detection of the second reference mark (shortening of phase 2)

• Absolute encoder:

MD34330 $MA_REFP_STOP_AT_ABS_MARKER defines the response of an axis with a valid calibration identifier (MD34210 $MA_ENC_REFP_STATE = 2) with G74 or when a traversing key is actuated in JOG-REF:

REFP_STOP_AT_ABS_MARKER = 0:

Axis traverses to the position entered in MD34100 $MA_REFP_SET_POS

REFP_STOP_AT_ABS_MARKER = 1:

Axis does not traverse.

MD irrelevant for:

Incremental encoders with zero mark (standard encoders)

Related to:

MD34100 $MA_REFP_SET_POS

(reference point distance/target point for distance-coded system)

34400	ENC_SSI_STATUS			A03, A11	G2	
-	Synchronization data for SSI absolute value encoder			BYTE	PowerOn	
-						
-	2	0x0,0x0	-	-	-1/2	M

Description:

```
Synchronization data for SSI absolute value encoder:
Bit 0 (LSB) (measured value code)   = 0 -> Gray code
                                     = 1 -> binary code
Bit 1 (parity test)                = 0 -> no
                                     = 1 -> yes
Bit 2 (parity)                     = 0 -> uneven parity
                                     = 1 -> even parity
Bit 3 (measurement)                      = 0 -> no provision for measure-
ment
                                   = 1 -> activate encoder for measurement
Bit 4 (probe selection)   = 0 -> probe with BEROMEPU3
                                     = 1 -> probe with BEROMEPU4
Bit 5                                = currently of no relevance
Bit 6                                = currently of no relevance
Bit 7                                = currently of no relevance
```

34410	ENC_SSI_MESSAGE_LENGTH		A02, A03, A11	G2	
-	Telegram length for SSI absolute value encoder		BYTE	PowerOn	
-					
-	2	0,0	0	3	-1/2	M

Description: Telegram length for SSI absolute value encoder

Value: 0 Default: 25 bits for multi-turn encoder
1 13 bits for single-turn encoder
2 21 bits for multi-turn encoder
3 25 bits for multi-turn encoder

34420	ENC_SSI_MESSAGE_FORMAT			A03, A11, A02	G2	
-	Steps per encoder revolution			BYTE	PowerOn	
-						
-	2	0,0	0	13	-1/2	M

Description: In the case of SSI absolute value encoders, the steps per encoder revolution are used

here to define the telegram format within the telegram length.

Value: 0 right-aligned
1 8192 steps/revolution in fir-tree format
2 4096 steps/revolution in fir-tree format
3 2048 steps/revolution in fir-tree format
4 1024 steps/revolution in fir-tree format
5 512 steps/revolution in fir-tree format
6 256 steps/revolution in fir-tree format
7 128 steps/revolution in fir-tree format
8 64 steps/revolution in fir-tree format
9 32 steps/revolution in fir-tree format
10 16 steps/revolution in fir-tree format
11 8 steps/revolution in fir-tree format
12 4 steps/revolution in fir-tree format
13 2 steps/revolution in fir-tree format

34800	WAIT_ENC_VALID			A01	-	
-	Parameter setting for part program command WAITENC			DWORD	PowerOn	
-						
-	-	0	0	1	7/2	M

Description: Parameter setting for part program command WAITENC:

0: Axis is not taken into account when waiting for synchronized / referenced or restored position with part program command WAITENC.

1: A delay is applied in part program command WAITENC until a synchronized / referenced or restored position is available for this axis.

34990	ENC_ACTVAL_SMOOTH_TIME			A02	V1	
s	Smoothing time constant for actual values.			DOUBLE	Reset	
-						
-	2	0.0, 0.0	0.0	0.5	7/2	I

Description: Using low-resolution encoders, a more continuous motion of coupled path or axis motions can be achieved with smoothed actual values. The bigger the time constant, the better the smoothing of actual values and the larger the overtravel.

Smoothed actual values are used for:

- Thread-cutting (G33, G34, G35)
- Revolutional feedrate (G95, G96, G97, FPRAON)
- Display of actual position and velocity, or speed respectively.

1.5.5 Spindles

35000	SPIND_ASSIGN_TO_MACHAX			A01, A06, A11	M1,S3,K2,S1	
-	Assignment of spindle to machine axis			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	20	7/2	M

Description: Spindle definition. The spindle is defined when the spindle number has been entered in this MD.

Example:

If the corresponding axis is to be spindle 1, value "1" must be entered in this MD.

The spindle functions are possible only for modulo rotary axes. For this purpose MD30300 $MA_IS_ROT_AX and MD30310 $MA_ROT_IS_MODULO must be set.

The axis functionality is maintained; transition to axis operation can be performed with M70.

The gear stage-specific spindle data are set in parameter blocks 1 to 5; parameter block 0 is used for axis operation (MD35590 $MA_PARAMSET_CHANGE_ENABLE).

The lowest spindle number is 1, the highest number depends on the number of axes in the channel.

If other spindle numbers are to be assigned, the function "spindle converter" must be used.

With multi-channel systems, the same numbers can be assigned in all channels, except for those spindles active in several channels (replacement axes/spindles MD 30550: $MA_AXCONF_ASSIGN_MASTER_CHAN).

35010	GEAR_STEP_CHANGE_ENABLE			A06, A11	P3 pl,P3 sl,S1	
-	Parameterize gear stage change			DWORD	Reset	
CTEQ						
-	-	0x00	0	0x2B	7/2	M

Description: Meaning of bit places:

Bit 0 = 0 and bit 1 = 0:

There is an invariable gear ratio between motor and load. The MD of the first gear stage is active. Gear stage change is not possible with M40 to M45.

Bit 0 = 1:

Gear stage change at undefined change position. The gear can have up to 5 gear stages, which can be selected with M40, M41 to M45. To support the gear stage change, the motor can carry out oscillating motions, which must be enabled by the PLC program.

Bit 1 = 1:

Same meaning as bit 0 = 1, although the gear stage change is carried out in a configured spindle position (SW 5.3 and higher). The change position is configured in MD35012 $MA_GEAR_STEP_CHANGE_POSITION. The position is approached in the current gear stage before the gear stage change. If this bit is set, bit 0 is not taken into account!

Bit 2: Reserved

Bit 3 = 1:

The gear stage change dialog between NCK and PLC is simulated. The setpoint gear stage is output to the PLC. A checkback signal from the PLC is not awaited. The acknowledgment is generated internally in the NCK.

Bit 4: Reserved

Bit 5 = 1:

The second gear stage data set is used for tapping with G331/ G332. The bit must be set for the master spindle used for tapping. Bit 0 or bit 1 must be set.

Related to:

MD35090 $MA_NUM_GEAR_STEPS (number of gear stages 1st data set, see bit 5)

MD35092 $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd data set, see bit 5)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for autom. gear stage change)

MD35112 $MA_GEAR_STEP_MAX_VELO2 (max. speed for autom. gear stage change 2nd data set, see bit 5)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for autom. gear stage change)

MD35122 $MA_GEAR_STEP_MIN_VELO2 (min. speed for autom. gear stage change 2nd data set, see bit 5)

35012	GEAR_STEP_CHANGE_POSITION			A06, A11	S1	
mm, degrees	Gear stage change position			DOUBLE	NEW CONF	
CTEQ						
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2	M

Description: Gear stage change position.

The value range must be within the configured modulo range.

Related to:

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE, bit 1

MD30330 $MA_MODULO_RANGE

35014	GEAR_STEP_USED_IN_AXISMODE			A01, A06, A11	-	
-	Gear stage for axis mode with M70			DWORD	NEW CONF	
CTEQ						
-	-	0	0	5	7/2	M

Description: With this MD, a gear stage can be defined which can be loaded into the axis mode during the transition with M70. The parameter set zero used in axis mode is to be optimized on this gear stage.

Significance of the values:

0: There is no implicit gear stage change with M70.

The current gear stage is retained.

1 ... 5:

There is a change into gear stage (1...5) during the execution of M70.

During the transition into axis mode without M70, there is monitoring for this gear stage and alarm 22022 is issued if necessary. The condition for a gear stage change is the general release of the function in MD35010 $MA_GEAR_STEP_CHANGE_ENABLE.

Secondary conditions:

When changing from axis mode into spindle mode, the configured gear stage continues to remain active. There is no automatic return to the last active gear stage in spindle mode.

35020	SPIND_DEFAULT_MODE			A06, A10	S1	
-	Initial spindle setting			BYTE	Reset	
CTEQ						
-	-	0	0	3	7/2	M

Description: SPIND_DEFAULT_MODE activates the set operating mode of the spindle at the time specified in MD35030 $MA_SPIND_DEFAULT_ACT_MASK. The appropriate spindle operating modes can be set with the following values:

0 Speed mode, position control deselected

1 Speed mode, position control activated

2 Positioning mode, no check for synchronized/referenced position on NC start

3 Axis mode, MD34110 $MA_REFP_CYCLE_NR can be used to configure / deactivate forced referencing on NC start

Corresponds with:

MD35030 $MA_SPIND_DEFAULT_ACT_MASK (activate spindle initial setting)

MD20700 $MC_REFP_NC_START_LOCK (NC start disable without reference point)

35030	SPIND_DEFAULT_ACT_MASK			A06, A10	S1	
-	Time at which initial spindle setting is effective			BYTE	Reset	
CTEQ						
-	-	0x00	0	0x03	7/2	M

Description: SPIND_DEFAULT_ACT_MASK specifies the time at which the operating mode defined in MD35020 $MA_SPIND_DEFAULT_MODE becomes effective. The initial spindle setting can be assigned the following values at the following points in time:

0 POWER ON

1 POWER ON and NC program start

2 POWER ON and RESET (M2/M30)

Special cases:

If MD35040 $MA_SPIND_ACTIVE_AFTER_RESET = 1, the following supplementary conditions are applicable:

- SPIND_DEFAULT_ACT_MASK should be set to 0
- If this is not possible, the spindle must be at a standstill prior to activation.

Related to:

MD35020 $MA_SPIND_DEFAULT_MODE (initial spindle setting)

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET (spindle active after reset)

35032	SPIND_FUNC_RESET_MODE			A06, A10	-	
-	Reset response of individual spindle functions			DWORD	PowerOn	
CTEQ						
-	-	0x00	0	0x01	7/2	M

Description: This data allows the "GWPS in every operating mode" function to be selected/deselected.

SPIND_FUNC_RESET_MODE, bit 0 = 0 : "GWPS in every operating mode" is deselected

SPIND_FUNC_RESET_MODE, bit 0 = 1 : "GWPS in every operating mode" is selected

35035	SPIND_FUNCTION_MASK			A06, A10	K1,S1	
-	Spindle functions			DWORD	Reset	
CTEQ						
-	-	0x510	-	-	7/2	M

Description: This MD allows spindle-specific functions to be set.

The MD is bit-coded, the following bits are assigned:

Bit 0 = 1: Gear stage changes are suppressed with activated DryRun function for
block programming (M40, M41 to M45), programming via FC18,
and synchronized actions.

Bit 1 = 1: Gear stage changes are suppressed with activated program test function
for block programming (M40, M41 to M45), programming via
FC18, and synchronized actions.

Bit 2 = 1: Gear stage change for programmed gear stage will finally be carried
out after deselection of DryRun or program test functions with REPOS.

Bit 3: reserved

Bit 4 = 1:

The programmed speed is transferred to SD 43200 $SA_SPIND_S (incl. speed default settings via FC18 and synchronized actions).

S programmings that are not speed programmings are not written to the SD. These include, for example, S value with constant cutting velocity (G96, G961), S value with revolution-related dwell time (G4).

Bit 5 = 1:

The content of SD 43200 $SA_SPIND_S is applied as the speed setpoint for JOG. If the content is zero, then other JOG speed default settings become active (see SD 41200 JOG_SPIND_SET_VELO).

Bit 6: reserved

Bit 7: reserved

Bit 8 = 1:

The programmed cutting velocity is transferred to SD 43202 $SA_SPIND_CONSTCUT_S (incl. default settings via FC18). S programmings, that are not cutting velocity programmings, are not written to the SD. These include, for example, S value outside of constant cutting velocity (G96, G961, G962), S value with revolution-related dwell time (G4), S value in synchronized actions.

Bit 9: reserved

Bit 10 = 0:

SD 43206 $SA_SPIND_SPEED_TYPE is not changed by part program or channel settings,

= 1:

For the master spindle, the value of the 15th G group (type of feedrate) is transferred to SD 43206 $SA_SPIND_SPEED_TYPE. For all other spindles, the corresponding SD remains unchanged.

Bit 11: reserved

Bit 12 = 1:

Spindle override is active with zero mark search for M19, SPOS, and SPOSA

= 0:

Previous response (default)

The following bits 16-20 can be used to set spindle-specific M functions which are output to the VDI interface

if the corresponding M functionality has been generated implicitly for the program sequence.

Bit 16: reserved

Bit 17: reserved

Bit 18: reserved

Bit 19:"Output implicit M19 to PLC"

= 0: If MD20850 $MC_SPOS_TO_VDI = 0 too, no auxiliary function M19 is generated for SPOS and SPOSA. As a result, the acknowledgment time for the auxiliary function is also eliminated. This can cause problems in the case of short blocks.

= 1: The implicit auxiliary function M19 is generated with the programming of SPOS and SPOSA and output to the PLC. The address is expanded in accordance with the spindle number.

Bit 20:"Output implicit M70 to PLC"

= 0: No generation of implicit auxiliary function M70. Note: A programmed auxiliary function M70 is always output to the PLC.

= 1: Auxiliary function M70 is generated implicitly and output to the PLC on transition to axis mode. The address is expanded in accordance with the spindle number.

Bit 21: reserved

Bit 22 = 0: As of NCK version 78.00.00: The NC/PLC interface signal DB31, ... DBX17.6 (invert M3/M4) is applied to the function for interpolatory tapping G331/G332.

Bit 22 = 1: Response is compatible with SW releases prior to NCK version 78.00.00: The NC/PLC interface signal DB31, ... DBX17.6 (invert M3/M4) is not applied to the function for interpolatory tapping G331/G332.

MD is Corresponds with:

MD20850 $MC_SPOS_TO_VDI

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET

MD35020 $MA_SPIND_DEFAULT_MODE

SD43200 $SA_SPIND_S

35040	SPIND_ACTIVE_AFTER_RESET			A06, A10	S1,Z1,2.7	
-	Own spindle RESET			BYTE	PowerOn	
CTEQ						
-	-	0	0	2	7/2	M

Description: MD35040 $MA_SPIND_ACTIVE_AFTER_RESET defines the response of the spindle after channel reset NC/PLC interface signal DB21-30 DBX7.7 (Reset) and program end (M2, M30).

This MD is only active in the spindle mode open-loop control mode. In positioning mode or oscillation mode, the spindle is always stopped.

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET = 0:

- Spindle stops (with M2/M30 and channel and mode group reset)
- Program is aborted

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET= 1:

- Spindle does not stop
- Program is aborted

MD35040 $MA_SPIND_ACTIVE_AFTER_RESET= 2:

- Spindle does not stop at the M function configured via MD10714 $MN_M_NO_FCT_EOP (e.g. M32).
- However, the spindle stops at channel or mode group reset.

The NC/PLC interface signal DB31, ... DBX2.2 (Delete distance-to-go/Spindle reset) is always effective, independent of MD35040 $MA_SPIND_ACTIVE_AFTER_RESET.

Not relevant to:

- Spindle modes other than open-loop control mode.

Related to:

NC/PLC interface signal DB21-30 DBX7.7 (Reset)

NC/PLC interface signal DB31, ... DBX2.2 (Delete distance-to-go/Spindle reset)

35090	NUM_GEAR_STEPS			A06, A10	S1	
-	Number of gear stages			DWORD	Reset	
-						
-	-	MAXNUM_GEAR_STEPS	1	5	2/2	M

Description: Number of set gear stages.

The first gear stage is always available.

Corresponding MDs:

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stages available/ functions)

MD35012 $MA_GEAR_STEP_CHANGE_POSITION (gear stage change position)

MD35014 $MA_GEAR_STEP_USED_IN_AXISMODE (gear stage for axis mode with M70)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for gear stage change)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for gear stage change)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (max. speed of gear stage)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL (acceleration in speed control mode)

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode)

MD35310 $MA_SPIND_POSIT_DELAY_TIME (positioning delay time)

MD35550 $MA_DRILL_VELO_LIMIT (maximum speeds for tapping)

MD35092 $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd gear stage data set)

35092	NUM_GEAR_STEPS2			A06, A10	S1	
-	Number of gear stages of 2nd gear stage data set			DWORD	Reset	
-						
-	-	MAXNUM_GEAR_STEPS	1	5	2/2	M

Description: Number of set gear stages of the second gear stage data set for the function 'Tapping with G331/G332'.

Activation (only makes sense for master spindle on tapping): MD 35010 $MA_GEAR_STEP_CHANGE_ENABLE, bit 5.

The number of gear stages must not be the same in the first and second gear stage data sets.

Corresponding MD:

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stages available/ functions)

MD35112 $MA_GEAR_STEP_MAX_VELO2 (2nd gear stage data set: max. speed for gear stage change)

MD35122 $MA_GEAR_STEP_MIN_VELO2 (2nd gear stage data set: min. speed for gear stage change)

MD35212 $MA_GEAR_STEP_POSCTRL_ACCEL2 (2nd gear stage data set: acceleration in position control mode)

35100	SPIND_VELO_LIMIT			A06, A11, A04	TE3,G2,S1,V1,Z1	
rev/min	Maximum spindle speed			DOUBLE	Reset	
CTEQ						
-	-	10000.0	1.0e-3	-	7/2	M

Description: MD35100 $MA_SPIND_VELO_LIMIT defines the maximum spindle speed that the spindle (the spindle chuck with the workpiece or the tool) must not exceed. The NCK limits an excessive spindle set-point speed to this value. If the maximum spindle actual speed is exceeded, even allowing for the spindle speed tolerance (MD35150 $MA_SPIND_DES_VELO_TOL), there is a fault with the drive and the NC/PLC interface signal DB31, ... DBX83.0 (speed limit exceeded) is set. Alarm 22100 "Maximum speed reached" is also output and all axes and spindles on the channel are decelerated (provided the encoder is still functioning correctly). The spindle has to be brought to a standstill before modifying the MD.

Corresponds with:

MD35150 $MA_SPIND_DES_VELO_TOL (spindle speed tolerance)

NC/PLC interface signal DB31, ... DBX83.0 (speed limit exceeded)

Alarm 22100 "Maximum speed reached"

35110	GEAR_STEP_MAX_VELO			A06, A11, A04	A3,S1	
rev/min	Maximum speed for gear stage change			DOUBLE	NEW CONF	
CTEQ						
-	6	500., 500., 1000., 2000., 4000., 8000.	-	-	7/2	M

Description: MD35110 $MA_GEAR_STEP_MAX_VELO defines the maximum speed (upper switching threshold) of the gear stage for automatic gear stage change M40 S... The speed ranges for the gear stages must be defined without gaps between them or can overlap.

Incorrect

MD35110 $MA_GEAR_STEP_MAX_VELO [gear stage1] =1000

MD35120 $MA_GEAR_STEP_MIN_VELO [gear stage2] =1200

Correct

MD35110 $MA_GEAR_STEP_MAX_VELO [gear stage1] =1000

MD35120 $MA_GEAR_STEP_MIN_VELO [gear stage2] = 950

Note:

- Programming a spindle speed which exceeds the highest numbered gear stage MD35110 $MA_GEAR_STEP_MAX_VELO [MD35090] triggers a switch to the highest gear stage (MD35090).

Related to:

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for automatic gear stage selection M40)

MD35090 $MA_NUM_GEAR_STEPS (number of gear stages)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change is possible)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage with speed control

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of gear stage with position control

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

35112	GEAR_STEP_MAX_VELO2			A06, A11, A04	S1	
rev/min	2nd data set: Maximum speed for gear stage change			DOUBLE	NEW CONF	
CTEQ						
-	6	500., 500., 1000., 2000., 4000., 8000.	0	-	2/2	M

Description: –

The 2nd gear stage data block for tapping with G331/G332 is activated with MD 35010:$MA_GEAR_STEP_CHANGE_ENABLE bit 5 for the master spindle.

Related to:

MD35122 $MA_GEAR_STEP_MIN_VELO2 (minimum speed for 2nd data block gear stage selection)

MD35092 $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd gear stage data block)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change, 2nd data block is possible)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage with speed control)

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of gear stage with position control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

35120	GEAR_STEP_MIN_VELO			A06, A11, A04	S1	
rev/min	Minimum speed for gear stage change			DOUBLE	NEW CONF	
CTEQ						
-	6	50., 50., 400., 800., 1500., 3000.	-	-	7/2	M

Description: –

See MD35120 $MA_GEAR_STEP_MAX_VELO for more information.

Note:

- Programming a spindle speed which undershoots the lowest speed of the first gear stage MD35120 $MA_GEAR_STEP_MIN_VELO[1] triggers a switch to the first gear stage.

Not relevant for:

- Programming of speed 0 (S0) if MD35120 $MA_GEAR_STEP_MIN_VELO[1] > 0

Related to:

MD35110 $MA_GEAR_STEP_MAX_VELO (maximum speed for automatic gear stage selection M40)

MD35090 $MA_NUM_GEAR_STEPS (number of gear stages)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change is possible)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of the gear stage with speed control)

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of the gear stage with position control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of the gear stage)

35122	GEAR_STEP_MIN_VELO2			A06, A11, A04	S1	
rev/min	2nd data set: Minimum speed for gear stage change			DOUBLE	NEW CONF	
CTEQ						
-	6	50., 50., 400., 800., 1500., 3000.	0	-	2/2	M

Description: The minimum speed (lower switching threshold) of the gear stage for automatic gear stage change M40 G331 S.. is set in GEAR_STEP_MIN_VELO2 for interpolatory tapping G331, G332. The speed ranges of the gear stages must be defined so that there are no gaps between them or they can overlap.

The 2nd gear stage data block for tapping with G331/G332 is activated with MD35010 $MA_GEAR_STEP_CHANGE_ENABLE bit 5 for the master spindle.

Related to:

MD35112 $MA_GEAR_STEP_MAX_VELO2 (maximum speed for 2nd data block gear stage change)

MD35092 $MA_NUM_GEAR_STEPS2 (number of gear stages 2nd gear stage data block)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change, 2nd data block is possible)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage with speed control)

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of gear stage with position control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (min. speed of gear stage)

35130	GEAR_STEP_MAX_VELO_LIMIT			A06, A11, A04	A2,S1,V1	
rev/min	Maximum speed of gear stage			DOUBLE	NEW CONF	
CTEQ						
-	6	500., 500., 1000., 2000., 4000., 8000.	1.0e-3	-	7/2	M

Description: The maximum speed of the current gear stage for speed control mode (position control not active) is configured in MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT. The speed setpoints generated taking the override into account are limited to this speed.

Note:

- The configured speed cannot exceed the value from MD35100 $MA_SPIND_VELO_LIMIT.
- If position control is active for the spindle, the speed is limited to the maximum speed of MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT.
- The NC/PLC interface signal "Setpoint speed limited" is set to indicate that the speed is being limited.
- The maximum speed entered here has no effect on the automatic gear stage selection M40 S..
- The upper switching threshold for the automatic gear stage selection M40 is configured in MD35110 $MA_GEAR_STEP_MAX_VELO.

Related to:

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of the gear stage with position control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (minimum speed of the gear stage)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage selection is possible)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for automatic gear stage selection M40)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for automatic gear stage selection M40)

35135	GEAR_STEP_PC_MAX_VELO_LIMIT			A06, A11, A04	S1	
rev/min	Maximum speed of the gear stage with position control			DOUBLE	NEW CONF	
CTEQ						
-	6	0., 0., 0., 0., 0., 0.	0	-	7/2	M

Description: The maximum speed of the current gear stage is configured in MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT with position control active. The speed setpoints generated taking the override into account are limited to this speed.

If a value of 0 is set (default), 90% of the value from MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT will become the maximum speed with position control active.

Note:

- The configured speed cannot exceed the value from MD35100 $MA_SPIND_VELO_LIMIT.
- The NC/PLC interface signal "Setpoint speed limited" is set to indicate that the speed is being limited.
- The maximum speed entered here has no effect on the automatic gear stage selection M40 S..
- The upper switching threshold for the automatic gear stage selection M40 is configured in MD35110 $MA_GEAR_STEP_MAX_VELO.

Related to:

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of the gear stage with spee control)

MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT (minimum speed of the gear stage)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage selection is possible)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for automatic gear stage selection M40)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for automatic gear stage selection M40)

35140	GEAR_STEP_MIN_VELO_LIMIT			A06, A11, A04	S1,V1	
rev/min	Minimum speed of gear stage			DOUBLE	NEW CONF	
CTEQ						
-	6	5., 5., 10., 20., 40., 80.	-	-	7/2	M

Description: The minimum speed of the current gear stage is configured in MD35140 $MA_GEAR_STEP_MIN_VELO_LIMIT. The minimum speed is applied only if the spindle is in speed control mode. The speed setpoints generated taking the override into account do not undershoot the minimum speed.

Note:

- If an S value lower than the minimum speed is programmed, the setpoint speed is increased to the minimum speed.
- The NC/PLC interface signal "Setpoint speed increased" is set to indicate that the speed has been increased.
- The minimum speed entered here has no effect on the automatic gear stage selection M40 S..
- The lower switching threshold for the automatic gear stage selectionM40 is configured in MD35120 $MA_GEAR_STEP_MIN_VELO.

Not relevant for:

- Spindle oscillation mode(gear stage change)
- Positioning and axis spindle modes
- Signals which cause the spindle to stop

Related to:

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage with speed control)

MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT (maximum speed of gear stage with position control)

MD35010 $MA_GEAR_STEP_CHANGE_ENABLE (gear stage change is possible)

MD35110 $MA_GEAR_STEP_MAX_VELO (max. speed for automatic gear stage selection M40)

MD35120 $MA_GEAR_STEP_MIN_VELO (min. speed for automatic gear stage selection M40)

35150	SPIND_DES_VELO_TOL			A03, A05, A06, A10, A04	R1,S1,Z1	
-	Spindle speed tolerance			DOUBLE	Reset	
-						
-	-	0.1	0.0	1.0	7/2	M

Description: In spindle control mode, the set speed (programmed speed x spindle offset, allowing for limits) is compared with the actual speed.

- If the actual speed deviates from the set speed by more than MD35150 $MA_SPIND_DES_VELO_TOL, the NC/PLC interface signal is DB31, ... DBX83.5 (Spindle in setpoint range) is set to zero.
- If the actual speed deviates from the set speed by more than MD35150 $MA_SPIND_DES_VELO_TOL, the path feed is disabled (positioning axes continue traversing).
- If the actual speed exceeds the maximum spindle speed (MD35100 $MA_SPIND_VELO_LIMIT) by more than MD35150 $MA_SPIND_DES_VELO_TOL, the NC/PLC interface signal is DB31, ... DBX83.0 (Speed limit exceeded) is enabled and alarm 22050 "Maximum speed reached" is output. All axes and spindles on the channel are decelerated.

MD irrelevant to:

- Spindle oscillation mode
- Spindle positioning mode

Example:

MD 35150 $MA_SPIND_DES_VELO_TOL = 0.1

The actual spindle speed must not deviate from the set speed by more than +/- 10%.

Related to:

MD35500 $MA_SPIND_ON_SPEED_AT_IPO_START

(feed enable for spindle in setpoint range)

MD35100 $MA_SPIND_VELO_LIMIT

(maximum spindle speed)

NC/PLC interface signal DB31, ... DBX83.5 (Spindle in setpoint range)

NC/PLC interface signal DB31, ... DBX83.0 (Speed limit exceeded)

Alarm 22050 "Maximum speed reached"

35160	SPIND_EXTERN_VELO_LIMIT			A06, A04	A3,S1,V1,Z1	
rev/min	Spindle speed limitation from PLC			DOUBLE	NEW CONF	
CTEQ						
-	-	1000.0	1.0e-3	-	7/2	M

Description: A limiting value for the maximum spindle speed is entered in MD35160 $MA_SPIND_EXTERN_VELO_LIMIT, which is taken into account exactly when the NC/PLC interface signal DB31, ... DBX3.6 (Velocity/speed limitation) is set.

The control limits a spindle speed which is too high to this value.

35200	GEAR_STEP_SPEEDCTRL_ACCEL			A06, A11, A04, -	S1	
rev/s²	Acceleration in speed control mode			DOUBLE	NEW CONF	
CTEQ						
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	7/2	M

Description: If the spindle is in speed control mode, the acceleration is entered in MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL.

The spindle is in speed control mode with the function SPCOF.

Special cases:

The acceleration in speed control mode (MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL) can be set so that the electric current limit is reached.

Related to:

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL(acceleration in position control mode)

MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT (speed limit for reduced acceleration)

35210	GEAR_STEP_POSCTRL_ACCEL			A06, A11, A04, -	S1	
rev/s²	Acceleration in position control mode			DOUBLE	NEW CONF	
CTEQ						
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	7/2	M

Description: The acceleration in position control mode must be set so that the electric current limit is not reached.

Related to:

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL

MD35212 $MA_GEAR_STEP_POSCTRL_ACCEL2

35212	GEAR_STEP_POSCTRL_ACCEL2			A06, A11, A04, -	S1	
rev/s²	2nd data set: Acceleration in position control mode			DOUBLE	NEW CONF	
CTEQ						
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	2/2	M

Description: Second gear stage data set for maximum acceleration capability of the gear stages in position control mode.

The acceleration in position control mode must be set so that the electric current limit is not reached.

The 2nd data set for tapping with G331/G332 is activated by MD35010 $MA_GEAR_STEP_CHANGE_ENABLE, bit 5 for the master spindle.

Related to:

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL

MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT

35220	ACCEL_REDUCTION_SPEED_POINT			A06, A04	S1,S3,B2	
-	Speed for reduced acceleration			DOUBLE	Reset	
-						
-	-	1.0	0.0	1.0	7/2	M

Description: This machine data defines the threshold speed/velocity for spindles/positioning/path axes from which the acceleration reduction is to start. The reference is the defined maximum speed/velocity. The starting point is a percentage of the maximum values.

Example: MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT = 0.7, the maximum speed is 3000 rpm. Acceleration reduction starts at v_on = 2100 rpm, i.e. the maximum acceleration capacity is utilized in the speed range 0...2099.99 rpm. Reduced acceleration is used from 2100 rpm to the maximum speed.

Related to:

MD32000 $MA_MAX_AX_VELO

(maximum axis velocity)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT

(maximum gear stage speed)

MD35230 $MA_ACCEL_REDUCTION_FACTOR

(reduced acceleration)

35230	ACCEL_REDUCTION_FACTOR			A06, A04	S1,S3,B2	
-	Reduced acceleration			DOUBLE	Reset	
CTEQ						
-	-	0.0	0.0	0.95	7/2	M

Description: The machine data contains the factor by which the acceleration of the spindle/positioning/path axes is reduced with reference to the maximum speed/velocity. The acceleration is reduced by this factor between the threshold speed/velocity defined in MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT and the maximum speed/velocity.

Example:

a= 10 rev/s², v_on = 2100 rpm, MD35230 $MA_ACCEL_REDUCTION_FACTOR = 0.3.

Acceleration and deceleration take place within the speed range 0...2099.99 rpm with an acceleration of 10 rev/s². From a speed of 2100 rpm up to the maximum speed, the acceleration is reduced from 10 rev/s² to 7 rev/s².

MD irrelevant to:

Errors that lead to rapid stop.

Related to:

MD32300 $MA_MAX_AX_ACCEL (axis acceleration)

MD35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL

(acceleration in speed control mode)

MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL

(acceleration in position control mode)

MD35242 $MA_ACCEL_REDUCTION_SPEED_POINT

(speed for reduced acceleration)

35240	ACCEL_TYPE_DRIVE			A04	B1,B2	
-	Acceleration curve DRIVE for axes ON/OFF			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: Basic setting of the acceleration response of the axis (positioning, oscillation, JOG, path motions):

FALSE: No acceleration reduction

TRUE: Acceleration reduction active

MD is active only when MD32420 $MA_JOG_AND_POS_JERK_ENABLE = FALSE.

The settings in MD35220 $MA_ACCEL_REDUCTION_SPEED_POINT and MD35230 $MA_ACCEL_REDUCTION_FACTOR are always active for spindles (in spindle mode).

Remark:

This MD also influences the path motion with SOFT, BRISK, TRAFO

35242	ACCEL_REDUCTION_TYPE			A04	B1,B2	
-	Type of acceleration reduction			BYTE	Reset	
CTEQ						
-	-	1	0	2	7/2	M

Description: Shape of acceleration reduction characteristic with DRIVE velocity control

0: Constant

1: Hyperbolic

2: Linear

35300	SPIND_POSCTRL_VELO			A06, A04	P3 pl,P3 sl,R1,S1	
rev/min	Position control activation speed			DOUBLE	NEW CONF	
CTEQ						
-	6	500.0, 500.0, 500.0, 500.0, 500.0, 500.0	-	-	7/2	M

Description: When positioning a spindle that is not in position control mode from a high speed, the position control is not activated until the spindle has reached or falls below the velocity defined in MD35300 $MA_SPIND_POSCTRL_VELO.

The speed can be changed with FA[Sn] from the part program. Please refer to the documentation:

/FB1/ Function Manual, Basic Functions; Spindles (S1), section "Spindle mode 'positioning operation" for a description of the spindle behavior under various supplementary conditions (positioning from rotation, positioning from standstill).

Note:

The active speed from MD35300 $MA_SPIND_POSCTRL_VELO cannot exceed the max. speed set in MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT. If MD35135 $MA_GEAR_STEP_PC_MAX_VELO_LIMIT = 0, the value is limited to 90% of MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT.

Related to:

MD35350 $MA_SPIND_POSITIONING_DIR (direction of rotation during positioning from standstill, if no synchronization is available)

MD35100 $MA_SPIND_VELO_LIMIT (chuck speed)

35310	SPIND_POSIT_DELAY_TIME			A06, A04	S1	
s	Positioning delay time			DOUBLE	NEW CONF	
CTEQ						
-	6	0.0, 0.05, 0.1, 0.2, 0.4, 0.8	-	-	7/2	M

Description: Positioning delay time.

After reaching the positioning end (exact stop fine), there is a waiting time equal to the time set in this MD. The position matching the currently set gear stage is selected.

The delay time is activated for:

- Gear stage change at defined spindle position. After reaching the position configured in MD35012 $MA_GEAR_STEP_CHANGE_POSITION, there is a waiting period equal to the time specified here. After expiry of this time, the position control is switched off for an active direct measuring system, and the NC/PLC interface signals DB31, ... DBX82.3 (Change gear) and DB31, _ DBX82.0 - .2 (Setpoint gear stage A-C) are output.
- Block search upon the output of an accumulated positioning block (SPOS, SPOSA, M19).

35350	SPIND_POSITIONING_DIR			A06	S1	
-	Direction of rotation when positioning			BYTE	Reset	
CTEQ						
-	-	3	3	4	7/2	M

Description: When SPOS or SPOSA is programmed, the spindle is switched to position control mode and accelerates with the acceleration defined in MD35210 $MA_GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode) if the spindle is not synchronized. The direction of rotation is defined by MD35350 $MA_SPIND_POSITIONING_DIR (direction of rotation for positioning from standstill).

MD35350 $MA_SPIND_POSITIONING_DIR = 3 ---> Clockwise direction of rotation

MD35350 $MA_SPIND_POSITIONING_DIR = 4 ---> Counterclockwise direction of rotation

Related to:

MD35300 $MA_SPIND_POSCTRL_VELO (position control activation speed)

35400	SPIND_OSCILL_DES_VELO			A06, A04	P3 pl,P3 sl,S1	
rev/min	Oscillation speed			DOUBLE	NEW CONF	
CTEQ						
-	-	500.0	-	-	7/2	M

Description: During oscillation, the NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed) is used to select a motor speed for the spindle motor. This motor speed is defined in MD35400 $MA_SPIND_OSCILL_DES_VELO. The motor speed defined in this MD is independent of the current gear stage. In the AUTOMATIC and MDI displays, the oscillation speed is displayed in the "Spindle setpoint" window until the gear is changed.

MD irrelevant to:

All spindle modes except oscillation mode

Special cases:

The acceleration during oscillation (MD35410 $MA_SPIND_OSCILL_ACCEL) is valid for the oscillation speed defined in this MD.

Related to:

MD35410 $MA_SPIND_OSCILL_ACCEL (acceleration during oscillation)

NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed)

NC/PLC interface signal DB31, ... DBX18.4 (Oscillation via PLC)

35410	SPIND_OSCILL_ACCEL			A06, A04, -	S1,Z1	
rev/s²	Acceleration during oscillation			DOUBLE	NEW CONF	
CTEQ						
-	-	16.0	1.0e-3	-	7/2	M

Description: The acceleration specified here is only effective for the output of the oscillation speed (MD35400 $MA_SPIND_OSCILL_DES_VELO) to the spindle motor. The oscillation speed is selected using the NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed).

MD irrelevant to:

All spindle modes except oscillation mode

Related to:

MD35400 $MA_SPIND_OSCILL_DES_VELO (oscillation speed)

NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed)

NC/PLC interface signal DB31, ... DBX18.4 (Oscillation via PLC)

35430	SPIND_OSCILL_START_DIR			A06	S1	
-	Start direction during oscillation			BYTE	Reset	
CTEQ						
-	-	0	0	4	7/2	M

Description: With the NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed), the spindle motor accelerates to the speed specified in MD35400: $MA_SPIND_OSCILL_DES_VELO.

The start direction is defined by MD35430 $MA_SPIND_OSCILL_START_DIR if the NC/PLC interface signal DB31, ... DBX18.4 (Oscillation via PLC) is not enabled.

MD35430 $MA_SPIND_OSCILL_START_DIR = 0 ---> Start direction same as the last direction of rotation

MD35430 $MA_SPIND_OSCILL_START_DIR = 1 ---> Start direction counter to the last direction of rotation

MD35430 $MA_SPIND_OSCILL_START_DIR = 2 ---> Start direction counter to the last direction of rotation

MD35430 $MA_SPIND_OSCILL_START_DIR = 3 ---> Start direction is M3

MD35430 $MA_SPIND_OSCILL_START_DIR = 4 ---> Start direction is M4

MD irrelevant to:

All spindle modes except oscillation mode

Related to:

MD35400 $MA_SPIND_OSCILL_DES_VELO (oscillation speed)

NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed)

NC/PLC interface signal DB31, ... DBX18.4 (Oscillation via PLC)

35440	SPIND_OSCILL_TIME_CW			A06	S1,Z1	
s	Oscillation time for M3 direction			DOUBLE	NEW CONF	
CTEQ						
-	-	1.0	-	-	7/2	M

Description: The oscillation time defined here is active in the M3 direction.

MD irrelevant to:

- All spindle modes except oscillation mode
- Oscillation via PLC (NC/PLC interface signal DB31, ... DBX18.4 (Oscillation via PLC) enabled)

Related to:

MD35450 $MA_SPIND_OSCILL_TIME_CCW (oscillation time for M4 direction)

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO (interpolator cycle)

NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed)

NC/PLC interface signal DB31, ... DBX18.4 (Oscillation via PLC)

35450	SPIND_OSCILL_TIME_CCW			A06	S1,Z1	
s	Oscillation time for M4 direction			DOUBLE	NEW CONF	
CTEQ						
-	-	0.5	-	-	7/2	M

Description: The oscillation time defined here is active in the M4 direction.

MD irrelevant to:

- All spindle modes except oscillation mode
- Oscillation via PLC (NC/PLC interface signal DB31, ... DBX18.4 (Oscillation via PLC) enabled)

Related to:

MD35440 $MA_SPIND_OSCILL_TIME_CW (oscillation time for M3 direction)

MD10070 $MN_IPO_SYSCLOCK_TIME_RATIO (interpolator cycle)

NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed)

NC/PLC interface signal DB31, ... DBX18.4 (Oscillation via PLC)

35500	SPIND_ON_SPEED_AT_IPO_START			A03, A06, A10	S1,Z1	
-	Feedrate enable for spindle in the set range			BYTE	Reset	
CTEQ						
-	-	1	0	2	7/2	M

Description: For SW 4.2 and higher:

Byte = 0:

The path interpolation is not affected

Byte = 1:

The path interpolation is not enabled (positioning axes continue traversing) until the spindle has reached the specified speed. The tolerance range can be set in MD 35150: $MA_SPIND_DES_VELO_TOL. If a measuring system is active, then the actual speed is monitored, otherwise the set speed. Path axes traversing in continuous-path mode (G64) are not stopped.

Byte = 2:

In addition to 1, traversing path axes are also stopped before machining begins, e.g. continuous-path mode (G64) and the change from rapid traverse (G0) to a machining block (G1, G2,..). The path is stopped at the last G0 block, and does not start traversing until the spindle is within the set speed range.

Restriction:

If the spindle is newly programmed by the PLC (FC18) or a synchronized action "shortly" before the end of the last G0 block, then the path decelerates taking the dynamic limitations into account. Because the spindle programming is asynchronous, a traverse can be made into the machining block if necessary. If the spindle has reached the setpoint speed range, then machining starts from this position.

Byte = 3:

No longer available for SW 5.3 and higher.

Related to:

MD35150 $MA_SPIND_DES_VELO_TOL (spindle speed tolerance)

NC/PLC interface signal DB31, ... DBX83.5 (Spindle in setpoint range)

35510	SPIND_STOPPED_AT_IPO_START			A03, A06, A10	S1	
-	Feedrate enable for spindle stopped			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: When a spindle is stopped (M5), the path feed is disabled (positioning axes continue traversing) if MD35510 $MA_SPIND_STOPPED_AT_IPO_START is enabled and the spindle is in control mode.

When the spindle has come to a standstill (NC/PLC interface signal DB31, ... DBX61.4 (Axis/spindle stationary) enabled), the path feed is enabled.

Related to:

MD35500 $MA_SPIND_ON_SPEED_AT_IPO_START (feed enable for spindle in setpoint range)

35550	DRILL_VELO_LIMIT			A06, A11, A04	-	
rev/min	Maximum speeds for tapping			DOUBLE	NEW CONF	
CTEQ						
-	6	10000., 10000., 10000., 10000., 10000., 10000.	1	-	7/2	M

Description: Limit speed values for tapping without compensating chuck with G331/G332.

The maximum speed of the linear motor characteristic range (constant acceleration capacity) must be specified depending on the gear stage.

35590	PARAMSET_CHANGE_ENABLE			EXP, A05	TE3,A2,S1,Z1	
-	Parameter set can be changed			BYTE	PowerOn	
CTEQ						
-	-	0	0	2	7/2	M

Description:

0: Parameter set changes cannot be controlled.

For axes and spindles in axis mode: The first parameter set is always active. In the case of spindles the parameter set is set as appropriate for the gear stage (1st gear stage uses 2nd parameter set). Exceptions: See below.

1: The parameter set applied in the servo is defined via the VDI interface or SCPARA. Parameter sets 1 to 6 can be selected. Sets are selected using the NC/PLC interface signal DB31, ... DBX9.0 - .2 (selection of parameter set servo A, B, C) in the binary-coded value range 0 to 5. Binary values 6 and 7 select parameter set no. 6. Exceptions: See below.

For 0 and 1:

With G33, G34, G35, G331, G332, the parameter set number for the axes involved is ativated in accordance with the master spindle gear stage, increased by one (corresponds with parameter set numbers 2 to 6).

For spindles, parameter sets 2 to 6 are always active, depending on the set gear stage plus one.

2: The parameter set is only ever defined via the VDI interface or SCPARA. Parameter sets 1 to 6 can be selected. Sets are selected using the NC/PLC interface signal DB31, ... DBX9.0 - .2 (selection of parameter set servo A, B, C) in the binary-coded value range 0 to 5. Binary values 6 and 7 select parameter set no. 6.

Secondary conditions:

Changeover response is determined by whether the KV factor differs between the active parameter set and the new parameter set.

Changing a parameter set where the load gearbox factors differ between the active parameter set and the new parameter set will reset the referenced signal, provided that the axis has an indirect measuring system.

The parameter set contains the following axial machine data:

MD36200 $MA_AX_VELO_LIMIT

MD32200 $MA_POSCTRL_GAIN

MD32800 $MA_EQUIV_CURRCTRL_TIME

MD32810 $MA_EQUIV_SPEEDCTRL_TIME

MD32910 $MA_DYN_MATCH_TIME

MD31050 $MA_DRIVE_AX_RATIO_DENOM

MD31060 $MA_DRIVE_AX_RATIO_NUMERA

Corresponds with:

NC/PLC interface signals DB31, ... DBX9.0 - .2 (selection of parameter set servo A, B, C) and DB31, ... DBX69.0 - .2 (selected parameter set servo A, B, C)

References:

/FB/, H2, "Output of Auxiliary Functions to PLC"

1.5.6 Monitoring functions

36000	STOP_LIMIT_COARSE			A05	TE1,A3,B1,G2,S1,Z1	
mm, degrees	Exact stop coarse			DOUBLE	NEW CONF	
-						
-	-	0.04,0.04,0.04,0.04,0.04,0.04,0.04...	-	-	7/2	M

Description: Threshold for exact stop coarse

An NC block is considered as terminated if the actual position of the path axes is away from the setpoint position by the value entered for the exact stop limit. If the actual position of a path axis is not within this limit, the NC block is considered as not terminated, and further part program execution is not possible. The magnitude of the value entered influences the transition to the next block. The larger the value, the earlier the block change is initiated.

If the specified exact stop limit is not reached, then

- the block is considered as not terminated,
- further traversing of the axis is not possible,
- alarm 25080 Positioning monitoring is output after expiry of the time specified in MD36020 $MA_POSITIONING_TIME (monitoring time for exact stop fine),
- the direction of movement +/- is indicated for the axis in the positioning display. The exact stop window is also evaluated for spindles in position control mode (SPCON instruction).

Special cases:

MD36000 $MA_STOP_LIMIT_COARSE must not be set smaller than MD36010 $MA_STOP_LIMIT_FINE (exact stop fine). To achieve the identical block change behavior as with the "exact stop fine" criterion, the exact stop coarse window may be identical to the exact stop fine window. MD36000 $MA_STOP_LIMIT_COARSE must not be set equal to or greater than MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance).

Related to:

MD36020 $MA_POSITIONING_TIME (delay time, exact stop fine)

36010	STOP_LIMIT_FINE			A05	TE1,A3,B1,D1,G2,S1,Z1	
mm, degrees	Exact stop fine			DOUBLE	NEW CONF	
-						
-	-	0.01,0.01,0.01,0.01,0.01,0.01,0.01...	-	-	7/2	M

Description: Threshold for exact stop fine

See also MD36000 $MA_STOP_LIMIT_COARSE (exact stop coarse)

Special cases:

MD36010 $MA_STOP_LIMIT_FINE must not be set greater than MD36000 $MA_STOP_LIMIT_COARSE (exact stop coarse).

MD36010 $MA_STOP_LIMIT_FINE must not be set greater than or equal to MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance).

Related to:

MD 36020: $MA_POSITIONING_TIME (delay time, exact stop fine)

36012	STOP_LIMIT_FACTOR			A05	G1,A3,B1,G2,S1,Z1	
-	Factor for exact stop coarse/fine and standstill			DOUBLE	NEW CONF	
-						
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	0.001	1000.0	7/2	M

Description:

```
With this factor,
   MD36000 $MA_STOP_LIMIT_COARSE,
   MD36010 $MA_STOP_LIMIT_FINE,
   MD36030 $MA_STANDSTILL_POS_TOL
can be re-assessed as a function of the parameter set. The rela-
tionship between these three values always remains the same.
Application examples:
Adapting the positioning behavior if the mass relationships change
significantly with a gear change, or if it is desired to save on
machine positioning time at the cost of accuracy in various oper-
ating conditions.
Related to:
   MD36000 $MA_STOP_LIMIT_COARSE,
   MD36010 $MA_STOP_LIMIT_FINE,
   MD36030 $MA_STANDSTILL_POS_TOL
```

36020	POSITIONING_TIME			A05	TE1,A3,B1,G2	
s	Delay time exact stop fine			DOUBLE	NEW CONF	
-						
-	-	1.0	-	-	7/2	M

Description:

```
The following error must have reached the limit value for exact
stop fine by the expiry of the time entered in this MD for travel-
ing into the position (position setpoint has reached the destina-
tion).
The current following error is therefore continuously monitored
for the time limit MD36010 $MA_STOP_LIMIT_FINE. If this time is
exceeded, alarm 25080 "Positioning monitoring" is output, and the
axis stopped. The time entered in this MD should be long enough to
ensure that the monitoring function is not triggered under normal
operating conditions, taking into account any settling times.
Related to:
   MD 36010: $MA_STOP_LIMIT_FINE (exact stop fine)
```

36030	STANDSTILL_POS_TOL			A05	G1,A3,D1,G2	
mm, degrees	Standstill tolerance			DOUBLE	NEW CONF	
-						
-	-	0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2,0.2...	-	-	7/2	M

Description: This MD serves as a tolerance band for the following monitoring functions:

- After termination of a traversing block (position partial setpoint=0 at the end of the movement), whether the following error has reached the limit value for MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance) is monitored after the programmable MD36040 $MA_STANDSTILL_DELAY_TIME (delay time, standstill monitoring).
- After termination of a positioning action (exact stop fine reached), positioning monitoring is replaced by standstill monitoring. The axis is monitored for moving from its position by more than defined in MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance).

If the setpoint position is over- or undershot by the standstill tolerance, alarm 25040 "Standstill monitoring" is output and the axis stopped.

Special cases:

The standstill tolerance must be greater than the "exact stop limit coarse".

Related to:

MD36040 $MA_STANDSTILL_DELAY_TIME (delay time, standstill monitoring)

36040	STANDSTILL_DELAY_TIME			A05	TE1,A3,F1,G2	
s	Delay time for standstill monitoring			DOUBLE	NEW CONF	
-						
-	-	0.4	-	-	7/2	M

Description: See MD36030 $MA_STANDSTILL_POS_TOL (standstill tolerance)

36042	FOC_STANDSTILL_DELAY_TIME			A05	F1	
s	Delay time for standstill monit. w/ active torque or force lim.			DOUBLE	NEW CONF	
-						
-	-	0.4	-	-	7/2	M

Description: Only for SIMODRIVE611D or PROFIdrive telegrams including a torque/force limiting value:

Waiting time between the end of a movement and activation of standstill monitoring with active torque/force limitation.

If the configurable end of block criterion occurs within this time, then standstill monitoring is activated.

36050	CLAMP_POS_TOL			A05	A3,D1,Z1	
mm, degrees	Clamping tolerance			DOUBLE	NEW CONF	
-						
-	-	0.5	-	-	7/2	M

Description: With NC/PLC interface signal DB31, ... DBX2.3 (Blocking action active), blocking monitoring is activated. If the monitored axis is forced away from the setpoint position (exact stop limit) by more than the blocking tolerance, alarm 26000 "Blocking monitoring" is output and the axis stopped.

Threshold value for clamping tolerance (half width of window).

Special cases:

The clamping tolerance must be greater than the "exact stop limit coarse".

Related to:

NC/PLC interface signal DB31, ... DBX2.3 (Blocking action active)

36052	STOP_ON_CLAMPING			A10	A3	
-	Special functions with clamped axis			BYTE	NEW CONF	
CTEQ						
-	-	0	0	0x07	2/1	M

Description: This MD defines how a blocked axis is taken into account.

Bit 0 =0:

If a blocked axis is to be traversed again in continuous-path mode, it must be ensured via the part program that the path axes are stopped and that there is time for releasing the blockage.

Bit 0 =1:

If a blocked axis is to be traversed again in continuous-path mode, the LookAhead function stops the path motion if required until the position controller is allowed to traverse the blocked axis again, i.e. until the controller enable is set again.

Bit 1 is relevant only if bit 0 is set:

Bit 1 =0:

If a blocked axis is to be traversed again in continuous-path mode, the LookAhead function does not release the blockage.

Bit 1 =1:

If a blocked axis is to be traversed again in continuous-path mode, a traversing command for the blocked axis is given in the preceding G0 blocks so that the PLC releases the axis blockage again.

Bit 2 =0:

If an axis is to be blocked in continuous-path mode, it must be ensured in the part program that the path axes are stopped to make sure that there is time for setting the blockage.

Bit 2 =1:

If an axis is to be blocked in continuous-path mode, the LookAhead function stops the path motion prior to the next non-G0 block, if the axis has not yet been blocked by that time, i.e. the PLC has not yet set the feedrate override to zero.

36060	STANDSTILL_VELO_TOL			A05, A04	TE1,A2,A3,D1,Z1	
mm/min, rev/min	Threshold velocity/speed 'Axis/spindle in stop'			DOUBLE	NEW CONF	
-						
-	-	5.00,5.00,5.00,5.00,5.00,5.00,5.00...	-	-	7/2	M

Description: This MD defines the standstill range for the axis velocity / spindle speed. If the current actual velocity of the axis or the actual speed of the spindle is less than the value entered in this MD, the NC/PLC interface signal DB31, ... DBX61.4 (Axis/spindle stationary) is set.

To bring the axis/spindle to a standstill under control, the pulse enable should not be removed until the axis/spindle is at a standstill. Otherwise the axis will coast down.

Related to:

NC/PLC interface signal DB31, ... DBX61.4 (Axis/spindle stationary)

36100	POS_LIMIT_MINUS			A03, A05, A11, -	TE1,R2,T1,A3,Z1	
mm, degrees	1st software limit switch minus			DOUBLE	NEW CONF	
CTEQ						
-	-	-1.0e8	-	-	7/2	M

Description: Same meaning as 1st software limit switch plus, however the traversing range limitation is in the negative direction.

The MD becomes active after reference point approach if the NC/PLC interface signal DB31, ... DBX12.2 (2nd software limit switch minus) is not set.

MD irrelevant:

if axis is not referenced.

Related to:

NC/PLC interface signal DB31, ... DBX12.2 (2nd software limit switch minus)

36110	POS_LIMIT_PLUS			A03, A05, A11, -	TE1,R2,T1,G2,A3,Z1	
mm, degrees	1st software limit switch plus			DOUBLE	NEW CONF	
CTEQ						
-	-	1.0e8	-	-	7/2	M

Description: A software limit switch can be activated in addition to the hardware limit switch. The absolute position in the machine axis system of the positive range limit of each axis is entered.

The MD is active after reference point approach if NC/PLC interface signal DB31, ... DBX12.3 (2nd software limit switch plus) has not been set.

MD irrelevant:

if axis is not referenced.

Related to:

NC/PLC interface signal DB31, ... DBX12.3 (2nd software limit switch plus)

36120	POS_LIMIT_MINUS2			A03, A05, -	TE1,A3,Z1	
mm, degrees	2nd software limit switch minus			DOUBLE	NEW CONF	
CTEQ						
-	-	-1.0e8	-	-	7/2	M

Description: Same meaning as 2nd software limit switch plus, but the traversing range limitation is in the negative direction.

The PLC can select whether software limit switch 1 or 2 is to be active by means of the interface signal.

For example:

DB31, ... DBX12.2 = 0 (1st software limit switch minus) active for 1st axis

DB31, ... DBX12.2 = 1 (2nd software limit switch minus) active for 1st axis

MD irrelevant:

if axis is not referenced.

Related to:

NC/PLC interface signal DB31, ... DBX12.2 (2nd software limit switch minus)

36130	POS_LIMIT_PLUS2			A03, A05, -	TE1,A3,Z1	
mm, degrees	2nd software limit switch plus			DOUBLE	NEW CONF	
CTEQ						
-	-	1.0e8	-	-	7/2	M

Description: This machine data can define a 2nd software limit switch position in the positive direction in the machine axis system. The PLC can select which of the two software limit switches 1 or 2 is to be active by means of an interface signal.

For example:

DB31, ... DBX12.3 = 0 (1st software limit switch plus) active for 1st axis

DB31, ... DBX12.3 = 1 (2nd software limit switch plus) active for 1st axis

MD irrelevant:

if axis is not referenced.

Related to:

NC/PLC interface signal DB31, ... DBX12.3 (2nd software limit switch plus)

36200	AX_VELO_LIMIT			A05, A11, A04	TE3,A3,G2,S1,V1	
mm/min, rev/min	Threshold value for velocity monitoring			DOUBLE	NEW CONF	
CTEQ						
-	6	11500., 11500., 11500., 11500., 11500., 11500....	-	-	7/2	M

Description: The threshold value for actual velocity monitoring is entered in this machine data.

If the axis has at least one active encoder and if this encoder is below its limit frequency, alarm 25030 "Actual velocity alarm limit" is triggered when the treshold value is exceeded, and the axis is stopped.

Settings:

- For axes, a value should be selected that is 10 to 15 % higher than that in MD32000 $MA_MAX_AX_VELO (maximum axis velocity). With active temperature compensation MD32750 $MA_TEMP_COMP_TYPE, the maximum axis velocity is increased by an additional factor which is determined by MD32760 $MA_COMP_ADD_VELO_FACTOR (velocity overshoot through compensation). The following should therefore apply to the velocity monitoring threshold value:

  MD36200 $MA_AX_VELO_LIMIT[n] > MD32000 $MA_MAX_AX_VELO * (1.1 ... 1.15 + MD32760 $MA_COMP_ADD_VELO_FACTOR)
- For spindles, a value should be selected for each gear stage that is 10 to 15 % higher than the corresponding values in MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT[n] (maximum speed of gear stage).

The index of the machine data has the following coding: [control parameter set no.]: 0-5

36210	CTRLOUT_LIMIT			EXP, A05	A3,D1,G2	
%	Maximum speed setpoint			DOUBLE	NEW CONF	
CTEQ						
-	1	110.0	0	200	7/2	M

Description: This MD defines the maximum speed setpoint in percent. 100% is the maximum speed setpoint, this corresponds to 10 V for an analog interface or the maximum speed for PROFIdrive drives (manufacturer-specific adjustable parameter in the drive, e.g. p1082 for SINAMICS.

The maximum speed setpoint depends on whether there are any setpoint limitations in the speed and current controller.

An alarm is output and the axis is stopped when the limit is exceeded.

The limit is to be selected so that the maximum velocity (rapid traverse) can be reached, and an appropriate additional control margin is available.

36220	CTRLOUT_LIMIT_TIME			EXP, A05	A3	
s	Delay time for speed setpoint monitoring			DOUBLE	NEW CONF	
-						
-	1	0.0	-	-	7/2	M

Description: This MD defines how long the speed setpoint may be within the limit CTRLOUT_LIMIT[n] (max. speed setpoint) until the monitoring function is triggered.

Monitoring (and with it also this machine data) is always active.

Reaching the limit renders the position control loop non-linear, which results in contour errors provided that the speed setpoint limited axis is participating in contour generation. That is why this MD has default value 0, i.e. the monitoring function responds as soon as the speed setpoint reaches the limit.

36300	ENC_FREQ_LIMIT			EXP, A02, A05, A06	A3,D1,R1,Z1	
-	Encoder limit frequency			DOUBLE	PowerOn	
-						
-	2	3.0e5, 3.0e5	-	-	7/2	M

Description: This MD is used to enter the encoder frequency, which,

in general, is a manufacturer specification (type plate, documentation).

For PROFIdrive:

No automatic, software-internal limitation for encoders on the PROFIdrive drive; here, the limit values of the measuring circuit module depend on the drive hardware used, i.e. known only by the drive. Therefore, it is the user who is responsible for taking into account the limit frequency of the measuring circuit module.

36302	ENC_FREQ_LIMIT_LOW			EXP, A02, A05, A06	A3,R1,S1,Z1	
%	Encoder limit frequency for new encoder synchronization.			DOUBLE	NEW CONF	
-						
-	2	99.9, 99.9	0	100	7/2	M

Description: Encoder frequency monitoring uses a hysteresis.

MD36300 $MA_ENC_FREQ_LIMIT defines the encoder limit frequency. The encoder is switched off when this frequency is exceeded. The encoder is switched on again when the frequency falls below that defined in MD36302 $MA_ENC_FREQ_LIMIT_LOW.

MD36300 $MA_ENC_FREQ_LIMITis entered directly in Hertz,

whereas MD36302 $MA_ENC_FREQ_LIMIT_LOW is a fraction, expressed as a percentage, of MD36300 $MA_ENC_FREQ_LIMIT.

MD36302 $MA_ENC_FREQ_LIMIT_LOW is therefore already correctly preset for most of the encoders used.

Exception: In the case of absolute encoders with an En-Dat interface, the limit frequency of the absolute track is significantly lower than the limit frequency of the incremental track. A low value in MD36302 $MA_ENC_FREQ_LIMIT_LOW ensures that the encoder is not switched on again until it falls below the limit frequency of the absolute track, and therefore is not referenced until permitted by the absolute track. For spindles, this referencing is carried out automatically.

Example EnDat encoder EQN 1325:

Limit frequency of the electronics of the incremental track: 430 kHz

===> MD36300 $MA_ENC_FREQ_LIMIT = 430 kHz

The limit frequency of the absolute track is approx. 2000 encoder rpm at 2048 increments/encoder revolution, i.e. the limit frequency is 2000/60 * 2048 Hz = 68 kHz

===> MD36302 $MA_ENC_FREQ_LIMIT_LOW = 68/430 = 15%

36310	ENC_ZERO_MONITORING			EXP, A02, A05	A3,R1	
-	Zero mark monitoring			DWORD	NEW CONF	
-						
-	2	0, 0	-	-	7/2	M

Description: This MD is used to activate zero mark monitoring.

For PROFIdrive drives (the corresponding diagnostics system variables are not currently supplied for incremental measuring systems):

For PROFIdrive, the permissible deviation must be set in the drive, *not* in the NC. Zero mark monitoring reported by the drive is mapped to the NCK according to the following rule:

0: no zero mark monitoring

100: no zero mark monitoring together with suppression of all encoder monitoring operations, i.e. not only alarm 25020 but also alarms 25000, 25010 etc. are suppressed).

>0 but less than 100: direct triggering of power ON alarm 25000 (or 25001).

>100: attenuated error message: reset alarm 25010 (25011) is output instead of power ON alarm 25000 (25001).

For absolute measuring systems ($MA_ENC_TYPE=4):

Permissible deviation in 1/2 coarse increments between the absolute and the incremental encoder track (one 1/2 coarse increment is sufficient).

If a SIMODRIVE611U drive type is used, monitoring only takes place at a standstill.

36312	ENC_ABS_ZEROMON_WARNING			EXP, A02, A05	A3	
-	Zero mark monitoring warning level			DWORD	NEW CONF	
-						
-	2	10, 10	-	-	7/2	M

Description: Only for absolute measuring systems ($MA_ENC_TYPE=4):

This MD activates zero mark diagnostics.

0: no zero mark diagnostics

>0: permissible deviation in 1/2 coarse increments between the absolute and the incremental encoder track (one 1/2 coarse increment is sufficient).

36314	ENC_ABS_ZEROMON_INITIAL			EXP, A02, A05	A3	
-	Warning level for absolute encoder power ON			DWORD	NEW CONF	
-						
-	2	1000, 1000	-	-	7/2	M

Description: Only for absolute measuring systems ($MA_ENC_TYPE=4):

Parameterization in 1/2 coarse increments

At absolute encoder power ON (deselect parking and similar) this MD parameterizes the previously permissible position offset (comparison of the new absolute position with the information last saved in SRAM). When the warning level is exceeded, system variable $VA_ENC_ZERO_MON_ERR_CNT is incremented in coarse increments by the value 10000.

36400	CONTOUR_TOL			A05, A11	A3,D1,G2	
mm, degrees	Tolerance band for contour monitoring			DOUBLE	NEW CONF	
-						
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/2	M

Description: Tolerance band for axial contour monitoring (dynamic following error monitoring).

The permissible deviation between the real and the modelled following error is entered in this MD.

The input of the tolerance band is intended to avoid spurious tripping of the dynamic following error monitoring caused by minor speed fluctuations, which occur during normal closed-loop control operations (e.g. during first cut).

Following error modelling and thus the input of this MD depend on the position control gain MD32200 $MA_POSCTRL_GAIN and, in the case of precontrol or simulation, on the accuracy of the controlled system model MD32810 $MA_EQUIV_SPEEDCTRL_TIME (equivalent time constant for precontrol of speed control loop), as well as on the accelerations and velocities used.

36480	AXSPDCTRL_ACT_POS_TOL			A11, A05	-	
mm, degrees	Tolerance for speed control mode			DOUBLE	NEW CONF	
-						
-	-	5.0	-	-	-1/2	M

Description: Permissible deviation between actual and setpoint positions of an axis in speed control mode ("control axis").

This MD has to be adapted to the accuracy of the speed controller as well as the permissible accelerations and velocities.

36500	ENC_CHANGE_TOL			A02, A05	G1,K6,K3,A3,D1,G2,Z1	
mm, degrees	Tolerance at actual position value change.			DOUBLE	NEW CONF	
-						
-	-	0.1	-	-	7/2	M

Description: The permissible deviation between the actual values of the two measuring systems is entered in this MD.

This difference must not be exceeded when switching over the measuring system used for closed-loop control, in order to avoid compensating processes that are too strong. Otherwise, the error message 25100 "Axis %1 Switchover of measuring system not possible" is generated and the switchover does not take place.

MD irrelevant for:

MD30200 $MA_NUM_ENCS = 0 or 1.

36510	ENC_DIFF_TOL			A02, A05	A3,G2	
mm, degrees	Tolerance of measuring system synchronization			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	M

Description: Permissible deviation between the actual values of the two measuring systems. This difference must not be exceeded during the cyclic comparison of the two measuring systems used, as otherwise error message 25105 (measuring systems deviate) would be generated.

The corresponding monitoring function is not active

- with MD input value=0,
- if less than 2 measuring systems are active/available in the axis
- or if the axis has not been referenced (at least act. closed-loop control meas. system).

With modulo axes, it is always the absolute value of the shortest/direct position difference that is monitored.

36520	DES_VELO_LIMIT			A02, A05	-	
%	Threshold for setpoint velocity monitoring			DOUBLE	NEW CONF	
-						
-	-	125.0	-	-	7/2	M

Description: Maximum permissible setpoint velocity as a percentage of the maximum axis velocity/spindle speed.

With MD36520 $MA_DES_VELO_LIMIT, the position setpoint is monitored for abrupt changes. If the permissible limit value is exceeded, alarm 1016 error code 550010 is output.

With axes, this machine data refers to MD32000 $MA_MAX_AX_VELO.

With spindles, this MD refers to the lower of the speeds set in

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT of the current gear stage and MD35100 $MA_SPIND_VELO_LIMIT.

36600	BRAKE_MODE_CHOICE			EXP, A05	A3,Z1	
-	Deceleration response on hardware limit switch			BYTE	PowerOn	
CTEQ						
-	-	1	0	1	7/2	M

Description: If a rising edge of the axis-specific hardware limit switch is detected while the axis is traversing, the axis is braked immediately.

The type of braking is determined by this machine data:

Value = 0:

Controlled braking along the acceleration ramp defined by MD32300 $MA_MAX_AX_ACCEL (axis acceleration).

Value = 1:

Rapid braking (selection of setpoint = 0) with reduction of following error.

Related to:

NC/PLC interface signal DB31, ... DBX12.1 / 12.0 (Hardware limit switch plus or minus)

36610	AX_EMERGENCY_STOP_TIME			A05, -	TE3,K3,A2,A3,N2,Z1	
s	Maximum time for braking ramp in case of error.			DOUBLE	NEW CONF	
-						
-	-	0.05	0.0	1.0e15	7/2	M

Description: This MD defines the braking ramp time that an axis or spindle requires to brake from maximum velocity/speed to a standstill in the event of errors (e.g. emergency stop). At the same lead/brake acceleration, standstill is reached correspondingly earlier from lower velocities/speeds.

Mechanically robust axes are normally stopped abruptly with speed setpoint 0; values in the lower ms range are appropriate in these cases (default setting).

However, high moving masses or limited mechanical conditions (e.g. gear load capacity) often have to be taken into account for spindles. This means that the MD has to be changed to set a longer braking ramp.

Notice:

- With interpolating axes or axis/spindle couplings, it cannot be ensured that the contour or coupling will be maintained during the braking phase.
- If the time set for the braking ramp for error states is too long, the controller enable will be removed although the axis/spindle is still moving. Depending on the drive type used and the activation of the pulse enable, either an immediate stop with speed setpoint 0 will be initiated or the axis/spindle will coast down without power. The time selected in MD36610 $MA_AX_EMERGENCY_STOP_TIME should therefore be shorter than the time in MD36620 $MA_SERVO_DISABLE_DELAY_TIME (cutout delay, controller enable) so that the configured braking ramp can be fully active throughout the entire braking operation.
- The braking ramp may be ineffective or not maintained if the active drive follows its own braking ramp logic (e.g. SINAMICS).

Related to:

MD36620 $MA_SERVO_DISABLE_DELAY_TIME (cutout delay controller enable)

MD36210 $MA_CTRLOUT_LIMIT (maximum speed setpoint)

36620	SERVO_DISABLE_DELAY_TIME			A05, -	TE3,K3,A2,A3,N2,Z1	
s	Cutout delay servo enable			DOUBLE	NEW CONF	
-						
-	-	0.1	0.0	1.0e15	7/2	M

Description: Maximum time delay for removal of "controller enable" after faults. The speed enable (controller enable) of the drive is removed internally within the controller after the set delay time, at the latest.

The delay time entered becomes active as a result of the following events:

- Errors that lead to immediate stopping of the axes
- Removal of the interface signal by the PLC DB31, ... DBX2.1 (Controller enable)

As soon as the actual speed reaches the standstill range (MD36060 $MA_STANDSTILL_VELO_TOL), the "controller enable" for the drive is removed. The time set should be long enough to enable the axis / spindle to brake down to a standstill from maximum traversing velocity or maximum speed. If the axis / spindle is stationary, the "controller enable" for the drive is removed immediately (i.e. the time defined in MD36620 $MA_SERVO_DISABLE_DELAY_TIME is terminated prematurely).

Application example(s):

Speed control of the drive should be retained long enough to enable the axis / spindle to brake down to standstill from maximum traversing velocity or maximum speed.

Notice:

If the cutout delay controller enable is set too short, controller enable will be removed although the axis/spindle is still moving. This axis/spindle then coasts down without power (which may be appropriate for grinding wheels, for example); otherwise the time set in MD36620 $MA_SERVO_DISABLE_DELAY_TIME should be longer than the duration of the braking ramp for error states (MD36610 $MA_AX_EMERGENCY_STOP_TIME).

Related to:

NC/PLC interface signal DB31, ... DBX2.1 (Controller enable)

MD36610 $MA_AX_EMERGENCY_STOP_TIME

36690	AXIS_DIAGNOSIS			EXP, A08	-	
-	Internal data for test purposes			DWORD	PowerOn	
NBUP						
-	-	0	-	-	0/0	S

Description: Internal data for test purposes

0: :Basic setting

Bit 0 (LSB) = 1 :For test case task.exp (for alarm SCAL_WARN_VEL)

Bit 1 = 1 :For test case brake test

- ACT_POS_ABS for ENC-SIM on HOST
- Additional error information in $VA_FXS_INFO

Bit 2 = 1 :For travel to fixed stop - preliminary

- Allow rapid braking for linked axes

Bit 3 = 1 :For travel to fixed stop - preliminary

- Consider inversion of direction when switching off rapid braking for linked axes

36700	DRIFT_ENABLE			EXP, A07, A09	G2	
-	Automatic drift compensation			BOOLEAN	NEW CONF	
-						
-	-	FALSE	-	-	1/1	M

Description: Only for special analog and hydraulic drives (not active with PROFIdrive drives):

Automatic drift compensation is activated with MD36700 $MA_DRIFT_ENABLE.

1: Automatic drift compensation active (only for position-controlled axes/spindles).

With automatic drift compensation, while the axis is at a standstill, the control continually calculates the additional drift value still required to ensure that the following error reaches the value 0 (compensation criterion). The total drift value is, therefore, formed from the drift basic value (MD36720 $MA_DRIFT_VALUE) and the drift additional value.

0: Automatic drift compensation not active.

The drift value is formed only from the drift basic value (MD36720 $MA_DRIFT_VALUE).

Not relevant for:

Non-position-controlled spindles

Related to:

MD36710 $MA_DRIFT_LIMIT drift limit value for automatic drift compensation

MD36720 $MA_DRIFT_VALUE drift basic value

36710	DRIFT_LIMIT			EXP, A07, A09	-	
%	Drift limit value for automatic drift compensation			DOUBLE	NEW CONF	
-						
-	1	0.0	0	1.e9	1/1	M

Description: Only for special analog and hydraulic drives (not active with PROFIdrive drives):

The magnitude of the drift additional value calculated during automatic drift compensation can be limited with MD36710 $MA_DRIFT_LIMIT.

If the drift additional value exceeds the limit value entered in MD36710 $MA_DRIFT_LIMIT, alarm 25070 "Drift value too large" is output and the drift additional value is limited to this value.

Not relevant for:

MD36700 $MA_DRIFT_ENABLE = 0

36720	DRIFT_VALUE			EXP, A07, A09	-	
%	Basic drift value			DOUBLE	NEW CONF	
-						
-	1	0.0	-1e15	1e15	1/1	M

Description: Only for special analog and hydraulic drives (not active with PROFIdrive drives):

The value entered in MD36720 $MA_DRIFT_VALUE is always added as an offset to the manipulated variable. Whereas automatic drift compensation is active only for position-controlled axes, this machine data is always active.

Special case: the following applies to PROFIdrive drives:

This MD can also be used for "simple" drives that have drift problems due to drive-internal implementation as analog drives. To avoid erroneous settings, this static drift compensation only becomes active with PROFIdrive if $MA_RATED_OUTVAL != 0 (i.e. the MD has no effect in the case of automatic interface adjustment between the NC and the drive).

Note:

> Drift compensation must not be active if the DSC function (MD32640 $MA_STIFFNESS_CONTROL_ENABLE=1) is being used, otherwise unexpected speed oscillations will occur when DSC is enabled/disabled.

Standardization: The input value is related to the corresponding interface standardization in

MD32250 $MA_RATED_OUTVAL,

MD32260 $MA_RATED_VELO, and

MD36210 $MA_CTRLOUT_LIMIT.

36730	DRIVE_SIGNAL_TRACKING			A10	B3	
-	Acquisition of additional drive actual values			BYTE	PowerOn	
-						
-	-	0	0	4	7/2	M

Description: MD36730 $MA_DRIVE_SIGNAL_TRACKING = 1 activates the acquisition of the following drive actual values:

For PROFIdrive:

- $AA_LOAD Drive load
- $AA_POWER Drive active power
- $AA_TORQUE Drive torque setpoint
- $AA_CURR Smoothed current setpoint (q-axis current) of drive

MD36730 $MA_DRIVE_SIGNAL_TRACKING = 2 activates the acquisition of the following drive actual values:

With PROFIdrive, it must be ensured that the stated values are also transmitted in the drive actual message frame (provide sufficient message frame length on the bus, assign the values to the message frame content in the drive, e.g. use message frame 116).

- $VA_DP_ACT_TEL shows actual value message frame words

36750	AA_OFF_MODE			A10	2.4,5.3,6.2	
-	Effect of value assignment for axial override of synchr. action.			BYTE	PowerOn	
CTEQ						
-	-	0	0	7	7/2	M

Description:

```
Mode setting for axial offset $AA_OFF
Bit 0: Effect of value assignment within a synchronized action
0:   Absolute value
1:   Incremental value (integrator)
Bit 1: Response of $AA_OFF on RESET
0:   $AA_OFF is deselected on RESET
1:   $AA_OFF is retained beyond RESET
Bit 2: $AA_OFF in JOG mode
0:   No superimposed motion due to $AA_OFF
1:   A superimposed motion due to $AA_OFF is interpolated
```

1.5.7 Safety Integrated

36901	SAFE_FUNCTION_ENABLE			A05, -	FBSI	
-	Enable safety functions			DWORD	PowerOn	
-						
-	-	0	0	0xFFFB	7/2	M

Description: The safe operation functions can be enabled for an axis/spindle with this data.

For each axis, only as many axes/spindles can be enabled for safe operation as are enabled by the global option.

The more sub-functions are set, the more CPU time the safety functions need.

Bit 0: Enables safe velocity, safe operational stop

Bit 1: Enables safe limit switch

Bit 2: Reserved for functions with absolute references (such as SE/SN)

Bit 3: Enables actual value synchronization, 2 encoder system

Bit 4: Enables external ESR activation (STOP E)

Bit 5: Enables SG offset

Bit 6: Enables external stop requests

Bit 7: Enables cam synchronization

Bit 8: Enables safe cams, pair 1, cam +

Bit 9: Enables safe cams, pair 1, cam -

Bit 10: Enables safe cams, pair 2, cam +

Bit 11: Enables safe cams, pair 2, cam -

Bit 12: Enables safe cams, pair 3, cam +

Bit 13: Enables safe cams, pair 3, cam -

Bit 14: Enables safe cams, pair 4, cam +

Bit 15: Enables safe cams, pair 4, cam -

Special cases:

- When one of the bits from bit 1 is set, then bit 0 also has to be set because the control switches to safe operational stop with STOP C, D, E (parameter alarm 27033 is displayed if there is an error).
- If the global option does not enable enough axes/spindles for safe operation, then this data can be overwritten with the value 0 during power on.

Related to: Global option

36902	SAFE_IS_ROT_AX			A01, A05, A06, -	FBSI	
-	Rotary axis			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: States whether the axis for safe operation is a rotary axis/spindle or a linear axis.

0: Linear axis

1: Rotary axis/spindle

The value in this MD must be equal to that in MD $MA_IS_ROT_AX. A parameterization error is displayed if there is a difference.

36903	SAFE_CAM_ENABLE			A05, -	-	
-	Function enable safe cam track			DWORD	PowerOn	
-						
-	-	0	0	0x3FFFFFFF	7/2	M

Description: Function enables of safe cam track for "Safety Integrated".

```
Bit  0: Enables safe cam track, cam 1
Bit  1: Enables safe cam track, cam 2
Bit  2: Enables safe cam track, cam 3
Bit  3: Enables safe cam track, cam 4
Bit  4: Enables safe cam track, cam 5
Bit  5: Enables safe cam track, cam 6
Bit  6: Enables safe cam track, cam 7
Bit  7: Enables safe cam track, cam 8
Bit  8: Enables safe cam track, cam 9
Bit  9: Enables safe cam track, cam 10
Bit 10: Enables safe cam track, cam 11
Bit 11: Enables safe cam track, cam 12
Bit 12: Enables safe cam track, cam 13
Bit 13: Enables safe cam track, cam 14
Bit 14: Enables safe cam track, cam 15
Bit 15: Enables safe cam track, cam 16
Bit 16: Enables safe cam track, cam 17
Bit 17: Enables safe cam track, cam 18
Bit 18: Enables safe cam track, cam 19
Bit 19: Enables safe cam track, cam 20
Bit 20: Enables safe cam track, cam 21
Bit 21: Enables safe cam track, cam 22
Bit 22: Enables safe cam track, cam 23
Bit 23: Enables safe cam track, cam 24
Bit 24: Enables safe cam track, cam 25
Bit 25: Enables safe cam track, cam 26
Bit 26: Enables safe cam track, cam 27
Bit 27: Enables safe cam track, cam 28
Bit 28: Enables safe cam track, cam 29
Bit 29: Enables safe cam track, cam 30
```

36905	SAFE_MODULO_RANGE			A02, -	FBSI	
degrees	Modulo value Safe cams			DOUBLE	PowerOn	
-						
-	-	0.0	0.0	737280.0	7/2	M

Description: Actual value range in which the safe cams are calculated for rotary axes. The axis must be a rotary axis ($MA_SAFE_IS_ROT_AX = 1).

0: Modulo compensation after +/- 2048 revolutions (that is after 737,280 degrees)

>0: And multiples of 360 degrees: Modulo compensation after this value, for example: value = 360 --> then the actual value range lies between 0 and 359.999 degrees. That is modulo compensation is made after each revolution.

Special cases:

- If the value of this data is not 0 or a multiple of 360 degrees then a corresponding alarm is issued during power on.
- The parameterized actual value ranges of the cam positions are also checked during power on. A corresponding alarm is issued if there is a parameterization error.
- The actual value ranges set by $MA_SAFE_MODULO_RANGE and $MA_MODULO_RANGE must be integers and divisible without a remainder.

Related to:

MD 30330: $MA_MODULO_RANGE

MD 36935: $MA_SAFE_CAM_POS_PLUS[n]

MD 36937: $MA_SAFE_CAM_POS_MINUS[n]

36906	SAFE_CTRLOUT_MODULE_NR			A01, A05, -	-	
-	SI drive assignment			BYTE	PowerOn	
-						
-	-	1,2,3,4,5,6,7,8,9,10,11, 12,13,14,15,16,17,18...	1	31	7/2	M

Description: Assignment of the drive for SI motion monitoring.

The entry refers to data field MD10393 $MN_SAFE_DRIVE_LOGIC_ADDRESS.

The drive assigned must be the same as the one selected using MD30110 $MA_CTRLOUT_MODULE_NR and MD13050 $MN_DRIVE_LOGIC_ADDRESS.

36907	SAFE_DRIVE_PS_ADDRESS			A01, A05, -	-	
-	PROFIsafe address of the drive			DWORD	PowerOn	
-						
-	-	0	-	-	7/RO	S

Description: This NCK MD contains the PROFIsafe address of the drive asigned to this axis. This MD is read out during the power on of the drive. This address must be unique across all axes.

This MD cannot be written, the PROFIsafe address must be parameterized in the drive.

The value of this MD is included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[2].

36910	SAFE_ENC_SEGMENT_NR			EXP, A01, A02, A05, -	FBSI	
-	Actual value assignment: type of drive			BYTE	PowerOn	
-						
-	-	5	5	5	-1/0	S

Description: Number of the bus segment over which the SI encoder is addressed.

0: Local bus

2: MERKUR local P-bus

4: Reserved (virtual buses)

5: PROFIBUS DP

Safety functions are only possible with SIMODRIVE611D or suitable PROFIBUS drives, see also MD 30210

36911	SAFE_ENC_MODULE_NR			A01, A02, A05, -	FBSI	
-	Actual value assignment: drive number/measurement circuit number			BYTE	PowerOn	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	0	-1/2	M

Description: Module number within a segment by which the SI encoder is addressed.

The logical drive number of the drive assigned to the axis by $MN_DRIVE_LOGIC_NR must be entered here.

In the standard case with a 2 encoder system, the encoder for Safety Integrated is connected to the second encoder connection (lower input) of the same drive submodule.

Related to:

MD 36910: $MA_SAFE_ENC_SEGMENT_NR

MD 36912: $MA_SAFE_ENC_INPUT_NR

MD 13010: $MN_DRIVE_LOGIC_NR

36912	SAFE_ENC_INPUT_NR			A01, A02, A05, -	FBSI	
-	Actual value assignm.: Input on drive module/meas. circuit board			BYTE	PowerOn	
-						
-	-	1	1	3	7/2	M

Description: Number of the actual value input through which the safe actual values are recorded.

Special cases:

Related to:

p9526, p0189

36914	SAFE_SINGLE_ENC			A01, A02, A05, -	-	
-	SI single-encoder system			BOOLEAN	PowerOn	
-						
-	-	TRUE	-	-	7/2	M

Description: Identifier that SI is carried out with an encoder. This MD must be parameterized to 0 if different encoders are used for the Safety Integrated monitoring functions in the NCK and in the drive.

36915	SAFE_ENC_TYPE			A01, A02, A05, -	FBSI	
-	Encoder type			BYTE	PowerOn	
-						
-	-	0	0	4	-1/2	M

Description: Definition of the type of SI encoder connected.

0: Simulation

1: Raw signal generator (voltage, current, EXE, etc.) -> high resolution

2: Rectangular signal encoder (standard, quadruplication of increments)

3: Encoder for stepper motor

4: EnDat absolute encoder

5: SSI encoder (synchronous serial interface) only for Merkur, see also MD 30240

\- The coding of the value corresponds to the data $MA_ENC_TYPE.

Related to:

MD 30240: $MA_ENC_TYPE

36916	SAFE_ENC_IS_LINEAR			A02, A05, -	FBSI	
-	Linear scale			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: Definition of whether a linear or a rotary encoder is connected.

0: Rotary encoder is connected, its resolution is defined by $MA_SAFE_ENC_RESOL, and converted by $MA_SAFE_ENC_GEAR_PITCH, $MA_SAFE_ENC_GEAR_DENOM[n] and $MA_SAFE_ENC_GEAR_NUMERA[n] on the load side. MD $MA_SAFE_ENC_GRID_POINT_DIST has no significance.

1: Linear encoder is connected, its resolution is defined by $MA_SAFE_ENC_GRID_POINT_DIST. MD $MA_SAFE_ENC_RESOL, $MA_SAFE_ENC_GEAR_PITCH, $MA_SAFE_ENC_GEAR_DENOM[n] and $MA_SAFE_ENC_GEAR_NUMERA[n] have no meaning. If the value changes, alarm 27036 is triggered.

Related to:

With 0:

$MA_SAFE_ENC_RESOL

$MA_SAFE_ENC_GEAR_PITCH

$MA_SAFE_ENC_GEAR_DENOM[n]

$MA_SAFE_ENC_GEAR_NUMERA[n]

With 1:

$MA_SAFE_ENC_GRID_POINT_DIST

36917	SAFE_ENC_GRID_POINT_DIST			A02, A05, -	FBSI	
mm	Scale division for linear scale			DOUBLE	PowerOn	
-						
-	-	0.01	0.00001	8	7/2	M

Description: Definition of the grid spacing of the linear scale used.

Not relevant for a rotary encoder.

36918	SAFE_ENC_RESOL			A02, A05, -	FBSI	
-	Encoder lines per revolution			DWORD	PowerOn	
-						
-	-	2048	1	100000	7/2	M

Description: Definition of the lines per revolution for a rotary encoder.

Not relevant for a linear encoder.

36919	SAFE_ENC_PULSE_SHIFT			A02, A05, -	-	
-	Shift factor of encoder multiplication			BYTE	PowerOn	
-						
-	-	11	2	18	7/RO	S

Description: Slide factor of the multiplication factor (high-resolution) of the encoder used for the Safety Integrated monitoring functions in the NCK. The encoder value must be divided by 2, the number of times needed to get the number of encoder lines. A slide factor of 11 corresponds to an encoder multiplication factor of 2048. If the drive provides this information (r0979[3,13,23]), this MD is automatically assigned internally after power ON of the drive. If the value changes during this process, alarm 27036 is triggered.

36920	SAFE_ENC_GEAR_PITCH			A02, A05, -	FBSI	
mm	Lead screw pitch			DOUBLE	PowerOn	
-						
-	-	10.0	0.1	10000.	7/2	M

Description: Gear ratio between encoder and load for a linear axis with a rotary encoder.

36921	SAFE_ENC_GEAR_DENOM			A02, A05, -	FBSI	
-	Denominator of gearbox encoder/load			DWORD	PowerOn	
-						
-	8	1, 1, 1, 1, 1, 1, 1, 1	1	2147000000	7/2	M

Description: Numerator of the gearbox between encoder and load, that is the numerator of the fraction: number of encoder revolutions / number of load revolutions

n = 0, 1, ... , 7 stand for gear stages 1, 2, ... 8

The current value is selected via safety-relevant input signals (SGE).

Related to:

MD 36922: $MA_SAFE_ENC_GEAR_NUMERA[n]

36922	SAFE_ENC_GEAR_NUMERA			A02, A05, -	FBSI	
-	Numerator of gearbox encoder/load			DWORD	PowerOn	
-						
-	8	1, 1, 1, 1, 1, 1, 1, 1	1	2147000000	7/2	M

Description: Numerator of the gearbox between encoder and load, that is the numerator of the fraction:

number of encoder revolutions / number of load revolutions

n = 0, 1, ... , 7 stand for gear stages 1, 2, ... 8

The current value is selected via safety-relevant input signals (SGE).

Related to:

MD 36921: $MA_SAFE_ENC_GEAR_DENOM[n]

36923	SAFE_INFO_ENC_RESOL			A02, A05, -	-	
mm, degrees	Safe encoder resolution			DOUBLE	PowerOn	
-						
-	8	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/RO	S

Description: Display data: Resolution of the encoder used in the relevant gear stage for the Safety Integrated monitoring functions. A single encoder system can monitor safe positions with this accuracy. This MD is 0 if different encoders are used in the drive and in the NCK for the Safety Integrated monitoring functions.

36924	SAFE_ENC_NUM_BITS			A02, A05, -	-	
-	Bit information of the redundant actual value			DWORD	PowerOn	
-						
-	4	16,2,16,16	-16	32	7/RO	S

Description: Information about the redundant actual value:

- Array index 0: Number of valid bits of the redundant actual value
- Array index 1: Number of fine resolution bits of the redundant actual value
- Array index 2: Number of relevant bits of the redundant actual value
- Array index 3: Most significant bit of the redundant coarse positon

This information is read out during ramp-up (for DRIVE-CLiQ encoders from drive parameters r0470, r0471, r0472, and r0475; the default values apply for SMI/SMC/SME encoders) and compared with the most recent values saved here. This MD is then overwritten. In the case of inequality, alarm 27035 or 27036 is output. The values from $MA_SAFE_ENC_NUM_BITS[0,1] are included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[1]. The values from $MA_SAFE_ENC_NUM_BITS[2,3] are included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[0].

36925	SAFE_ENC_POLARITY			A02, A05, -	FBSI	
-	Direction reversal of actual value			DWORD	PowerOn	
-						
-	-	1	-1	1	7/2	M

Description: A direction reversal of the actual value can be set with this data.

-1: Direction reversal

0: No direction reversal or

1: No direction reversal

36926	SAFE_ENC_FREQ_LIMIT			A02, A05, -	FBSI	
-	Encoder frequency limit for safe operation			DWORD	PowerOn	
-						
-	-	500000	500000	500000	-1/2	M

Description: Encoder limit frequency above which amplitude monitoring is switched off.

A speed corresponding to this frequency must not be exceeded in safe operation with a 1-encoder system.

If this limit frequency is exceeded in safe operation (SBH or SG,), the drive is shut down by the stop response parameterized for active monitoring.

This frequency can be set to more than 300kHz only for performance-2 control units High Standard und High Performance.

Incorrect parameterizations are indicated by alarm 27033.

36927	SAFE_ENC_MOD_TYPE			A02, A05, -	-	
-	Encoder evaluation type			BYTE	PowerOn	
-						
-	-	1	-	-	7/RO	S

Description: Type of encoder evaluation used for Safety Integrated on this axis.

1 = Sensor Module (SMI,SMC,SME)

2 = DRIVE-CLiQ encoder

This type is read out from drive parameter r9527 during ramp-up. If a valid value has not been entered (permissible values are 1 and 2), alarm 27038 is output. If the drive parameter contains a valid value, this is compared with the last value stored in this MD. This MD is then overwritten. In the event of inequality, alarm 27035 is output. The value of this MD is included in the calculation of MD36998 $MA_SAFE_ACT_CHECKSUM[1].

36928	SAFE_ENC_IDENT			A02, A05, -	-	
-	Encoder identification			DWORD	PowerOn	
-						
-	3	0, 0, 0	-	-	7/RO	S

Description: Identification of the encoder evaluation used for Safety Integrated on this axis. This identification is read out during power on by the encoder evaluation, and compared with the last value stored here. This MD is then overwritten. The value of this MD is included in the calculation of MD36998 $MA_SAFE_ACT_CHECKSUM[1].

Related to:

r9881: SI Motion Sensor Module Node Identifier control

36929	SAFE_ENC_CONF			A02, A05, -	-	
-	Configuration of the redundant actual value			DWORD	PowerOn	
-						
-	-	0	-	-	7/RO	S

Description:

```
Configuration of the redundant actual value on DRIVE-CLiQ encoder:
Bit 0: Up-down counter
     = 0: Up counter
     = 1: Down counter
Bit 1: Encoder CRC: Processing of redundant coarse position
     = 0: Most significant byte first
     = 1: Least significant byte first
Bit 2: Redundant coarse position MSB-/LSB-justified
     = 0: Redundant coarse position LSB-justified
     = 1: Redundant coarse position MSB-justified
```

This information is read out from drive parameter r0474 during ramp-up and compared with the last value stored here. This MD is then overwritten. In the event of inequality, alarm 27035 is output. The value of this MD is included in the calculation of MD36998 $MA_SAFE_ACT_CHECKSUM[1].

36930	SAFE_STANDSTILL_TOL			A05, -	FBSI	
mm, degrees	Standstill tolerance			DOUBLE	PowerOn	
-						
-	-	1.	0.	100.	7/2	M

Description:

Definition of the tolerance for safe operational stop.

The control triggers alarm 27010 with STOP B if the difference between position limit value und position actual value is greater than this tolerance when safe operational stop is selected. The position limit value is the position actual value at the time safe operational stop was selected.

Related to:

MD 36956: $MA_SAFE_PULSE_DISABLE_DELAY

36931	SAFE_VELO_LIMIT			A05, A04, -	FBSI	
mm/min, rev/min	Limit value for safe velocity			DOUBLE	PowerOn	
-						
-	4	2000., 2000., 2000., 2000.	-	-	7/2	M

Description: Definition of the limit values for the safe velocities 1, 2, 3 and 4.

If SG1, SG2, SG3 or SG4 is selected and the current velocity exceeds this limit value, the control triggers alarm 27011 with the stop response configured in $MA_SAFE_VELO_STOP_MODE or $MA_SAFE_VELO_STOP_REACTION.

n = 0, 1, 2, 3 stand for the limit values of SG1, SG2, SG3, SG4

Special cases:

In a 1-encoder system with SBH/SG active, the velocity is monitored according to the encoder frequency set in MD $MA_SAFE_ENC_FREQ_LIMIT. A corresponding alarm is output if this is exceeded.

Related to:

MD 36961: $MA_SAFE_VELO_STOP_MODE

MD 36963: $MA_SAFE_VELO_STOP_REACTION

36932	SAFE_VELO_OVR_FACTOR			A05, -	FBSI	
%	SG offset values			DOUBLE	PowerOn	
-						
-	16	100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0...	1.0	100.0	7/2	M

Description: Overrides for the limit values of safe velocities 2 and 4 can be selected via the SGEs, and the associated override value (percentage values) can be set with this MD.

n = 0, 1, ... , 15 stand for overrides 0, 1, ... 15

Special cases:

- The function "Override safe speed" is enabled by MD 36901 $MA_SAFE_FUNCTION_ENABLE.
- This override is inactive for the limit values of velocities 1 and 3.

Related to:

MD 36978: $MA_SAFE_OVR_INPUT[n]

MD 36931: $MA_SAFE_VELO_LIMIT[n]

36933	SAFE_DES_VELO_LIMIT			A05, A04, -	FBSI	
%	SG setpoint speed limit			DOUBLE	Reset	
-						
-	-	0.0	0	100	7/2	M

Description: Weighting factor for determining the setpoint limit from the current actual speed limit. The active SG limit value is weighted with this factor and defined as the setpoint limit for the interpolator. Setpoint 0 is defined when SBH is selected.

An input of 100% limits the setpoint to the active SG stage

The setpoint speed limit is inactive with an input of 0%.

Special cases:

- In order to take the drive dynamics into account, multiple changes may have to be made to set this MD optimally. "Reset" is defined as the effectivity criterion to avoid making this procedure unnecesarily complicated.
- This data is not included in the cross-check with the drive.
- This data is not included in the axial check sum $MA_SAFE_ACT_CHECKSUM, as this is a 1-channel function.

36934	SAFE_POS_LIMIT_PLUS			A03, A05, -	FBSI	
mm, degrees	Upper limit of safe end position			DOUBLE	PowerOn	
-						
-	2	100000., 100000.	-2147000	2147000	7/2	M

Description: Definition of the upper limit value for safe end positions 1 and 2.

If SE1 or SE2 is selected and the current actual position is greater than this limit value, the control triggers alarm 27012 with the stop response configured in $MA_SAFE_POS_STOP_MODE and switches to SBH. Stop responses STOP B and A follow if SBH is violated.

n = 0, 1 stand for the upper limit values of SE1, SE2

Related to:

MD 36962: $MA_SAFE_POS_STOP_MODE

MD 36935: $MA_SAFE_POS_LIMIT_MINUS[n]

MD 36901: $MA_SAFE_FUNCTION_ENABLE

Special cases:

A parameterization error is displayed if a value is entered in MD: $MA_SAFE_POS_LIMIT_PLUS[n] which is less than or equal to that in MD: $MA_SAFE_POS_LIMIT_MINUS[n].

36935	SAFE_POS_LIMIT_MINUS			A03, A05, -	FBSI	
mm, degrees	Lower limit of safe end position			DOUBLE	PowerOn	
-						
-	2	-100000., -100000.	-2147000	2147000	7/2	M

Description: Definition of the lower limit value for safe end positions 1 and 2.

If SE1 or SE2 is selected and the current actual position is less than this limit value, the control triggers alarm 27012 with the stop response configured in $MA_SAFE_POS_STOP_MODE and switches to SBH. Stop responses STOP B and A follow if SBH is violated.

n = 0, 1 stand for the lower limit values of SE1, SE2

Related to:

MD 36962: $MA_SAFE_POS_STOP_MODE

MD 36934: $MA_SAFE_POS_LIMIT_PLUS[n]

Special cases:

A parameterization error is displayed if a value is entered in MD: $MA_SAFE_POS_LIMIT_PLUS[n] which is less than or equal to that in MD: $MA_SAFE_POS_LIMIT_MINUS[n].

36936	SAFE_CAM_POS_PLUS			A03, A05, -	FBSI	
mm, degrees	Plus cam position for safe cams			DOUBLE	PowerOn	
-						
-	30	10., 10., 10., 10., 10., 10., 10., 10., 10., 10., 10., 10., 10....	-2147000	2147000	7/2	M

Description: Definition of the plus cam positions for the safe cams SN1 +, SN2 +, SN3 + and SN4 +, ...

The following applies to the function "Safe cams":

If, with activated safe cams, the actual position is greater than this value, the corresponding safety-relevant output signal (SGA) is set to 1. If the actual position falls below this value, the SGA is set to 0.

n = 0, 1, 2, 3 stand for plus cam positions of SN1 +, SN2 +, SN3 +, SN4 +

The following applies to the function "Safe cam track":

If the function "Safe cam track" has been enabled, the safety-related output signals "Cam track" and "Cam range" are set in accordance with the cam parameterization. For this purpose, the parameterization of the cam range in MD $MA_SAFE_CAM_TRACK_ASSIGN[n] must be viewed.

n = 0 ... 29 stand for plus cam positions of SN1+, SN2+, ..., SN30+.

Related to:

MD 36988: $MA_SAFE_CAM_PLUS_OUTPUT[n]

MD 36937: $MA_SAFE_CAM_POS_MINUS[n]

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]

MD 37900: $MA_SAFE_CAM_TRACK_OUTPUT[n]

MD 37901: $MA_SAFE_CAM_RANGE_OUTPUT_1[n]

MD 37902: $MA_SAFE_CAM_RANGE_OUTPUT_2[n]

MD 37903: $MA_SAFE_CAM_RANGE_OUTPUT_3[n]

MD 37904: $MA_SAFE_CAM_RANGE_OUTPUT_4[n]

36937	SAFE_CAM_POS_MINUS			A03, A05, -	FBSI	
mm, degrees	Minus cam position for safe cams			DOUBLE	PowerOn	
-						
-	30	-10., -10., -10., -10., -10., -10., -10., -10., -10., -10....	-2147000	2147000	7/2	M

Description:

```
Definition of the minus cam positions for the safe cams SN1 -, SN2
-, SN3 -, ...
The following applies to the function "Safe cams":
If, with activated safe cams, the actual position is greater than
this value, the corresponding, safety-relevant output signal (SGA)
is set to 1. If the actual position falls below this value, the SGA
is set to 0.
n = 0, 1, 2, 3 stand for minus cam positions of SN1 -, SN2 -, SN3
-, SN4 -
The following applies to the function "Safe cam track":
If the function "Safe cam track" has been enabled, the safety-
related output signals "Cam track" and "Cam range" are set in
accordance with the cam parameterization. For this purpose, the
parameterization of the cam range in MD
$MA_SAFE_CAM_TRACK_ASSIGN[n] must be viewed.
n = 0 ... 29 stand for minus cam positions of SN1-, SN2-, ...,
SN30-.
Related to:
  MD 36989: $MA_SAFE_CAM_MINUS_OUTPUT[n]
  MD 36936: $MA_SAFE_CAM_POS_PLUS[n]
  MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]
  MD 37900: $MA_SAFE_CAM_TRACK_OUTPUT[n]
  MD 37901: $MA_SAFE_CAM_RANGE_OUTPUT_1[n]
  MD 37902: $MA_SAFE_CAM_RANGE_OUTPUT_2[n]
  MD 37903: $MA_SAFE_CAM_RANGE_OUTPUT_3[n]
  MD 37904: $MA_SAFE_CAM_RANGE_OUTPUT_4[n]
```

36938	SAFE_CAM_TRACK_ASSIGN			A03, A05, -	FBSI	
-	Cam track assignment			DWORD	PowerOn	
-						
-	30	100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112...	100	414	7/2	M

Description: Assignment of the individual cams to the max. 4 cam tracks including definition of the numerical value for SGA "Cam range".

>The hundreds digit defines to which cam track the cam is assigned. Valid values are 1, 2, 3 or 4.

The tens and ones digits include the numerical value that is to be reported to the safe logics as SGA "Cam range" and processed there. Valid values are 0 to 14, while each numerical value per cam track may be used only once.

Therefore the valid value range of this machine data is:

100...114, 200...214, 300...314, 400...414

Examples:

MD36938[0] = 207: cam 1 (index 0) is assigned to cam track 2.

If the position is within the range of this cam, a 7 is entered in SGA "Cam range" of the 2nd cam track.

MD36938[5] = 100: cam 6 (index 5) is assigned to cam track 1.

If the position is within the range of this cam, a 0 is entered in SGA "Cam range" of the 1st cam track.

Related to:

MD 36936: $MA_SAFE_CAM_POS_PLUS[n]
MD 36937: $MA_SAFE_CAM_POS_MINUS[n]
MD 37900: $MA_SAFE_CAM_TRACK_OUTPUT[n]
MD 37901: $MA_SAFE_CAM_RANGE_OUTPUT_1[n]
MD 37902: $MA_SAFE_CAM_RANGE_OUTPUT_2[n]
MD 37903: $MA_SAFE_CAM_RANGE_OUTPUT_3[n]
MD 37904: $MA_SAFE_CAM_RANGE_OUTPUT_4[n]

36940	SAFE_CAM_TOL			A05, -	FBSI	
mm, degrees	Tolerance for safe cams			DOUBLE	PowerOn	
-						
-	-	0.1	0.001	10	7/2	M

Description: As a result of differing encoder mounting positions and differing cycle and run times, the cam signals of the two monitoring channels never switch at exactly the same position or at exactly the same time.

This data defines the tolerance as a load-side path for all cams, within which the monitoring channels can have different signal states for the same cam without triggering alarm 27001.

Recommendation:

Enter a value equal to or slightly larger than that in MD 36942.

36942	SAFE_POS_TOL			A05, -	FBSI	
mm, degrees	Tolerance actual value cross-check			DOUBLE	PowerOn	
-						
-	-	0.1	0.001	360	7/2	M

Description: Because of varying installation locations for the encoder, backlash, torsion, lead screw error etc, the two actual positions acquired by NCK and drive at the same time can differ from one another.

The tolerance for the cross-check of the actual positions in the two monitoring channels is entered in this data.

Special cases:

- The prime consideration for defining this tolerance is the "finger protection" (ca. 10 mm).
- If this tolerance is exceeded, stop reaction STOP F ensues.

36944	SAFE_REFP_POS_TOL			A05, -	FBSI	
mm, degrees	Tolerance actual value check (referencing)			DOUBLE	PowerOn	
-						
-	-	0.01	0	36	7/2	M

Description: This data defines the tolerance for checking the actual values after referencing (for an incremental encoder) or during power on (for an absolute encoder).

Referencing determines an absolute actual position of the axis. A second absolute actual position is derived from the last stored standstill position before the control was switched off and the path traversed since power on. The control checks the actual values after referencing with these two absolute positions, the path traversed and this data.

The following influences must be taken into account when determining the tolerance values:

backlash, leadscrew error, compensations (max. compensation values with LEC, sag and temperature compensations), temperature errors, torsion (2-encoder system), gear tolerance in variable gears, coarser resolution (2-encoder system), oscillation distance with variable gears.

Special cases:

Given user agreement, if the two absolute actual positions differ by more than the value in this data, alarm 27001 is displayed with error code 1003, and renewed user agreement is required for referencing.

36946	SAFE_VELO_X			A05, -	FBSI	
mm/min, rev/min	Velocity limit n_x			DOUBLE	PowerOn	
-						
-	-	20.	0.	6000.	7/2	M

Description: This data defines the limit speed n_x for the SGA "n < nx".

The SGA "n < nx" is set if this speed limit is undershot.

36948	SAFE_STOP_VELO_TOL			A05, -	FBSI	
mm/min, rev/min	Velocity tolerance for Safe monitoring of acceleration			DOUBLE	PowerOn	
-						
-	-	300.	0.	120000.	7/2	M

Description: Tolerance of the actual velocity for safe monitoring of the acceleration (SBR).

This tolerance is added to the actual velocity after safe monitoring of the acceleration has been activated (by triggering a Stop B or C).

The actual velocity must not be greater than the limit thus defined.

Otherwise a Stop A is triggered. This reveals an acceleration of the drive as quickly as possible.

36949	SAFE_SLIP_VELO_TOL			A05, -	FBSI	
mm/min, rev/min	Slip velocity tolerance			DOUBLE	PowerOn	
-						
-	-	6.	0.	6000.	7/2	M

Description: Difference in velocity between the motor and load sides tolerated by a 2-encoder system, without the data cross-check between SIMODRIVE611D and NCK signaling an error.

MD36949 $MA_SAFE_SLIP_VELO_TOL is only evaluated if MD36901 $MA_SAFE_FUNCTION_ENABLE, bit3 is set.

Related to:

MD1349 $MD_SAFE_SLIP_VELO_TOL

36950	SAFE_MODE_SWITCH_TIME			A05, -	FBSI	
s	Tolerance time for SGE switchover			DOUBLE	PowerOn	
-						
-	-	0.5	0	10.	7/2	M

Description: SGE switchovers are not active simultaneously because the data transfer runtimes of the SGEs differ in the two monitoring channels. The data cross-check would report an error in this case.

This data defines the length of time after SGE switchovers during which the actual values and the monitoring results are not cross-checked (the machine data continue to be compared!). The selected monitoring continues to run uninterrupted in both monitoring channels.

A safe function becomes active in a monitoring channel as soon as the selection or switchover is detected in this channel.

The differing runtime is mainly determined by the PLC cycle time.

System-related minimum tolerance time: 2 x PLC cycle time (maximum cycle) + 1 x IPO cycle time.

The runtime differences must also be taken into account in the external circuit (e.g. relay switching times).

36951	SAFE_VELO_SWITCH_DELAY			A05, -	FBSI	
s	Delay time for velocity changeover			DOUBLE	PowerOn	
-						
-	-	0.1	0	600.	7/2	M

Description: A timer is started with this value when transferring from a higher to a lower safe speed or when selecting safe operational stop with safe speed active.

The parameterized value selected must be as low as possible.

The last selected speed limit value continues to be monitored while the timer is running. During this time, the axle/spindle can be decelerated, for example via the PLC user program, without the monitoring reporting an error and triggering a stop reaction.

Special cases:

1. The timer is aborted immediately on switching to a limit greater than or equal to the previously active SG limit.
2. The timer is aborted immediately on switching to "Non-safe operation" (SGE "Deselect SBH/SG=1).
3. The timer is retriggered (restarted) on switching to a limit less than the previously active SG limit or to SBH while the timer is running.

36952	SAFE_STOP_SWITCH_TIME_C			A05, -	FBSI	
s	Transition time STOP C to safe standstill			DOUBLE	PowerOn	
-						
-	-	0.1	0	600.	7/2	M

Description: This data defines the time after which a switch is made to safe operational stop when a STOP C has been triggered.

The parameterized value selected must be as low as possible.

Safe operational stop is monitored after this time has expired. STOP A or B is triggered if the axis/spindle could not be stopped.

36953	SAFE_STOP_SWITCH_TIME_D			A05, -	FBSI	
s	Transition time STOP D to safe standstill			DOUBLE	PowerOn	
-						
-	-	0.1	0	600.	7/2	M

Description: This data defines the time after which a switch is made to safe operational stop when a STOP D has been triggered.

The parameterized value selected must be as low as possible.

Safe operational stop is monitored after this time has expired. STOP B is triggered if the axis/spindle could not be stopped.

36954	SAFE_STOP_SWITCH_TIME_E			A05, -	FBSI	
s	Transitional period STOP E to safe standstill			DOUBLE	PowerOn	
-						
-	-	0.1	0	600.	7/2	M

Description: Time period after which a switch over takes place from STOP E to safe operational stop.

The parameterized value selected must be as small as possible.

36955	SAFE_STOP_SWITCH_TIME_F			A05, -	FBSI	
s	Transition time STOP F to STOP B			DOUBLE	PowerOn	
-						
-	-	0.0	0	600.	7/2	M

Description: Time period after which a switch over takes place from stop F to stop B with active monitoring functions.

The parameterized value selected must be as low as possible.

During this time, another deceleration reaction can be activated, e.g. by means of synchronized actions.

The switch over also takes place if a C/D/E stop occurs during this time.

36956	SAFE_PULSE_DISABLE_DELAY			A05, -	FBSI	
s	Delay time for pulse suppression			DOUBLE	PowerOn	
-						
-	-	0.1	0	600.	7/2	M

Description: On STOP B, deceleration is made with speed setpoint 0 at the current limit and changed to STOP A for pulse suppression after the delay time defined with this data.

The parameterized value selected must be as low as possible.

Special cases:

The pulse suppression is performed earlier than defined in this data if the condition for pulse suppression is present via MD 36960: $MA_SAFE_STANDSTILL_VELO_TOL or via MD 36620: $MA_SERVO_DISABLE_DELAY_TIME.

If the time is set in this data to ZERO, then on STOP B an immediate change is made to STOP A (immediate pulse suppression).

Relating to:

MD 36960: $MA_SAFE_STANDSTILL_VELO_TOL

MD 36620: $MA_SERVO_DISABLE_DELAY_TIME

MD 36060: $MA_STANDSTILL_VELO_TOL

36957	SAFE_PULSE_DIS_CHECK_TIME			A05, -	FBSI	
s	Time for checking pulse suppression			DOUBLE	PowerOn	
-						
-	-	0.1	0	10	7/2	M

Description: Definiiton of the time after which pulses have to be disabled after a request to disable pulses.

The time between deleting the SGA "Enable pulse" and detecting the disabling of pulses via the SGE "Status pulses disabled" must not exceed the value of this data.

Special cases:

STOP A is triggered if this time is exceeded.

36958	SAFE_ACCEPTANCE_TST_TIMEOUT			A05, -	FBSI	
s	Time limit for acceptance test duration			DOUBLE	PowerOn	
-						
-	-	40.0	5	100	7/2	M

Description: On the NCK side, a time limit can be specified for the duration of an acceptance test.

The NCK terminates the test if an acceptance test lasts longer than the time defined in MD 36958.

The acceptance test status is set to zero on the NCK side. When the acceptance test status is reset, SI-power-ON-alarms are reset again from reset-acknowledgeable to power-ON-acknowledgeable on the NCK and drive sides.

The NCK clears alarm 27007 and the drive clears alarm 300952.

This MD is also used to limit the duration of an SE (safe limit position) acceptance test. After the programmed time has elapsed, the SE acceptance test is aborted and alarm 27008 deleted. The software limit positions then once again act as defined in the machine data.

36960	SAFE_STANDSTILL_VELO_TOL			A05, A04, -	FBSI	
mm/min, rev/min	Creep speed for pulse suppression			DOUBLE	PowerOn	
-						
-	-	0.0	0.0	6000.	7/2	M

Description: Speed below which the axle/spindle is regarded as being at a standstill and the pulses are disabled with STOP B (through transition to STOP A).

Related to:

MD 36956: $MA_SAFE_PULSE_DISABLE_DELAY

36961	SAFE_VELO_STOP_MODE			A05, -	FBSI	
-	Stop reaction for safe velocity			BYTE	PowerOn	
-						
-	-	5	0	14	7/2	M

Description: The stop reaction defined in this data is triggered if the limit value for the safe velocity 1, 2, 3 or 4

is exceeded.

= 0, 1, 2, 3 correspond to STOP A, B, C, D, common to each safe velocity stage

= 5 means that the stop reaction can be configured specifically for each safe velocity in MD 36963.

The units digit defines the selection of the stop reaction when the safe velocity is exceeded.

The tens digit defines the behavior in the case of a drive bus failure if a time greater than 0 is parameterized in $MN_SAFE_PULSE_DIS_TIME_BUSFAIL.

0: Stop A

1: Stop B

2: Stop C

3: Stop D

4: Stop E

5: SAFE_VELO_STOP_MODE invalid, stop reaction is parameterized via MD SAFE_VELO_STOP_REACTION

10: Stop A, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

11: Stop B, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

12: Stop C, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

13: Stop D, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

14: Stop E, additionally, in the event of a drive bus failure, pulses are not disabled immediately if safe velocity is active

Special cases:

- If the value in this MD is 5, the stop reaction for each safe velocity stage is defined selectively in $MA_SAFE_VELO_STOP_REACTION.

Related to:

MD 36931: $MA_SAFE_VELO_LIMIT[n]

MD 36963: $MA_SAFE_VELO_STOP_REACTION[n]

36962	SAFE_POS_STOP_MODE			A05, -	FBSI	
-	Stop reaction for safe end position			BYTE	PowerOn	
-						
-	-	2	2	4	7/2	M

Description: The stop reaction defined in this data is triggered if safe end position 1 or 2 is overrun.

2: Stop C

3: Stop D

4: Stop E

Related to:

MD 36934: $MA_SAFE_POS_LIMIT_PLUS[n]

MD 36935: $MA_SAFE_POS_LIMIT_MINUS[n]

36963	SAFE_VELO_STOP_REACTION			A05, -	FBSI	
-	Stop reaction for safe velocity			BYTE	PowerOn	
-						
-	4	2, 2, 2, 2	0	14	7/2	M

Description: The stop reaction defined in this data is triggered if the limit value for the safe velocity 1, 2, 3 or 4 is exceeded.

= 0, 1, 2, 3 stand for SG1, SG2, SG3, SG4

The units digit defines the selection of the stop reaction for each specific safe velocity when the safe velocity is exceeded.

The tens digit defines the behavior in the case of a drive bus failure for each specific safe velocity if a time greater than 0 has been parameterized in $MN_SAFE_PULSE_DIS_TIME_BUSFAIL.

Value Meaning

0: Stop A

1: Stop B

2: Stop C

3: Stop D

4: Stop E

10: Stop A, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity stage is active

11: Stop B, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity is active

12: Stop C, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity is active

13: Stop D, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity is active

14: Stop E, additionally, in the event of a drive bus failure, pulses are not disabled immediately if this safe velocity is active

Special cases:

This MD is only active when MD 36961 and MD 1361 have the value 5.

Related to:

MD 10089: $MN_SAFE_PULSE_DIS_TIME_BUSFAIL

MD 36961: $MA_SAFE_VELO_STOP_MODE

36964	SAFE_IPO_STOP_GROUP			A01, A05, -	FBSI	
-	Safety-integrated IPO-response grouping			BYTE	Reset	
-						
-	-	0	0	1	7/2	M

Description: This MD is only active with Safety Integrated axes and spindles.

It influences the channel-wide IPO response distribution of Safety Integrated:

0 = Default: All other axes/spindles in the channel are informed of the IPO stop response of this axis.

1 = For internal stops, the axes and machining spindles interpolating with the axis in question are also influenced via the triggered safety alarms.

Other axes/spindles in the channel, however, continue without disturbance. In the case of external stops (without an alarm) all other axes/spindles are not influenced by the safety axis/spindle stop. This allows, for example, the safe cancellation of the pulses of a spindle (using external Stop A) so that the spindle can be turned manually but still move the axes safely with monitoring.

If the other axes/spindles stop together with the safety axis/spindle in certain machining situations, the user must implement this at his own responsibility using the PLC or synchronous action operations.

36965	SAFE_PARK_ALARM_SUPPRESS			A01, -	FBSI	
-	Alarm suppression on parking axis			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description: This MD is only active for Safety Integrated axes/spindles.

0 = Default setting: Alarms 27000/A01797 are displayed when parking is selected.

1 = Alarms 27000/A01797 are not displayed when parking is selected. This is necessary for axes that are disconnected on the encoder side during the machining process (e.g. dressing axes). The alarms are displayed when parking is deselected again.

36966	SAFE_BRAKETEST_TORQUE			A05, A10, -	FBSI	
%	Holding torque for brake test			DOUBLE	PowerOn	
CTEQ						
-	-	5.0	0.0	800.0	7/2	M

Description: Specification of the torque and force for the functional test of the brake mechanism.

This torque and force must be able to be exerted on the applied brake during the test without the axis starting to move.

SINAMICS: The percentage value entered here is related to drive parameter p2003 of the axis.

The following supplementary conditions apply to SINAMICS:

If the current torque is more than 85% of the test torque when the brake test is selected (that is with the brake off) the brake test is aborted with alarm 20095. This ensures that the motor can stop the axis even if the brake is defective.

If the brake test is made with the drive parameter p1532 (MD36968 $MA_SAFE_BRAKETEST_CONTROL bit0 = 0), the safety reserve required is increased by double the difference between the current holding torque and the value in parameter p1532.

Release of the correspnding test function via MD37000 $MA_FIXED_STOP_MODE bit 1.

36967	SAFE_BRAKETEST_POS_TOL			A05, A10, -	FBSI	
mm, degrees	Position tolerance for brake test			DOUBLE	PowerOn	
CTEQ						
-	-	1.0	-	-	7/2	M

Description: Maximum position tolerance for the functional test of the brake mechanics.

The functional test of the brake mechanics is aborted if the axis position deviates

by more than this tolerance from the position at selection of the brake test.

The corresponding test function is enabled by

MD37000 $MA_FIXED_STOP_MODE bit 1.

36968	SAFE_BRAKETEST_CONTROL			A05, A10, -	-	
-	Advanced settings for the brake test			DWORD	PowerOn	
CTEQ						
-	-	0	0	1	7/2	M

Description: Advanced settings for the brake test

Bit 0: Selection of the average value of the torque limit

= 0: SINAMICS: The drive parameter p1532 is used as the average value of the torque limit

= 1: The torque measured at the time of selection of the brake test is used as the average value of the torque limit

36969	SAFE_BRAKETEST_TORQUE_NORM			A05, A10, -	FBSI	
kgm²	Reference variable for brake test holding torque			DOUBLE	PowerOn	
CTEQ						
-	-	0.0	-	-	7/RO	S

Description: Setting of the reference variable for torques

All torques indicated as relative value refer to this reference variable.

This MD is an image of drive parameter p2003

36970	SAFE_SVSS_DISABLE_INPUT			A01, A05, -	FBSI	
-	Input assignment SBH/SG deselection			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: This data defines the NCK input for selecting/deselectng the functions SBH and SG.

Signal Meaning

= 0 SG or SBH is selected

= 1 SG and SBH are deselected

Structure:

Special cases:

- Entry of 0 means there is no existing assignment, the input remains fixed at 0, SG and SBH cannot be deselected.
- Entry of 80 00 00 00 means there is no existing assignment, the input remains fixed at 1.
- If a single output signal is placed on a terminal, the signal is processed inverted if MD bit 31 is set.
- If several output signals are placed on the same terminal, the signal concerned is initially inverted if MD bit 31 is set.

If MD bit 31 is set, the signal concerned is initially inverted.
The (if applicable inverted) output signals are then AND-ed.
The result is output on the terminal.

Related to:

MD 10366: $MN_HW_ASSIGN_DIG_FASTIN

MD 13010: $MN_DRIVE_LOGIC_NR

References: /FB/, A4, Digital and Analog NCK I/Os

36971	SAFE_SS_DISABLE_INPUT			A01, A05, -	FBSI	
-	Input assignment SBH deselection			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: Assignment of the NCK input for deselecting the function safe operational stop.

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

Assignment of the terminal level for the safe functions if either safe velocity or safe operational stop have been activated.

Signal Meaning

= 0 Safe operational stop is selected

= 1 Safe operational stop is deselected (only if other functions have not triggered a STOP C, D or E)

Special cases:

- The signal is processed inverted if MD bit 31 is set.
- This input is irrelevant if SG and SBH have been deselected (see $MA_SAFE_SVSS_DISABLE_INPUT).

Related to:

MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT

36972	SAFE_VELO_SELECT_INPUT			A01, A05, -	FBSI	
-	Input assignment SG selection			DWORD	PowerOn	
-						
-	2	0, 0	-	-	7/2	M

Description: This data defines the two inputs for selecting SG1, SG2, SG3 or SG4.

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

n = 1, 0 stand for bit 1, 0 for selecting SG1 to SG4

Assignment of the input bits to the safe velocities:

Bit 1	Bit 0	Selected SG
0	0	SG1
0	1	SG2
1	0	SG3
1	1	SG4

Special cases:

The signal is processed inverted if the MD bits 31 are set.

36973	SAFE_POS_SELECT_INPUT			A01, A05, -	FBSI	
-	Input assignment SE selection			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: This data defines the input for selecting safe limit positions 1 or 2.

Structure see: $MA_SAFE_SVSS_DISABLE_INPUT

Signal Meaning

= 0 SE1 is active

= 1 SE2 is active

Special cases:

The signal is processed inverted if MD bit 31 is set.

Related to:

MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT.

36974	SAFE_GEAR_SELECT_INPUT			A01, A05, -	FBSI	
-	Input assignment speed ratio selection			DWORD	PowerOn	
-						
-	3	0, 0, 0	-	-	7/2	M

Description: Assignment of the input terminals for selecting the gear ratio (gear stage).

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

n = 2, 1, 0 stand for bit 2, 1, 0 for selecting gear stages 1 to 8

Bit 2	Bit 1	Bit 0	Active gear stage
0	0	0	Stage 1
0	0	1	Stage 2
0	1	0	Stage 3
...	...	...	...
1	1	1	Stage 8

Special cases:

The signals are processed inverted if the MD bits 31 are set.

Related to:

MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT

36975	SAFE_STOP_REQUEST_INPUT			A01, A05, -	FBSI	
-	Input assignment test stop selection			DWORD	PowerOn	
-						
-	-	0	-	-	-1/2	M

Description: This data defines the input for selecting the test stop.

Structure see: $MA_SAFE_SVSS_DISABLE_INPUT

Signal Meaning

= 0 test stop is inactive

= 1 test stop is executed

Special cases:

The signal is processed inverted if MD bit 31 is set.

36976	SAFE_PULSE_STATUS_INPUT			A01, A05, -	FBSI	
-	Input assignment status pulses suppressed			DWORD	PowerOn	
-						
-	-	0	-	-	-1/2	M

Description: This data defines the input for reading back the disabling of pulses.

Structure see: $MA_SAFE_SVSS_DISABLE_INPUT

Signal Meaning

= 0 Pulses are enabled

= 1 Pulses are disabled

Special cases:

- The signal is processed inverted if MD bit 31 is set.
- This MD need not be parameterized. With the default value 0, the status of the disabling of pulses is determined internally. The old use of this MD with the wiring of the terminals AS1/AS2 is still permissible.

36977	SAFE_EXT_STOP_INPUT			A01, A05, -	FBSI	
-	Input assignment for external stop request			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description: This data defines the NCK inputs for selecting/deselecting the external brake requests.

n = 0, 1, 2, 3 stand for the various braking modes

n = 0: Assignment for "Deselect external stop A" (SH, disabling of pulses)

n = 1: Assignment for "Deselect external stop C" (braking at the current limit)

n = 2: Assignment for "Deselect external stop D" (path braking)

n = 3: Assignment for "Deselect external stop E" (ESR + path braking)

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

Special cases:

The signals are processed inverted if the MD bits 31 are set. The signal "Deselect external stop A" cannot be parameterized inverted. A parameter error is reported if there is an error.

36978	SAFE_OVR_INPUT			A01, A05, -	FBSI	
-	Input assignment for SG override			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description: Assignment of the NCK inputs for the override of the limit values of safe velocities 2 and 4.

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

n = 3, 2, 1, 0 stand for the override selection bits 3, 2, 1, 0

Assignment of the input bits to the SG override values:

Bit 3	Bit 2	Bit 1	Bit 0	
0	0	0	0	Override 0 is selected
0	0	0	1	Override 1 is selected
to ...				
1	1	1	1	Override 15 is selected

The following machine data defines the override factor itself (percentage value):

MD 36932: $MA_SAFE_VELO_OVR_FACTOR[n]

Special cases:

- The function "Override safe velocity" is enabled by MD 36901 $MA_SAFE_FUNCTION_ENABLE.
- The signals are processed inverted if the MD bits 31 are set.

Related to:

MD 36932: $MA_SAFE_VELO_OVR_FACTOR[n]

36979	SAFE_STOP_REQUEST_EXT_INPUT			A01, A05, -	FBSI	
-	Input assignment for test of external shutdown			DWORD	PowerOn	
-						
-	-	0	-	-	-1/2	M

Description: Assignment of the input terminal for selecting the test of the external switch off.

This MD must be parameterized as soon as the internal pulse suppression is used (bit 30 in $MA_SAFE_PULSE_ENABLE_OUTPUT=1)

Structure: see coding of input assignment

With each such machine data, a single input/output bit is assigned to a terminal or a system variable. Otherwise the structure corresponds to machine data 36970 ff..

36980	SAFE_SVSS_STATUS_OUTPUT			A01, A05, -	FBSI	
-	Output assignment SBH/SG active			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: Assignment of the output for reporting the status of the functions safe velocity and safe operational stop.

Signal Meaning

= 0 SG and SBH are not active

= 1 SG or SBH is active

Special cases:

- Entry of 0 means
  there is no existing assignment, the output is not affected.
- Entry of 80 00 00 00 means there is no existing assignment, the output remains fixed at 1.
- If a single output signal is placed on a terminal, the
  the signal is processed inverted if MD bit 31 is set.
- If several output signals are placed on the same terminal, then
  the signal concerned is initially inverted if MD bit 31 is set.
  The (if applicable inverted) output signals are then AND-ed.
  The result is output on the terminal.

Related to:

MD 10368: $MN_HW_ASSIGN_DIG_FASTOUT

MD 13010: $MN_DRIVE_LOGIC_NR

References: /FB/, A4, Digital and Analog NCK I/Os

36981	SAFE_SS_STATUS_OUTPUT			A01, A05, -	FBSI	
-	Output assignment SBH active			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: This data defines the output or the system variable for the message "SBH active".

Structure see: $MA_SAFE_EXT_STOP_INPUT

Signal Meaning

= 0 SBH is inactive

= 1 SBH is active

Special cases:

The signal is processed inverted if MD bit 31 is set.

36982	SAFE_VELO_STATUS_OUTPUT			A01, A05, -	FBSI	
-	Output assignment for active SG selection			DWORD	PowerOn	
-						
-	2	0, 0	-	-	7/2	M

Description: This data defines the outputs or the system variables for the messages "SBH active bit 0" and "SBH active bit 1".

Structure see: $MA_SAFE_EXT_STOP_INPUT

n = 1, 0 stand for SG active bits 1, 0

SG active

Bit 1 Bit 0 Meaning:

= 0 = 0 SG1 active if SBH/SG are active and SBH is not active

SBH active if SBH/SG are active and SBH is active

= 1 = 0 SG2 active

= 0 = 1 SG3 active

= 1 = 1 SG4 active

Special cases:

The signal is processed inverted if MD bit 31 is set.

36984	SAFE_EXT_PULSE_ENAB_OUTPUT			A01, A05, -	FBSI	
-	Output assignment enable for pulses external			DWORD	PowerOn	
-						
-	-	0	-	-	-1/2	M

Description: Assignment of the output terminal for the request "Enable pulses externally".

This MD must be parameterized as soon as the internal pulse suppression is used (bit 30 in $MA_SAFE_PULSE_ENABLE_OUTPUT=1).

Structure: see coding of input assignment.

With each such machine data, a single input/output bit is assigned to a terminal or a system variable. Otherwise the structure corresponds to machine data 36970 ff..

36985	SAFE_VELO_X_STATUS_OUTPUT			A01, A05, -	FBSI	
-	Output assignment n < n_x			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: This data defines the output or the system variable for the message "n < nx".

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Signal Meaning

= 0 Actual speed is greater than the limit speed in $MA_SAFE_VELO_X

= 1 Actual speed is less than or equal to the limit speed in $MA_SAFE_VELO_X

Related to: $MA_SAFE_VELO_X

Special cases:

The signal is processed inverted if MD bit 31 is set.

36986	SAFE_PULSE_ENABLE_OUTPUT			A01, A05, -	FBSI	
-	Output assignment enable pulses			DWORD	PowerOn	
-						
-	-	0	-	-	-1/2	M

Description: This data defines the output for the request "Enable pulses".

Structure: See $MA_SAFE_SVSS_STATUS_OUTPUT

Signal Meaning

= 0 Request to disable pulses

= 1 Request to enable pulses

Special cases:

- The signal is processed inverted if MD bit 31 is set.
- Bit 30 is given the following special meaning:

  If bit 30 is set to 1, the pulse are switched internally via the drive bus (only permissible with SIMODRIVE611 digital performance module). In this case, the MDs for external pulse enable must be parameterized as an additional safeguard if the internal pulse disable fails ($MA_SAFE_EXT_PULSE_ENAB_OUTPUT and $MA_SAFE_STOP_REQUEST_EXT_INPUT)

Possible combinations for the most significant bits (30, 31) in this MD:

Bit 31 Bit 30 MD value Meaning

0 0 0xxxxxxxH The SGA "Enable Pulses" is output to the parameterized interface (SPL or I/Os).

0 1 4xxxxxxxH The pulses are disabled internally via the drive bus. The SGA "Enable Pulses" contains the same information and is output inverted to the parameterized interface (SPL or I/O).

1 0 8xxxxxxxH The SGA "Enable Pulses" is output inverted to the parameterized interface.

1 1 CxxxxxxxH The pulses are disabled internally via the drive bus. The SGA "Enable Pulses" contains the same information and is output inverted to the parameterized interface.

36987	SAFE_REFP_STATUS_OUTPUT			A01, A05, -	FBSI	
-	Output assignment axis safely referenced			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: This data defines the output for the message "Axis safely referenced".

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Signal Meaning

= 0 Axis is not safely referenced (that is the safe limit monitoring is inactive!)

= 1 Axis is safely referenced

Special cases:

The signal is processed inverted if MD bit 31 is set.

36988	SAFE_CAM_PLUS_OUTPUT			A01, A05, -	FBSI	
-	Output assignment SN1 + to SN4 +			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description: This data defines the outputs for the cam signals SN1 + to SN4 +.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the assignments for plus cams SN1 +, SN2 +, SN3 +, SN4 +

Signal Meaning

= 0 Axis is left of the cam (actual value < cam position)

= 1 Axis is right of the cam (actual value > cam position)

Special cases:

The signal is processed inverted if MD bit 31 is set.

36989	SAFE_CAM_MINUS_OUTPUT			A01, A05, -	FBSI	
-	Output assignment SN1 - to SN4 -			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description: This data defines the outputs for the minus cams SN1 - to SN4 -.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the assignments for minus cams SN1 -, SN2 -, SN3 -, SN4 -

Signal Meaning

= 0 Axis is left of the cam (actual value < cam position)

= 1 Axis is right of the cam (actual value > cam position)

Special cases:

- If a cam is negated and placed with another cam on an output, it is AND-ed and a single cam signal is generated for range recognition.

36990	SAFE_ACT_STOP_OUTPUT			A01, A05, -	FBSI	
-	Output assignment of active stop			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description: Assignment of the output terminals for displaying the currently active stop.

Index 0: Assignment for "Stop A/B active"

Index 1: Assignment for "Stop C active"

Index 2: Assignment for "Stop D active"

Index 3: Assignment for "Stop E active"

36992	SAFE_CROSSCHECK_CYCLE			A01, A05, A08, -	FBSI	
s	Display of axial cross-check cycle			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/RO	S

Description: Display data for safety functions: Effective axial cross-check cycle in seconds.

The cycle derives from INFO_SAFETY_CYCLE_TIME and the number of data to be cross-checked.

The axial value displayed depends on the associated drive module as the length of cross-check lists varies between performance-1/ standard-2 and performance-2 modules.

36993	SAFE_CONFIG_CHANGE_DATE			EXP, A07, A05, -	FBSI	
-	Date/time of last change of SI axis MD			STRING	PowerOn	
-						
-	7	, , , , , ,	-	-	7/RO	S

Description: Display data for safety functions:

Date and time of the last configuration change to safety related NCK axis machine data.

Changes to the machine data included in the calculation of axial checksums SAFE_ACT_CHECKSUM are recorded.

36994	SAFE_PREV_CONFIG			EXP, A07, A05, -	FBSI	
-	Data of previous safety axis configuration			DWORD	PowerOn	
-						
-	9	0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	0/RO	S

Description: Intermediate buffer for storing previous safety configuration data

Index [0]: Status flag for change history

Index [1]: Previous value of function enable

Index [2]: Previous value of set checksum SAFE_DES_CHECKSUM[0]

Index [3]: Last value of function enable before standard data were loaded

Index [4]: Last value of set checksum SAFE_DES_CHECKSUM[0] before standard data were loaded.

Index [5]: Previous value of set checksum SAFE_DES_CHECKSUM[1]

Index [6]: Last value of set checksum SAFE_DES_CHECKSUM[1] before standard data were loaded

Index [7]: Previous value of set checksum SAFE_DES_CHECKSUM[2]

Index [8]: Last value of set checksum SAFE_DES_CHECKSUM[2] before standard data were loaded

36995	SAFE_STANDSTILL_POS			A07, A05, -	FBSI	
-	Standstill position			DWORD	PowerOn	
-						
-	-	0	-	-	0/0	S

Description: This MD displays the current standstill position.

In order to be able to test the referencing of the axis for plausibility at the next control Power ON, the current position of the axis is stored in non-volatile memory in the following cases:

- On selection of safe operational stop (SBH)
- Cyclically, if SE/SN are activated

Special cases:

If the MD is changed manually, this will be detected at the next Power ON and plausibility test. Another user agreement is required after referencing.

36997	SAFE_ACKN			A07, A05, -	FBSI	
-	User acknowledge			DWORD	PowerOn	
-						
-	-	0	-	-	7/2	M

Description: This data displays the status of the user agreement.

The user agreement can be given or withdrawn by the user by means of a corresponding screen.

If the software detects internally that the reference to the machine has been lost, then it is "automatically" withdrawn (e.g. on changing gear or if the plausibility comparison with the stored standstill position fails during referencing).

Special cases:

If the MD is changed manually, then this will be detected at the next Power ON and plausibility test. Another user agreement is required after referencing.

36998	SAFE_ACT_CHECKSUM			EXP, A07, A05, -	FBSI	
-	Actual checksum			DWORD	PowerOn	
-						
-	3	0, 0, 0	-	-	7/RO	S

Description: The actual checksum calculated after POWER ON or on RESET is entered here over the current values of the safety relevant machine data.

Assignment of the field indices:

Index 0: Axial monitoring functions

Index 1: Hardware component recognition

Index 2: Drive assignment

36999	SAFE_DES_CHECKSUM			EXP, A07, A05, -	FBSI	
-	Desired (expected) checksum			DWORD	PowerOn	
-						
-	3	0, 0, 0	-	-	7/1	M

Description: In this data, the set checksum stored at the last machine acceptance appears above the current values of the safety relevant machine data.

Assignment of the field indices:

Index 0: Axial monitoring functions

Index 1: Hardware component recognition

Index 2: MDs for drive assignment

1.5.8 Travel to fixed stop

37000	FIXED_STOP_MODE			A10, -	-	
-	Travel to fixed stop mode			BYTE	PowerOn	
CTEQ						
-	-	0x0	0x0	0x3	7/2	M

Description: Activation of subfunctions of "Travel to fixed stop".

Bit 0: Enable for travel to fixed stop

= 0: Travel to fixed stop not available

= 1: Travel to fixed stop can be started only from the NC program with the command FXS[x]=1.

Bit 1: Enable for safe brake test

= 0: Safe brake test not available

= 1: Safe brake test can be executed under the control of the PLC

Note: If both functions are enabled, the user must ensure that travel to fixed stop and safe brake test are not assigned simultaneously.

37002	FIXED_STOP_CONTROL			A10	F1	
-	Sequence control for travel to fixed stop			BYTE	PowerOn	
-						
-	-	0x0	0x0	0x3	7/2	M

Description: Sequence control for travel to fixed stop.

Bit 0: behavior on pulse disable at fixed stop

= 0: travel to fixed stop is canceled

= 1: travel to fixed stop is interrupted, i.e. the drive is without power.

As soon as the pulse disable is canceled again, the drive continues with the limited torque.

Control of the torque injection see bit 1.

Bit 1: behavior after pulse disable at the fixed stop

= 0: the torque is applied in steps.

= 1: the torque is applied in ramps (see MD37012 $MA_FIXED_STOP_TORQUE_RAMP_TIME)

37010	FIXED_STOP_TORQUE_DEF			A10	-	
%	Default fixed stop clamping torque			DOUBLE	PowerOn	
CTEQ						
-	-	5.0	0.0	100.0	7/2	M

Description: The clamping torque is set in this machine data as a % of the maximum motor torque (in the case of FDD this corresponds to the % of the max. current setpoint).

The clamping torque becomes active as soon as the fixed stop is reached or the NC/PLC interface signal DB31, ... DBX1.1 (Acknowledge fixed stop reached) has been set.

The entered value is a default and is active only as long as

- no clamping torque has been programmed with command FXST[x]
- the clamping torque set in SD 43510: FIXED_STOP_TORQUE was not changed after fixed stop had been reached.

In the case of "Travel to fixed stop" with an analog drive (611-A) and fixed clamping torque, the torque limit set in the drive should be the same as the limit entered in MD37070 $MA_FIXED_STOP_ANA_TORQUE.

Related to:

MD37070 $MA_FIXED_STOP_ANA_TORQUE
(torque limit on approach to fixed stop for analog drives)
SD 43510: FIXED_STOP_TORQUE
(clamping torque for travel to fixed stop)

37012	FIXED_STOP_TORQUE_RAMP_TIME			A10	-	
s	Time period until reaching the changed torque limit			DOUBLE	NEW CONF	
-						
-	-	0.0	-	-	7/2	M

Description: Period in seconds until the changed torque limit is reached.

The value 0.0 deactivates the ramp function.

37014	FIXED_STOP_TORQUE_FACTOR			A10	TE3	
-	Adaption factor torque limit			DOUBLE	NEW CONF	
-						
-	-	1.0	-	-	7/2	M

Description: Interface factor torque limit.

With this factor, the torque limit of linked slave axes (MD 37250) can be weighted additionally.

Even with different motors, the torque limits can be kept equal in all linked axes.

37020	FIXED_STOP_WINDOW_DEF			A05, A10	-	
mm, degrees	Default fixed-stop monitoring window			DOUBLE	PowerOn	
CTEQ						
-	-	1.0	0.0	1.0e15	7/2	M

Description: This machine data is used to enter the default for the standstill monitoring window at fixed stop.

Fixed stop monitoring becomes active as soon as the fixed stop is reached, i.e. NC/PLC interface signal DB31, ... DBX62.5 (Fixed stop reached) is set.

If the position at which the fixed stop is detected is left by more than the tolerance specified in MD37020 $MA_FIXED_STOP_WINDOW_DEF alarm 20093 "Fixed stop monitoring has responded" is output and the "FXS" function is deselected.

The value entered is a default setting and is active only as long as

- no fixed stop monitoring window is programmed with command FXSW[x],
- the fixed stop monitoring window is not changed via SD 43520: FIXED_STOP_WINDOW (after reaching of fixed stop).

Related to:

SD43520 $SA_FIXED_STOP_WINDOW (fixed stop monitoring window)

37030	FIXED_STOP_THRESHOLD			A10, -	-	
mm, degrees	Threshold for fixed stop detection			DOUBLE	NEW CONF	
-						
-	-	2.0	0.0	1.0e15	7/2	M

Description: Threshold value for fixed stop detection.

The contour deviation is checked for this threshold as a criterion for reaching the fixed stop. Waiting until the set torque limit is reached is a further condition for digital drives.

This machine data is only active if MD37040 $MA_FIXED_STOP_BY_SENSOR = 0.

The NC/PLC interface signal DB31, ... DBX62.5 (Fixed stop reached) is set if the axial contour deviation exceeds the threshold value set in MD37030 $MA_FIXED_STOP_THRESHOLD.

MD irrelevant to:

MD37040 $MA_FIXED_STOP_BY_SENSOR = 1

Related to:

NC/PLC interface signal DB31, ... DBX62.5 (Fixed stop reached)

37040	FIXED_STOP_BY_SENSOR			A10	-	
-	Fixed stop detection by sensor			BYTE	Immediately	
CTEQ						
-	-	0	0	3	7/2	M

Description: This machine data defines how the criterion "Fixed stop reached" is determined.

A change of this machine data becomes active with the next selection of travel to fixed stop.

MD=0

The criterion "Fixed stop reached" is determined internally on the basis of the axial FIXED_STOP_THRESHOLD.

MD=1

The criterion "Fixed stop reached" is determined via an external sensor and signalled to the NC via the NC/PLC interface signal DB31, ... DBX1.2 (Sensor fixed stop).

MD=2

The criterion "Fixed stop reached" is accepted if either the contour monitoring (MD = 0) or the signal of the external sensor (MD = 1) has responded.

MD=3

Triggering through movement analysis (only as an alternative to triggering via sensor)

Related to:

MD37030 $MA_FIXED_STOP_THRESHOLD

(threshold for fixed stop detection)

NC/PLC interface signal DB31, ... DBX1.2 (Sensor fixed stop)

37050	FIXED_STOP_ALARM_MASK			A05, A10	-	
-	Enable of the fixed stop alarms			BYTE	NEW CONF	
-						
-	-	1	0	15	7/2	M

Description: This machine data defines whether the alarms

20091 "Fixed stop not reached",

20094 "Fixed stop aborted" and

25042 "FOC: Standstill monitoring" are output.

MD= 0

Suppression of alarm 20091 "Fixed stop not reached"

MD= 2

Suppression of alarms

20091 "Fixed stop not reached" and

20094 "Fixed stop aborted" (SW 4 and higher)

MD=3

Suppression of alarm 20094 "Fixed stop aborted" (SW 4 and higher)

Add value 8

Suppression of alarm 25042 "FOC: Standstill monitoring" (SW 7 and higher)

Errors occurring during travel to fixed stop can be read out from the status variable $AA_FXS irrespective of the setting of the alarm screen.

Standard: 1 = Alarms 20091, 20094 and 25042 are triggered

37052	FIXED_STOP_ALARM_REACTION			A05, A10	-	
-	Reaction with fixed stop alarms			BYTE	PowerOn	
-						
-	-	0	-	-	7/1	M

Description: Behavior of VDI signal "Mode group ready" in case of fixed stop alarms:

Bit value = 0: "Mode group ready" will be deleted (drives de-energized)

Bit value = 1: "Mode group ready" remains active

Bit0: Alarm 20090 Travel to fixed stop not possible

Bit1: Alarm 20091 Fixed stop not reached

Bit2: Alarm 20092 Travel to fixed stop still active

Bit3: Alarm 20093 Standstill monitoring at fixed stop has triggered

Bit4: Alarm 20094 Travel to fixed stop aborted

All other bits without meaning.

Standard: 0 = All alarms de-energize the drives

37060	FIXED_STOP_ACKN_MASK			A10	-	
-	Waiting for PLC acknowledgements during travel to fixed stop			BYTE	PowerOn	
CTEQ						
-	-	0x0	0x0	0x3	7/2	M

Description: This machine data defines whether or not the NC waits for acknowledgment messages from the PLC when the "Travel to fixed stop" function is active.

Bit 0 = 0

Once the NC has transmitted the interface signal DB31, ... DBX62.4 (Activate travel to fixed stop) to the PLC, it starts the programmed traversing.

Bit 0 = 1

After the NC has transmitted the interface signal DB31, ... DBX62.4 (Activate travel to fixed stop) to the PLC, it waits for the PLC to acknowledge with the interface signal DB31, ... DBX3.1 (Enable travel to fixed stop) and then starts the programmed traversing.

Bit 0 = 1 should be set for analog drives so that the motion is not started before the PLC has limited the torque in the drive.

Bit 1 = 0

Once the NC has transmitted the interface signal DB31, ... DBX62.5 (Fixed stop reached) to the PLC, the program advances to the next block.

Bit 1 = 1

After the NC has transmitted the interface signal DB31, ... DBX62.5 (Fixed stop reached) to the PLC, it waits for the PLC to acknowledge with the interface signal DB31, ... DBX1.1 (Acknowledge fixed stop reached), outputs the programmed torque and then advances to the next block.

Bit 1 should be set for analog drives so that the PLC can switch the drive to torque-controlled operation if a programmable clamping torque has to be specified.

With digital drives (PROFIdrive), the "Travel to fixed stop" function can be executed without any acknowledgments, thus allowing program run times to be reduced.

Related to:

NC/PLC interface signal DB31, ... DBX62.4 (Activate travel to fixed stop)

NC/PLC interface signal DB31, ... DBX3.1 (Enable travel to fixed stop)

NC/PLC interface signal DB31, ... DBX62.5 (Fixed stop reached)

NC/PLC interface signal DB31, ... DBX1.1 (Acknowledge fixed stop reached)

37070	FIXED_STOP_ANA_TORQUE			A10	-	
%	Torque limit when approaching the fixed stop for analog drives			DOUBLE	PowerOn	
CTEQ						
-	-	5.0	0.0	100.0	7/2	M

Description: Only for analog drives (not relevant for PROFIdrive digital drives):

This machine data defines an internal NC torque limit for analog drives. It is specified as a percentage of the maximum drive torque (corresponds to % of max. current setpoint with FDD).

This torque limit is active in the NC from the start of the motion (acceleration torque) until the instant the fixed stop is reached.

The torque limit must have the same effect as the torque limit set in the drive.

This torque limit is required to ensure that:

- There are no step changes in torque during switchover from speed-controlled to current-controlled or torque-controlled operation
- The acceleration is reduced to the correct value in the NC

37080	FOC_ACTIVATION_MODE			A10	-	
-	Initial setting of modal torque/force limitation			BYTE	PowerOn	
-						
-	-	0x0	0x0	0x3	7/2	M

Description: The initial setting of the modal torque/force limitation is set with this MD after reset and PowerOn:

Bit 0: Response after PowerON

= 0 : FOCOF

= 1 : FOCON (modal)

Bit 1: Response after reset

= 0 : FOCOF

= 1 : FOCON (modal)

Default setting: FOCOF after reset and PowerOn

37100	GANTRY_AXIS_TYPE			A01, A10	G1,TE1,Z3	
-	Gantry axis definition			BYTE	PowerOn	
CTEQ						
-	-	0	0	33	7/2	M

Description:

```
General: decimal representation, with a b
a
   0: Leading axis
   1: Synchronized axis
b
   0: No gantry axis
   1: Axis in gantry grouping 1
   2: Axis in gantry grouping 2
   3: Axis in gantry grouping 3
   ...
   A max. of 8 gantry groupings is possible.
Examples:
   11: Axis is a synchronized axis in a gantry grouping 1
   2:  Axis is a leading axis in gantry a grouping 2
   12: Axis is a synchronized axis in a gantry grouping 2
   3: Axis is a leading axis in a gantry grouping 3
   13:Axis is a synchronized axis in a gantry grouping 3
Special cases:
   Alarm 10650 "Incorrect gantry machine data" and 10651 "Gantry
   unit not defined" in the case of an incorrect gantry axis defi-
   nition.
Related to:
   MD37110 $MA_GANTRY_POS_TOL_WARNING (gantry warning limit)
   MD37120 $MA_GANTRY_POS_TOL_ERROR (gantry trip limit)
   MD37130 $MA_GANTRY_POS_TOL_REF (gantry trip limit during refer-
   encing)
```

37110	GANTRY_POS_TOL_WARNING			A05, A10	G1,Z3	
mm, degrees	Gantry warning limit			DOUBLE	Reset	
-						
-	-	0.0	-1e15	1e15	7/2	M

Description: Value > 0

With gantry axes, the difference between the position actual values of the leading and synchronized axes is constantly monitored.

MD37110 $MA_GANTRY_POS_TOL_WARNING is used to define a limit value for the position actual value difference; when the limit is exceeded, warning 10652 "Warning limit exceeded" is output. However, the gantry axes are not stopped internally in the control. The warning threshold must therefore be selected so that the machine can withstand the position actual value deviation between the gantry axes without sustaining mechanical damage.

Furthermore, the NC/PLC interface signal DB31, ... DBX101.3 (Gantry warning limit exceeded) to the PLC is set to "1". The PLC user program can thus initiate the necessary measures (e.g. program interruption at block end) when the warning limit is exceeded.

As soon as the current position actual value difference has dropped below the warning limit again, the message is canceled and the interface signal "Gantry warning limit exceeded" is reset.

Effect of the gantry warning limit on the gantry synchronization process:

The position actual value difference between the leading and synchronized axes is determined during gantry synchronization. If the deviation is less than the gantry warning limit, the synchronizing motion of the gantry axes is automatically started internally in the control.

Otherwise the synchronizing motion has to be initiated via the PLC interface (interface signal DB31, ... DBX29.4 (Start gantry synchronization process))

Value = 0

The setting MD37110 $MA_GANTRY_POS_TOL_WARNING = 0 deactivates the monitoring for violation of the warning limit.

The gantry synchronization is not initiated internally in the control.

Special cases:

Alarm 10652 "Warning limit exceeded" in response to violation of the gantry warning limit.

Related to:

MD37100 $MA_GANTRY_AXIS_TYPE Gantry axis definition

MD37120 $MA_GANTRY_POS_TOL_ERROR Gantry trip limit

MD37130 $MA_GANTRY_POS_TOL_REF

Gantry trip limit during referencing

NC/PLC interface signal DB31, ... DBX101.3 (Gantry warning limit exceeded)

NC/PLC interface signal DB31, ... DBX29.4 (Start gantry synchronization process)

37120	GANTRY_POS_TOL_ERROR			A05, A10	G1,Z3	
mm, degrees	Gantry trip limit			DOUBLE	PowerOn	
-						
-	-	0.0	-1e15	1e15	7/2	M

Description: With gantry axes, the difference between the position actual values of the leading and synchronized axes is continuously monitored. MD37120 $MA_GANTRY_POS_TOL_ERROR defines the maximum permissible deviation in position actual value between the synchronized axis and the leading axis in the gantry axis grouping. Violation of this limit value is monitored only if the gantry axis grouping is already synchronized (NC/PLC interface signal DB31, ... DBX101.5 (Gantry grouping is synchronized) = 1); otherwise the value set in MD37130 $MA_GANTRY_POS_TOL_REF is used.

When this limit value is exceeded, alarm 10653 "Error limit exceeded" is output. The gantry axes are immediately stopped internally in the control to prevent any damage to the machine.

In addition, the NC/PLC interface signal DB31, ... DBX101.2 (Gantry trip limit exceeded) to the PLC is set to "1".

Special cases:

Alarm 10653 "Error limit exceeded" in response to violation of the gantry trip limit.

Related to:

MD37100 $MA_GANTRY_AXIS_TYPE Gantry axis definition

MD37110 $MA_GANTRY_POS_TOL_WARNING Gantry warning limit

MD37130 $MA_GANTRY_POS_TOL_REF

Gantry trip limit during referencing

NC/PLC interface signal DB31, ... DBX101.5 (Gantry grouping is synchronized)

NC/PLC interface signal DB31, ... DBX101.2 (Gantry trip limit exceeded)

37130	GANTRY_POS_TOL_REF			A05, A10	G1,Z3	
mm, degrees	Gantry trip limit during referencing			DOUBLE	PowerOn	
-						
-	-	0.0	-1e15	1e15	7/2	M

Description: With gantry axes, the difference between the position actual values of the leading and synchronized axes is continuously monitored. MD37130 $MA_GANTRY_POS_TOL_REF defines the maximum permissible difference between the position actual values of the synchronized axis and the leading axis that is monitored if the gantry axis grouping has not yet been synchronized (NC/PLC interface signal DB31, ... DBX101.5 (Gantry grouping is synchronized) = 0).

Alarm 10653 "Error limit exceeded" is output if the limit value is exceeded. The gantry axes are immediately stopped internally in the control to prevent any damage to the machine.

In addition, the NC/PLC interface signal DB31, ... DBX101.2 (Gantry trip limit exceeded) to the PLC is set to "1".

Special cases:

Alarm 10653 "Error limit exceeded" in response to violation of the gantry trip limit.

Related to:

MD37100 $MA_GANTRY_AXIS_TYPE Gantry axis definition

MD37110 $MA_GANTRY_POS_TOL_WARNING Gantry warning limit

MD37120 $MA_GANTRY_POS_TOL_ERROR Gantry trip limit

NC/PLC interface signal DB31, ... DBX101.5 (Gantry grouping is synchronized)

NC/PLC interface signal DB31, ... DBX101.2 (Gantry trip limit exceeded)

37135	GANTRY_ACT_POS_TOL_ERROR			A05, A10	-	
mm, degrees	Current gantry trip limit			DOUBLE	Reset	
-						
-	-	0.0	-	-	7/2	M

Description: Actual value difference between master axis and slave axis in the case of alarm 10653.

Leads to alarm 10657 after Power ON.

37140	GANTRY_BREAK_UP			EXP, A01, A10	G1,Z3	
-	Invalidate gantry axis grouping			BOOLEAN	Reset	
CTEQ						
-	-	FALSE	-	-	7/2	M

Description: GANTRY_BREAK_UP = "0"

The forced coupling of the gantry axis grouping remains valid! Monitoring of violation of the gantry warning or trip limit is active!

GANTRY_BREAK_UP = "1"

This breaks up the forced coupling of the gantry grouping, thus allowing all gantry axes in this grouping to be traversed individually in JOG, AUTOMATIC, and MDI modes. Monitoring for violation of the gantry warning or trip limit is deactivated! The NC/PLC interface signal DB31, ... DBX101.5 "gantry grouping is synchronized" is set to "0".

Notice:

In cases where the gantry axes continue to be mechanically coupled, the machine may sustain damage in this operating state when the leading or synchronized axis is traversed!

The gantry axes cannot be referenced individually.

Corresponds with:

MD 37100: $MA_GANTRY_AXIS_TYPE Gantry axis definition

MD 37110: $MA_GANTRY_POS_TOL_WARNING Gantry warning limit

MD 37130: $MA_GANTRY_POS_TOL_REF
Gantry trip limit during referencing

NC/PLC interface signal DB31, ... DBX101.5 (gantry grouping is synchronized)

NC/PLC interface signal DB31, ... DBX101.2 (gantry trip limit exceeded)

37150	GANTRY_FUNCTION_MASK			A10	-	
-	Gantry functions			DWORD	Reset	
-						
-	-	0x00	0	0x7	7/2	M

Description: Special gantry functions are set with this MD.

The MD is bit-coded, the following bits are assigned:

Bit 0 == 0:

Extended monitoring of the actual value difference is inactive.

An offset between master and slave axes occurring in tracking or BREAK_UP is not taken into account in the monitoring of the actual value difference.

Alarm 10657 is not output if alarm 10563 occurs before Power OFF.

Bit 0 = 1:

Extended monitoring of the actual value difference is active.

An offset between master and slave axes occurring in tracking or BREAK_UP is taken into account in the monitoring of the actual value difference.

Prerequisite: The gantry grouping must be rereferenced or resynchronized after control startup.

Alarm 10657 is output if alarm 10563 occurs before Power OFF.

Bit 1 = 0:

Zero mark search direction of the slave axis analogous to MD 34010

Bit 1 = 1:

Zero mark search direction of the slave axis same as for master axis

Bit 2 = 0 :

Alarm 10655 "Synchronization in progress" is output

Bit 2 = 1

Alarm 10655 "Synchronization in progress" is not output

37160	LEAD_FUNCTION_MASK			A10	M3	
-	Functions for master value coupling			DWORD	NEW CONF	
CTEQ						
-	-	0x01	0	0x3	1/1	M

Description: With this MD, special functions of master value coupling are set.

The MD is bit-coded, the following bits are assigned:

Bit 0 = 0:

Dead time compensation is not active at actual value coupling.

Bit 0 = 1:

Dead time compensation is active at actual value coupling.

During actual value coupling, a systematic position offset is created between master and following axis. It is caused by the IPO/position controller dead time between the actual values of master axis and following axis.

For SW 6.4 and higher, this position offset can be compensated by a linear extrapolation of the master value.

Possible velocity fluctuations in the master axis may have an increased impact on the following axis.

The bit must be set for the relevant master axis.

Bit 1 = 0:

The spindle/axis disable of the axis will not become effective with the master value coupling active.

The spindle/axis disable of the master axis becomes effective.

Bit 1 = 1:

The spindle/axis disable is effective for this axis even with the master value coupling active.

The bit must be set for the relevant following axis.

37200	COUPLE_POS_TOL_COARSE			A05, A10	M3,S3,2.4,6.2	
mm, degrees	Threshold value for 'Synchronism coarse'			DOUBLE	NEW CONF	
-						
-	-	1.0	0.0	1.0e15	7/2	M

Description: In synchronous mode, the positional difference between the leading and following axis(axes)/spindle(s) is monitored (only DV and AV mode or cmdpos and actpos in the case of CP programming).

The NC/PLC interface signal DB31, ... DBX98.1 (synchronism coarse) is set if the current positional difference is within the tolerance band specified by the threshold value.

Furthermore, this threshold value can be used to define the criterion for block change on activation of synchronous mode or on modification of the speed ratio parameters when the coupling is active in cases where "synchronism coarse" is selected as the block change response condition (see channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF, WAITC, CPBC).

Entering a value of "0" always sets the NC/PLC interface signal DB31, ... DBX98.1 "synchronism coarse" to "1" in DV/AV mode or with cmd/actpos.

Corresponds with:

Channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1

(block change response in synchronous mode)

NC/PLC interface signal DB31, ... DBX98.1 (synchronism coarse)

37202	COUPLE_POS_TOL_COARSE_2			A05, A10	-	
mm, degrees	Second threshold value for 'synchronism monitoring coarse'			DOUBLE	NEW CONF	
-						
-	-	2.0	0.0	1.0e15	0/0	S

Description:

Generic coupling - second synchronism monitoring of the synchronism difference on the actual value side in the case of positional couplings - coarse threshold value.

Entering a value of "0" deactivates monitoring.

Entering a value other than "0" starts synchronism monitoring (2) once 'synchronism coarse' has been reached:

The VDI interface signal DB31.., DBX103.5 "synchronism 2 coarse" indicates whether the synchronism difference on the actual value side violates the threshold value.

If the threshold value is violated, this is indicated by show alarm 22026, which can be canceled.

Corresponds with:

MD37200 $MA_COUPLE_POS_TOL_COARSE

VDI interface signal DB31.., DBX98.1 'synchronism coarse'

37210	COUPLE_POS_TOL_FINE			A05, A10	M3,S3,2.4	
mm, degrees	Threshold value for 'Synchronism fine'			DOUBLE	NEW CONF	
-						
-	-	0.5	0.0	1.0e15	7/2	M

Description:

In synchronous mode, the positional difference between the leading and following axis(axes)/spindle(s) is monitored (only DV and AV mode or cmdpos and actpos in the case of CP programming).

The NC/PLC interface signal DB31, ... DBX98.0 (synchronism fine) is set if the current positional difference is within the tolerance band specified by the threshold value.

Furthermore, this threshold value can be used to define the criterion for block change on selection of synchronous mode or on modification of the speed ratio parameters when the coupling is active in cases where "synchronism fine" is selected as the block change response condition (see channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF, WAITC, CPBC).

Entering a value of "0" always sets the NC/PLC interface signal DB31, ... DBX98.0 (synchronism fine) to "1" in DV/AV mode or with cmd/actpos.

Corresponds with:

Channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1
(block change response in synchronous mode)

NC/PLC interface signal DB31, ... DBX98.0 (synchronism fine)

37212	COUPLE_POS_TOL_FINE_2			A05, A10	-	
mm, degrees	Second threshold value for 'synchronism monitoring fine'			DOUBLE	NEW CONF	
-						
-	-	1.0	0.0	1.0e15	0/0	S

Description: Generic coupling - second synchronism monitoring of the synchronism difference on the actual value side in the case of positional couplings - fine threshold value.

Entering a value of "0" deactivates monitoring.

Entering a value other than "0" starts synchronism monitoring (2) once 'synchronism fine' has been reached:

The VDI interface signal DB31.., DBX103.4 "synchronism 2 fine" indicates whether the synchronism difference on the actual value side violates the threshold value.

If the threshold value is violated, this is indicated by show alarm 22025, which can be canceled.

Corresponds with:

MD37210 $MA_COUPLE_POS_TOL_FINE

VDI interface signal DB31.., DBX98.0 'synchronism coarse'

37220	COUPLE_VELO_TOL_COARSE			A05, A10	S3	
mm/min, rev/min	Velocity tolerance 'coarse'			DOUBLE	NEW CONF	
-						
-	-	60.0	-	-	7/2	M

Description: In synchronous mode, the velocity difference between the leading and following axis(axes)/spindle(s) is monitored (only VV mode or cmdvel in the case of CP programming).

The NC/PLC interface signal DB31, ... DBX98.1 (synchronism coarse) is set if the current velocity difference is within the tolerance band specified by the threshold value.

Furthermore, this threshold value can be used to define the criterion for block change on activation of synchronous mode or on modification of the speed ratio parameters when the coupling is active in cases where "synchronism coarse" is selected as the block change response condition (see channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF, WAITC, CPBC).

Entering a value of "0" always sets the NC/PLC interface signal DB31, ... DBX98.1 (synchronism coarse) to "1" in VV mode or with cmdvel.

Corresponds with:

Channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1

(block change response in synchronous mode)

NC/PLC interface signal DB31, ... DBX98.1 (synchronism coarse)

37230	COUPLE_VELO_TOL_FINE			A05, A10	S3	
mm/min, rev/min	Velocity tolerance 'fine'			DOUBLE	NEW CONF	
-						
-	-	30.0	-	-	7/2	M

Description: In synchronous mode, the velocity difference between the leading and following axis(axes)/spindle(s) is monitored (only VV mode or cmdvel in the case of CP programming).

The NC/PLC interface signal DB31, ... DBX98.0 (synchronism fine) is set if the current velocity difference is within the tolerance band specified by the threshold value.

Furthermore, this threshold value can be used to define the criterion for block change on activation of synchronous mode or on modification of the speed ratio parameters when the coupling is active in cases where "synchronism fine" is selected as the block change response condition (see channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF, WAITC, CPBC).

Entering a value of "0" always sets the NC/PLC interface signal DB31, ... DBX98.0 (synchronism fine) to "1" in VV mode or with cmdvel.

Corresponds with:

Channel-specific MD21320 $MC_COUPLE_BLOCK_CHANGE_CTRL_1
(block change response in synchronous mode)
NC/PLC interface signal DB31, ... DBX98.0 (synchronism fine)

37240	COUP_SYNC_DELAY_TIME			A05, A10	-	
s	Delay time actual value synchronism			DOUBLE	NEW CONF	
-						
-	2	60, 30	-	-	7/2	M

Description: Synchronous spindle coupling: delay time - monitors the time taken to reach actual value synchronism after reaching setpoint synchronism.

$MA_COUP_SYNC_DELAY_TIME[0]: time to reach 'Synchronism fine'

$MA_COUP_SYNC_DELAY_TIME[1]: time to reach 'Synchronism coarse'

If the value "0" is entered, the relevant monitoring is inactive

Related to:

MD 37200 $MA_COUPLE_POS_TOL_COARSE
MD 37210 $MA_COUPLE_POS_TOL_FINE
MD 37220 $MA_COUPLE_VELO_TOL_COARSE
MD 37230 $MA_COUPLE_VELO_TOL_FINE

37250	MS_ASSIGN_MASTER_SPEED_CMD			A10	TE3	
-	Master axis number for speed setpoint coupling			DWORD	PowerOn	
-						
-	-	0	0	31	7/2	M

Description: A master/slave speed setpoint linkage is configured by indicating the machine axis number of the master axis belonging to this slave.

Related to:

MD37252 $MA_MS_ASSIGN_MASTER_TORQUE_CTR

37252	MS_ASSIGN_MASTER_TORQUE_CTR			A10	TE3	
-	Master axis number for torque control			DWORD	PowerOn	
-						
-	-	0	0	31	7/2	M

Description: Torque distribution between master and slave axes is configured by stating the machine axis number of the master axis belonging to the slave.

Homogenous torque distribution is achieved by using the torque compensatory controller.

In order to do this, the controller has to know the torque actual values of the drives involved (with PROFIdrive, the message frame used must include and transfer these values, e.g. use message frame 116)

With default setting = 0, the same master axis is used for torque control as for speed setpoint coupling MD37250 $MA_MS_ASSIGN_MASTER_SPEED_CMD.

Related to:

MD37250 $MA_MS_ASSIGN_MASTER_SPEED_CMD

MD37254 $MA_MS_TORQUE_CTRL_MODE

MD37256 $MA_MS_TORQUE_CTRL_P_GAIN

MD37258 $MA_MS_TORQUE_CTRL_I_TIME

MD37268 $MA_MS_TORQUE_WEIGHT_SLAVE

37253	MS_FUNCTION_MASK			A10	TE3	
-	Master/slave settings			DWORD	NEW CONF	
-						
-	-	0x0	-	-	7/2	M

Description: Parameterizing a master/slave coupling

Bit 0 = 0:

The scaling of MD37256 $MA_MS_TORQUE_CTRL_P_GAIN, MD37260 $MA_MS_MAX_CTRL_VELO is smaller than described in the documentation by the factor 1s/IPO cycle.

Bit 0 = 1:

The scaling of MD37256 $MA_MS_TORQUE_CTRL_P_GAIN, MD37260 $MA_MS_MAX_CTRL_VELO corresponds to the documentation.

37254	MS_TORQUE_CTRL_MODE			A10	TE3	
-	Torque compensatory controller interconnection			DWORD	Immediately	
-						
-	-	0	0	3	7/2	M

Description: The output of the torque compensatory controller is connected to

0: Master and slave axis

1: Slave axis

2: Master axis

3: No axis

when the torque control is active.

Related to:

MD37252 $MA_MS_ASSIGN_MASTER_TORQUE_CTR

MD37250 $MA_MS_ASSIGN_MASTER_SPEED_CMD

MD37254 $MA_MS_TORQUE_CTRL_MODE

37255	MS_TORQUE_CTRL_ACTIVATION			A10	TE3	
-	Torque compensatory controller activation			BYTE	NEW CONF	
-						
-	-	0	0	1	7/2	M

Description: The torque compensatory controller can be switched ON and OFF by means of MD37254 $MA_MS_TORQUE_CTRL_MODE or via the NC/PLC interface signal DB31, ... DBX24.4 (torque compensatory controller on).

In order to do this, the controller has to know the torque actual values of the drives involved (with PROFIdrive, the message frame used must include and transfer these values, e.g. use message frame 116).

In the case of the PLC, MD37254 $MA_MS_TORQUE_CTRL_MODE is only used for configuring the interconnection of the torque compensatory controller.

0: Switch ON/OFF via MD37254

1: Switch ON/OFF via the NC/PLC interface signal DB31, ... DBX24.4 (torque compensatory controller on)

37256	MS_TORQUE_CTRL_P_GAIN			A10	TE3	
%	Torque compensatory controller gain factor			DOUBLE	NEW CONF	
-						
-	-	0.0	0.0	100.0	7/2	M

Description: Gain factor of the torque compensatory controller

The gain factor is entered in percent as the ratio of the maximum axis velocity of the slave axis on the load side to the rated torque.

The maximum axis velocity is derived from MD32000 $MA_MAX_AX_VELO, the rated torque from the product of drive machine data MD1725.

Related to:

MD37254 $MA_MS_TORQUE_CTRL_MODE

MD37258 $MA_MS_TORQUE_CTRL_I_TIME

MD32000 $MA_MAX_AX_VELO

37258	MS_TORQUE_CTRL_I_TIME			A10	TE3	
s	Torque compensatory controller integral action time			DOUBLE	NEW CONF	
-						
-	-	0.0	0.0	100.0	7/2	M

Description: Integral time of the torque compensatory controller

The integral time does not become active until the P gain factor is greater than 0.

Related to:

MD37254 $MA_MS_TORQUE_CTRL_MODE

MD37256 $MA_MS_TORQUE_CTRL_P_GAIN

MD32000 $MA_MAX_AX_VELO

37260	MS_MAX_CTRL_VELO			A10	TE3	
%	Torque compensatory controller limit			DOUBLE	NEW CONF	
-						
-	-	100.0	0.0	100.0	7/2	M

Description: Torque compensatory controller limitation

The speed setpoint value calculated by the torque compensatory controller is limited.

The limit that can be entered as a percentage refers to MD32000 $MA_MAX_AX_VELO of the slave axis.

Related to:

MD37254 $MA_MS_TORQUE_CTRL_MODE

MD37256 $MA_MS_TORQUE_CTRL_P_GAIN

MD37258 $MA_MS_TORQUE_CTRL_I_TIME

MD32000 $MA_MAX_AX_VELO

37262	MS_COUPLING_ALWAYS_ACTIVE			A10	TE3	
-	Permanent master/slave link			BYTE	NEW CONF	
-						
-	-	0	0	1	7/2	M

Description: Activation behavior of a master/slave coupling

0: Temporary coupling

The coupling is activated/deactivated via PLC interface signals and language commands.

1: Permanent coupling

This machine data activates the permanent coupling.

PLC interface signals and language commands do not have any effect.

Related to:

MD37252 $MA_MS_ASSIGN_MASTER_TORQUE_CTR

MD37250 $MA_MS_ASSIGN_MASTER_SPEED_CMD

37263	MS_SPIND_COUPLING_MODE			A10	TE3	
-	Link response of a spindle			BYTE	NEW CONF	
-						
-	-	0	0	1	7/2	M

Description: Link behavior of a speed-controlled spindle:

0: Link is closed/released in standstill only.

1: Link is closed/released already during motion.

The configuration is valid both for activation/deactivation via DB3x.DBX24.5 and for MASLON, MASLOF, MASLOFs, MASLDEL

37264	MS_TENSION_TORQUE			A10	TE3	
%	Master/slave tension torque			DOUBLE	Immediately	
-						
-	-	0.0	-100.0	100.0	7/2	M

Description: A constant tension torque between the master and the slave axis can be entered as a percentage of the rated drive torque of the slave axis.

Use of a tension torque requires an active torque compensatory controller (compare MD37255 $MA_MS_TORQUE_CTRL_ACTIVATION).

Related to:

MD37252 $MA_MS_ASSIGN_MASTER_TORQUE_CTR

MD37266 $MA_MS_TENSION_TORQ_FILTER_TIME

MD37255 $MA_MS_TORQUE_CTRL_ACTIVATION

37266	MS_TENSION_TORQ_FILTER_TIME			A10	TE3	
s	Filter time constant tension torque			DOUBLE	NEW CONF	
-						
-	-	0.0	0.0	100.0	7/2	M

Description: The tension torque between the master and slave axes can be activated via a PT1 filter. Any change of MD37264 $MA_MS_TENSION_TORQUE is then travelled out with the time constant of the filter.

As default, the filter is inactive; any torque change becomes active unfiltered.

Related to:

MD37264 $MA_MS_TENSION_TORQUE

37268	MS_TORQUE_WEIGHT_SLAVE			A10	TE3	
%	Torque weighting of slave axis			DOUBLE	NEW CONF	
-						
-	-	50.0	1.0	100.0	7/2	M

Description: The torque share that the slave axis contributes to the total torque can be configured via the weighting. This enables different torque shares to be implemented between the master and slave axes.

In the case of motors with the same rated torque, a 50% to 50% torque sharing is suggested.

The torque share of the master axis results implicitly from 100% - MD37268.

Related to:

MD37252 $MA_MS_ASSIGN_MASTER_TORQUE_CTR

MD37266 $MA_MS_TENSION_TORQ_FILTER_TIME

37270	MS_VELO_TOL_COARSE			A10	TE3,Z3	
%	Master/slave speed tolerance coarse			DOUBLE	NEW CONF	
-						
-	-	5.0	-	-	7/2	M

Description: Tolerance window, coarse, for the differential speed between the master and the slave.

If the speed difference is within the tolerance window, the NC/PLC interface signal DB31, ... DBX96.4 (Master-Slave compensatory controller active) is set.

The tolerance value is entered as a percentage of MD32000 $MA_MAX_AX_VELO.

37272	MS_VELO_TOL_FINE			A10	TE3,Z3	
%	Master/slave speed tolerance fine			DOUBLE	NEW CONF	
-						
-	-	1.0	-	-	7/2	M

Description: Tolerance window, fine, for the differential speed between the master and the slave.

If the speed difference is within the tolerance window, the NC/PLC interface signal DB31, ... DBX96.3 (Master/Slave coarse) is set.

The tolerance value is entered as a percentage of MD32000 $MA_MAX_AX_VELO.

37274	MS_MOTION_DIR_REVERSE			A10	-	
-	Inverting traversing direction slave axis			BYTE	NEW CONF	
-						
-	-	0	0	1	7/2	M

Description: Inverting the traversing direction of a slave axis in the linked status.

0: Equidirectional to the master axis

1: Inverse to the master axis

37400	EPS_TLIFT_TANG_STEP			A10	T3	
mm, degrees	Tangent angle for corner recognition			DOUBLE	Reset	
CTEQ						
-	-	5.0	-	-	7/2	M

Description: If TLIFT has been programmed and the axis is tracked tangentially, a step of the position setpoint larger than MD37400 $MA_EPS_TLIFT_TANG_STEP causes an intermediate block to be inserted. The intermediate block traverses the axis to the position corresponding to the start tangent in the next block.

MD irrelevant if: TLIFT not activated

Related to:

TLIFT instruction

37402	TANG_OFFSET			A10	T3	
mm, degrees	Default angle for tangential correction			DOUBLE	Reset	
CTEQ						
-	-	0.0	-	-	7/2	M

Description: Default offset (angle), which the tracked axis forms with the tangent. The angle acts in addition to the angle programmed in the TANGON block.

MD irrelevant if tangential tracking not active.

Related to:

TANGON instruction

37500	ESR_REACTION			EXP, A01, A10, -	M3,P2	
-	Axial mode of "Extended Stop and Retract"			BYTE	NEW CONF	
CTEQ						
-	-	0	0	22	7/2	M

Description: Selection of the response to be triggered via system variable "$AN_ESR_TRIGGER".

0 = No response Reaktion (or only external response through synchronized action programming of rapid digital outputs).

21 = NC-controlled retraction axis

22 = NC-controlled stopping axis

37510	AX_ESR_DELAY_TIME1			EXP, A01, A10, -	P2	
s	Delay time ESR single axis			DOUBLE	NEW CONF	
CTEQ						
-	-	0.0	-	-	7/2	M

Description: If, for example, an alarm occurs, the deceleration time can be delayed by means of this MD, e.g. to allow in case of gear hobbing the retraction from the tooth gap first.

37511	AX_ESR_DELAY_TIME2			EXP, A01, A10, -	P2	
s	ESR time for interpolatory deceleration of single axis			DOUBLE	NEW CONF	
CTEQ						
-	-	0.0	-	-	7/2	M

Description: The time for interpolatory braking specified here in MD37511 $MA_AX_ESR_DELAY_TIME2 still remains after expiry of the time MD37510 $MA_AX_ESR_DELAY_TIME1.

Rapid braking with subsequent tracking is initiated after expiry of the time MD37511 $MA_AX_ESR_DELAY_TIME2.

37550	EG_VEL_WARNING			A05, A10	M3,Z3	
%	Threshold value for velocity warning threshold.			DOUBLE	NEW CONF	
-						
-	-	90.0	0	100	7/2	M

Description: Threshold value for VDI signals

If, with active EG axis link, the maximum velocities stored in MD 32000: $MA_MAX_AX_VELO have been reached for the current velocity of the axis by the percentage set here, a warning (signal) for velocity is output.

Related to:

MD32000 $MA_MAX_AX_VELO

37560	EG_ACC_TOL			A05, A10	M3,Z3	
%	Threshold value for 'Axis accelerating'			DOUBLE	NEW CONF	
-						
-	-	25.0	-	-	7/2	M

Description: Threshold value for VDI signal "Axis accelerates"

If, with active EU axis link, the maximum accelerations stored in MD 32300: $MA_MAX_AX_ACCEL have been reached for the current acceleration of the axis by the percentage set here, a warning (signal) for acceleration is output.

Korrespondiert mit:

MD32300 $MA_MAX_AX_ACCEL

37600	PROFIBUS_ACTVAL_LEAD_TIME			EXP, A01, A02	-	
s	Actual value acquisition time (PROFIBUS/PROFINET Ti)			DOUBLE	PowerOn	
-						
-	-	0.000125	0.0	0.032	0/0	S

Description: For PROFIBUS/PROFINET only:

Machine data for setting the actual value acceptance time (Ti) of the encoder on the PROFIBUS/PROFINET.

Unit: seconds; therefore default is 125µs

(this is also the default which STEP 7 sets for a 611U).

NOTICE:

The actual Ti value is read directly from the SDB configuration or the drive, if possible.

In this case, the machine data value is set to the read value and will only serve for display purposes.

37602	PROFIBUS_OUTVAL_DELAY_TIME			EXP, A01, A02	-	
s	Setpoint delay time (PROFIBUS/PROFINET To)			DOUBLE	PowerOn	
-						
-	-	0.003	0.0	0.032	0/0	S

Description: For PROFIBUS/PROFINET only:

Machine data for setting the setpoint acceptance time (To) on the PROFIBUS/PROFINET.

Unit: seconds

NOTICE:

The actual To value is read directly from the SDB configuration or the drive, if possible.

In this case, the value of the machine data is set to the read value and serves for display purposes only.

37610	PROFIBUS_CTRL_CONFIG			EXP, A01	-	
-	PROFIdrive control bit configuration			BYTE	PowerOn	
-						
-	-	0	0	2	7/2	M

Description: For PROFIdrive only:

Machine data for setting special PROFIdrive control word functionality:

0 =

default = no change of standard behavior

1 =

STW2, bits 0-1 are set depending on mode of operation/rapid traverse suppressing the setting of defaults for the VDI control bits "Parameter set bit0/1" from the PLC.

Bits 0-1 get the following combinations depending on the mode of operation, and controlled by NCK:

00 = Default (after Power-On)

01 = JOG (except for JOG-INC) or ((AUTOMATIC or MDI) and G0)

10 = ((AUTOMATIC or MDI) and not G0), other

11 = JOG-INC

2 =

Combination of MD=0 (preset by VDI) and MD=1 (internally preset):

MD=2 acts as MD=1, as long as there are no VDI control bits from the PLC, i.e. if the VDI control bits "Parameter set bit0/1" are both reset (0).

MD=2 acts as MD=0, if the VDI control bits "Parameter set bit0/1" are set both or individually (!=0). In this case, the VDI control bits are transferred directly to the drive (priority of VDI signals higher than that of internally created signals).

37620	PROFIBUS_TORQUE_RED_RESOL			EXP, A01	-	
%	Resolution PROFIdrive torque reduction			DOUBLE	NEW CONF	
-						
-	-	1.0	0.005	10.0	7/2	M

Description:

```
For PROFIdrive only:
Resolution of torque reduction on the PROFIdrive (LSB signifi-
cance)
The MD is only relevant for controls with PROFIdrive drives. For
these controls, it defines the resolution of the cyclic interface
data "Torque reduction value" (only exists for MD13060
$MN_DRIVE_TELEGRAM_TYPE = 101 ff. or 201 ff.), which is required
for the "Travel to fixed stop" functionality.
The 1% default value corresponds to the original significance. The
torque limit is transferred on the PROFIdrive with increments of
1%; the value 100 in the corresponding PROFIdrive message frame
data cell corresponds to full torque reduction (i.e. without
force).
By changing this MD to 0.005%, for example, the value can be
entered in increments of 0.005%, i.e. the increments for the
torque limit value become finer by a factor of 200.
For limitation to the rated torque, the value 0 is transmitted in
this case; complete torque reduction (i.e. without force) charac-
terizes the transmittable value 10000.
To avoid misadaptation, the setting value of the MD must be
selected to match the interpretation configured on the drive side
or the firmly defined interpretation of the torque reduction
value. If the setting of the control on the drive (manufacturer-
specific drive parameter) is known (i.e. with SIEMENS drives), the
software automatically sets the MD; in other words, in this case
the MD is merely used for display purposes.
```

37800	OEM_AXIS_INFO			A01, A11	-	
-	OEM version information			STRING	PowerOn	
-						
-	2	,	-	-	7/2	M

Description:

```
A version information freely available to the user
(is indicated in the version screen)
```

37900	SAFE_CAM_TRACK_OUTPUT			A01, A05, -	FBSI	
-	Output assignment cam track 1 to 4			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description:

```
This data defines the outputs for the cam tracks 1 to 4.
Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT
n = 0, 1, 2, 3 correspond to the assignment for cam track 1 to 4
Signal       Meaning
= 0  Axis is not placed on a cam of the cam track
= 1  Axis is placed on a cam of the cam track
Special cases:
The function "Safe cam track" is enabled via MD 36903
$MA_SAFE_CAM_ENABLE.
```

37901	SAFE_CAM_RANGE_OUTPUT_1			A01, A05, -	FBSI	
-	Output assignment cam range for cam track 1			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description: This data defines the outputs for the cam range of cam track 1.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the 4 bits for the indicated range on cam track 1

```
Bit 3  Bit 2   Bit 1  Bit 0
  0      0       0      0      Cam range 0 active
  0      0       0      1      Cam range 1 active
to ...
  1      1       1      1      Cam range 15 active
```

The cam range is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]

```
Signal          Meaning
```

= 0...14Axis is placed within the cam range, to which the range ID 0...14 on cam track 1 was assigned

= 15 Axis is placed within the range to the right of the cam with the highest position of cam track 1

Special cases:

The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.

37902	SAFE_CAM_RANGE_OUTPUT_2			A01, A05, -	FBSI	
-	Output assignment cam range for cam track 2			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description: This data defines the outputs for the cam range of cam track 2.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the 4 bits for the indicated range on cam track 2

```
Bit 3  Bit 2   Bit 1  Bit 0
  0      0       0      0      Cam range 0 active
  0      0       0      1      Cam range 1 active
to ...
  1      1       1      1      Cam range 15 active
```

The cam range is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]

```
Signal          Meaning
```

= 0...14Axis is placed within the cam range, to which the range ID 0...14 on cam track 2 was assigned

= 15 Axis is placed within the range to the right of the cam with the highest position of cam track 2

Special cases:

The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.

37903	SAFE_CAM_RANGE_OUTPUT_3			A01, A05, -	FBSI	
-	Output assignment cam range for cam track 3			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description:

```
This data defines the outputs for the cam range of cam track 3.
Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT
n = 0, 1, 2, 3 correspond to the 4 bits for the indicated range on
cam track 3
Bit 3  Bit 2   Bit 1  Bit 0
  0      0       0      0      Cam range 0 active
  0      0       0      1      Cam range 1 active
to ...
  1      1       1      1      Cam range 15 active
The cam range is defined via the following machine data:
MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]
Signal          Meaning
= 0...14Axis is placed within the cam range, to which the range ID
0...14 on cam track 3 was assigned
= 15  Axis is placed within the range to the right of the cam with
the highest position of cam track 3
Special cases:
The function "Safe cam track" is enabled via MD 36903
$MA_SAFE_CAM_ENABLE.
```

37904	SAFE_CAM_RANGE_OUTPUT_4			A01, A05, -	FBSI	
-	Output assignment cam range for cam track 4			DWORD	PowerOn	
-						
-	4	0, 0, 0, 0	-	-	7/2	M

Description:

```
This data defines the outputs for the cam range of cam track 4.
Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT
n = 0, 1, 2, 3 correspond to the 4 bits for the indicated range on
cam track 4
Bit 3  Bit 2   Bit 1  Bit 0
  0      0       0      0      Cam range 0 active
  0      0       0      1      Cam range 1 active
to ...
  1      1       1      1      Cam range 15 active
The cam range is defined via the following machine data:
MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[n]
Signal          Meaning
= 0...14Axis is placed within the cam range, to which the range ID
0...14 on cam track 4 was assigned
= 15  Axis is placed within the range to the right of the cam with
the highest position of cam track 4
Special cases:
The function "Safe cam track" is enabled via MD 36903
$MA_SAFE_CAM_ENABLE.
```

37906	SAFE_CAM_RANGE_BIN_OUTPUT_1			A01, A05, -	FBSI	
-	Output assignment cam range bit for cam track 1			DWORD	PowerOn	
-						
-	15	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2	M

Description: This data defines the outputs for the cam range bits of cam track 1.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Field index n corresponds to the parameterizable cam range numbers on cam track 1.

The cam range number is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[k]

Signal Meaning

= 0 Axis is not placed on cam with cam range number n

= 1 Axis is placed on cam with cam range number n

Example:

The signal addressed with field index 5 changes to 1, if the axis is placed on the cam, to which cam range number 5 on cam track 1 was assigned during parameterization.

Special cases:

- The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.
- If cam range number n on cam track 1 is not parameterized, the signal of field index can never change to 1. In this case the output MD with field index n does not have to be parameterized.

37907	SAFE_CAM_RANGE_BIN_OUTPUT_2			A01, A05, -	FBSI	
-	Output assignment cam range bit for cam track 2			DWORD	PowerOn	
-						
-	15	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2	M

Description: This data defines the outputs for the cam range bits of cam track 2.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Field index n corresponds to the parameterizable cam range numbers on cam track 2.

The cam range number is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[k]

Signal Meaning

= 0 Axis is not placed on cam with cam range number n

= 1 Axis is placed on cam with cam range number n

Example:

The signal addressed with field index 5 changes to 1, if the axis is placed on the cam, to which cam range number 5 on cam track 2 was assigned during parameterization.

Special cases:

- The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.
- If cam range number n on cam track 2 is not parameterized, the signal of field index n can never change to 1. In this case the output MD with field index n does not have to be parameterized.

37908	SAFE_CAM_RANGE_BIN_OUTPUT_3			A01, A05, -	FBSI	
-	Output assignment cam range bit for cam track 3			DWORD	PowerOn	
-						
-	15	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2	M

Description: This data defines the outputs for the cam range bits of cam track 3.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Field index n corresponds to the parameterizable cam range numbers on cam track 3.

The cam range number is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[k]

Signal Meaning

= 0 Axis is not placed on cam with cam range number n

= 1 Axis is placed on cam with cam range number n

Example:

The signal addressed with field index 5 changes to 1, if the axis is placed on the cam, to which cam range number 5 on cam track 3 was assigned during parameterization.

Special cases:

- The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.
- If cam range number n on cam track 3 is not parameterized, the signal of field index n can never change to 1. In this case the output MD with field index n does not have to be parameterized.

37909	SAFE_CAM_RANGE_BIN_OUTPUT_4			A01, A05, -	FBSI	
-	Output assignment cam range bit for cam track 4			DWORD	PowerOn	
-						
-	15	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/2	M

Description: This data defines the outputs for the cam range bits of cam track 4.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Field index n corresponds to the parameterizable cam range numbers on cam track 4.

The cam range number is defined via the following machine data:

MD 36938: $MA_SAFE_CAM_TRACK_ASSIGN[k]

Signal Meaning

= 0 Axis is not placed on cam with cam range number n

= 1 Axis is placed on cam with cam range number n

Example:

The signal addressed with field index 5 changes to 1, if the axis is placed on the cam, to which cam range number 5 on cam track 4 was assigned during parameterization.

Special cases:

- The function "Safe cam track" is enabled via MD 36903 $MA_SAFE_CAM_ENABLE.
- If cam range number n on cam track 4 is not parameterized, the signal of field index n can never change to 1. In this case the output MD with field index n does not have to be parameterized.

1.5.9 Axis-specific memory settings

38000	MM_ENC_COMP_MAX_POINTS			A01, A09, A02	K3	
-	Number of intermediate points for interpol. compensation (SRAM)			DWORD	PowerOn	
-						
-	2	0, 0	0	5000	7/2	M

Description: The number of interpolation points required per measuring system must be defined for the leadscrew error compensation.

The required number can be calculated as follows using the defined parameters:

```
                                     $AA_ENC_COMP_MAX -
$AA_ENC_COMP_MIN
MD38000 $MA_MM_ENC_COMP_MAX_POINTS = -----------------------------
-----  + 1
                                               $AA_ENC_COMP_STEP
```

$AA_ENC_COMP_MIN   Initial position (system variable)

$AA_ENC_COMP_MAX   End position (system variable)

$AA_ENC_COMP_STEP   Distance between interpolation points (system variable)

When selecting the number of interpolation points and/or the distances between them, it is important to take into account the size of the resulting compensation table and the space required in the buffered NC user memory (SRAM). 8 bytes are required for each compensation value (interpolation point).

The index [n] has the following coding: [encoder no.]: 0 or 1

Special cases: Notice:

After any change in MD38000 $MA_MM_ENC_COMP_MAX_POINTS, the buffered NC user memory is automatically re-allocated on system power-on.

All data in the buffered NC user memory are then lost (e.g. part programs, tool offsets etc.). Alarm 6020 "Machine data changed - memory reallocated" is output.

If reallocation of the NC user memory fails because the total memory capacity available is insufficient, alarm 6000 "Memory allocation made with standard machine data" is output.

In this case, the NC user memory division is allocated using the default values of the standard machine data.

References:

/FB/, S7, "Memory Configuration"

/DA/, "Diagnostics Guide"

Related to:

MD32700 $MA_ENC_COMP_ENABLE[n]LEC active

References:

/FB/, S7, "Memory Configuration"

38010	MM_QEC_MAX_POINTS		A01, A09	K3	
-	Number of values for quadrant error compens. with neural network		DWORD	PowerOn	
-					
-	1	0	0	1040	7/2	M

Description: In quadrant error compensation with neural networks (QEC), the number of compensation values required has to be entered for each axis that is to be compensated.

The required number can be calculated as follows using the defined parameters: MD38010 $MA_MM_QEC_MAX_POINTS _ ($AA_QEC_COARSE_STEPS + 1) ^ $AA_QEC_FINE_STEPS

$AA_QEC_COARSE_STEPS Coarse quantization of the characteristic (system variable)

$AA_QEC_FINE_STEPS Fine quantization of the characteristic (system variable)

For "direction-dependent" compensation, the number must be greater than or equal to double the value of this product.

When selecting coarse or fine quantization, the resulting size of the compensation table and its memory requirement in the buffered user memory must be taken into account. 4 bytes are required for each compensation value. If the value 0 is entered, no memory is reserved for the table; i.e. the table does not exist and the function cannot therefore be activated.

Special cases: Caution!

If MD38010 $MA_MM_QEC_MAX_POINTS is altered, the buffered NC user memory is automatically re-allocated on system power-on. This deletes all the user data in the buffered user memory (e.g. drive and HMI machine data, code, tool offsets, part programs etc.).

Note:

For better handling, a large number should be chosen initially, because the exact number of interpolation points that are required is not known when the compensation is started for the first time. This number can be reduced to the required size as soon as the characteristics have been recorded and saved. After performing another power-on, the saved characteristics can be reloaded.

References:

/FB/, S7, "Memory Configuration"

1.6 Setting data

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Description: Description

1.6.1 General setting data

41010	JOG_VAR_INCR_SIZE			-	H1	
-	Size of the variable increment for JOG			DOUBLE	Immediately	
-						
-	-	0.	-	-	7/7	U

Description: This setting data defines the number of increments when variable increment (INCvar) is selected. This increment size is traversed by the axis in JOG mode each time the traverse key is pressed or the handwheel is turned one detent position and variable increment is selected (PLC interface signal "Active machine function: INC variable" for machine or geometry axes is set to 1). The defined increment size also applies to DRF.

Note:

Please note that the increment size is active for incremental jogging and handwheel jogging. So, if a large increment value is entered and the handwheel is turned, the axis might cover a large distance (depends on setting in MD31090 $MA_JOG_INCR_WEIGHT).

SD irrelevant to ......

JOG continuous

Related to ....

NC/PLC interface signal DB21-30 DBX41.5,DBX47.5,DBX53.5 (Geometry axis 1-3 active machine function: INC variable) or NC/PLC interface signal DB31, ... DBX65.5 (Active machine function: INC variable)

MD31090 $MA_JOG_INCR_WEIGHT (weighting of an increment for INC/handwheel)

41050	JOG_CONT_MODE_LEVELTRIGGRD			-	H1	
-	Jog mode / continuous operation with continuous JOG			BOOLEAN	Immediately	
-						
-	-	TRUE	-	-	7/7	U

Description:

```
1:   Jog mode for JOG continuous
     In jog mode (default setting) the axis traverses as long as the
     traverse key is held down and an axis limitation has not been
     reached. When the key is released the axis is decelerated to
     zero speed and the movement is considered complete.
0:   Continuous operation for JOG continuous
     In continuous operation the traverse movement is started with
     the first rising edge of the traverse key and continues to move
     even after the key is released. The axis can be stopped again by
     pressing the traverse key again (second rising edge).
SD irrelevant for ......
Incremental jogging (JOG INC)
Reference point approach (JOG REF)
```

41100	JOG_REV_IS_ACTIVE			-	-	
-	JOG mode: (1) revolutional feedrate / (0) feedrate			BYTE	Immediately	
-						
-	-	0x0E	-	-	7/7	U

Description:

```
Bit 0 = 0:
   The behavior depends on the following:
   - in the case of an axis/spindle:
      on the axial SD43300 $SA_ASSIGN_FEED_PER_REV_SOURCE
   - in the case of a geometry axis with an active frame with rota-
   tion:
      on the channel-specific SD42600 $SC_JOG_FEED_PER_REV_SOURCE
   - in the case of an orientation axis:
      on the channel-specific SD42600 $SC_JOG_FEED_PER_REV_SOURCE
Bit 0 = 1:
   A JOG motion with revolutional feedrate shall be traversed
   depending on the master spindle.
   The following must be considered:
   - If a spindle is the master spindle itself, it will be tra-
   versed without revolutional feedrate.
   - If the master spindle is in stop position and if SD43300
   $SA_ASSIGN_FEED_PER_REV_SOURCE (with an axis/spindle) or
   SD42600 $SC_JOG_FEED_PER_REV_SOURCE (with a geometry axis with
   an active frame with rotation, or with an orientation axis) = -
   3, traversing will be carried out without revolutional fee-
   drate.
Bit 1 = 0:
   The axis/spindle, geometry axis or orientation axis will be
   traversed with revolutional feedrate even during rapid traverse
   (see bit 0 for selection).
Bit 1 = 1:
   The axis/spindle, geometry axis or orientation axis is always
   traversed without revolutional feedback during rapid traverse.
Bit 2 = 0:
   The axis/spindle, geometry axis or orientation axis is tra-
   versed with revolutional feedrate during JOG handwheel travel,
   too (see bit 0 for selection).
Bit 2 = 1:
   The axis/spindle, geometry axis or orientation axis is always
   traversed without revolutional feedrate during JOG handwheel
   travel.
Bit 3 = 0:
   The axis/spindle is traversed with revolutional feedrate during
   DRF handwheel travel, too (see bit 0 for selection).
Bit 3 = 1:
   The axis/spindle is always traversed without revolutional fee-
   drate during DRF handwheel travel.
```

41110	JOG_SET_VELO			-	H1	
mm/min	Axis velocity in JOG			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description:

Value not equal to 0:

The velocity value entered applies to linear axes traversed in JOG mode if linear feedrate (G94) is active for the relevant axis (SD41100 $SN_JOG_REV_IS_ACTIVE = 0).

The axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing.

The value entered is valid for all linear axes and must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

In the case of DRF, the velocity defined by SD41110 $SN_JOG_SET_VELO is reduced by

MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR.

Value = 0:

If 0 has been entered in the setting data, the active linear feedrate in JOG mode is

MD32020 $MA_JOG_VELO "Jog axis velocity". Each axis can be given its own JOG velocity with this MD (axial MD).

SD irrelevant for ......

- Linear axes if SD41100 $SN_JOG_REV_IS_ACTIVE = 1
- Rotary axes (SD41130 $SN_JOG_ROT_AX_SET_VELO is active here)

Application example(s)

The operator can thus define a JOG velocity for a specific application.

Related to ....

SD41100 $SN_JOG_REV_IS_ACTIVE (revolutional feedrate with JOG active)

Axial MD32020 $MA_JOG_VELO (JOG axis velocity)

Axial MD32000 $MA_MAX_AX_VELO (maximum axis velocity)

Axial MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR (ratio of JOG velocity to handwheel velocity (DRF))

SD41130 $SN_JOG_ROT_AX_SET_VELO (JOG speed with rotary axes)

41120	JOG_REV_SET_VELO			-	H1	
mm/rev	Revolutional feedrate of axes in JOG mode			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Value not equal to 0:

The velocity value entered applies to axes traversed in JOG mode if revolutional feedrate (G95) is active for the relevant axis (SD41100 $SN_JOG_REV_IS_ACTIVE = 1). The axis velocity is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing. The value entered is valid for all axes and must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

Value = 0:

If 0 has been entered in the setting data, the active revolutional feedrate in JOG mode is MD32050 $MA_JOG_REV_VELO "revolutional feedrate with JOG".

Each axis can be given its own revolutional feedrate with this MD (axial MD).

SD irrelevant for ......

- For axes if SD41100 $SN_JOG_REV_IS_ACTIVE = 0

Application example(s)

The operator can define a JOG velocity for a particular application.

Related to ....

Axial SD41100 $SN_JOG_REV_IS_ACTIVE (revolutional feedrate for JOG active)

Axial MD32050 $MA_JOG_REV_VELO (revolutional feedrate with JOG)

Axial MD32000 $MA_MAX_AX_VELO (maximum axis velocity)

41130	JOG_ROT_AX_SET_VELO			-	H1	
rev/min	Axis velocity for rotary axes in JOG mode			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Value not equal to 0:

The velocity entered applies to rotary axes in JOG mode (to continuous jogging, incremental jogging, jogging with handwheel). The value entered is common to all rotary axes, and must not exceed the maximum permissible axis velocity (MD32000 $MA_MAX_AX_VELO).

With DRF, the velocity set with SD41130 $SN_JOG_ROT_AX_SET_VELO must be reduced by MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR.

Value equal to 0:

If the value 0 is entered in the setting data, the velocity applied to rotary axes in JOG mode is the axial MD32020 $MA_JOG_VELO (jog axis velocity). In this way, it is possible to define a separate JOG velocity for each axis.

Application example(s)

The operator can define a JOG velocity for a particular application.

Related to ....

MD32020 $MA_JOG_VELO (JOG axis velocity)

MD32000 $MA_MAX_AX_VELO (maximum axis velocity)

MD32090 $MA_HANDWH_VELO_OVERLAY_FACTOR (ratio JOG velocity to handwheel velocity (DRF)

41200	JOG_SPIND_SET_VELO			-	H1	
rev/min	Speed for spindle JOG mode			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Value not equal to 0:

The speed entered applies to spindles in JOG mode if they are traversed manually by the "Plus and minus traversing keys" or the handwheel. The speed is active for

- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing. The value entered is valid for all spindles, and must not exceed the maximum permissible speed (MD32000 $MA_MAX_AX_VELO).

Value = 0:

If 0 has been entered in the setting data, MD32020 $MA_JOG_VELO (JOG axis velocity) acts as the JOG velocity. Each axis can thus be given its own JOG velocity with this MD (axial MD).

The maximum speeds of the active gear stage (MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT) are taken into account when traversing the spindle with JOG.

SD irrelevant for ......

Application example(s). The operator can thus define a JOG speed for the spindles for a specific application.

Related to ....

Axial MD32020 $MA_JOG_VELO (JOG axis velocity)

MD35130 $MA_GEAR_STEP_MAX_VELO_LIMIT (maximum speeds of the gear stages)

41300	CEC_TABLE_ENABLE			-	K3	
-	Compensation table enable			BOOLEAN	Immediately	
-						
-	62	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description:

1: The evaluation of the compensation table [t] is enabled.

The compensation table is now included in the calculation of the compensation value for the compensation axis.

The compensation axis $AN_CEC_OUTPUT_AXIS can be taken from the table configuration.

The effective total compensation value in the compensation axis can be adapted to the current machining by the targeted activation of tables (from NC part programm or PLC user program).

The function does not become active until the following conditions have been fulfilled:

- The option "Interpolatory compensation" is set
- The associated compensation tables in the NC user memory have been loaded and enabled (SD41300 $SN_CEC_TABLE_ENABLEt] = 1)
- The current position measuring system is referenced (NC/PLC interface signal DB31, ... DBX60.4 / 60.5 (Referenced/synchronized 1 or 2) = 1).

0: The evaluation of the sag compensation table [t] is not enabled.

Related to ....

MD18342 $MN_MM_CEC_MAX_POINTS[t] Number of interpolation points with sag compensation

SD41300 $SN_CEC_TABLE_ENABLE[t] Evaluation of the sag compensation table t is enabled

NC/PLC interface signal DB31, ... DBX60.4 (Referenced/synchronized 1)

NC/PLC interface signal DB31, ... DBX60.5 (Referenced/synchronized 2)

41310	CEC_TABLE_WEIGHT		-	K3	
-	Weighting factor compensation table		DOUBLE	Immediately	
-					
-	62	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/7	U

Description: The compensation value stored in the table [t] is multiplied by the weighting factor.

When selecting the weighting factor it should be ensured that the total compensation value in the compensation axis does not exceed the maximal value of

(MD18342 $MN_CEC_MAX_SUM). With [t] = index of the compensation table (see MD18342 $MN_MM_CEC_MAX_POINTS)

If, for example, the weight of the tools used on the machine or the workpieces to be machined are too different and this affects the error curve by changing the amplitude, this can be corrected by changing the weighting factor. In the case of sag compensation, the weighting factor in the table can be changed for specific tools or workpieces from the PLC user program or the NC program by overwriting the setting data. However, different compensation tables are to be used if the course of the error curve is substantially changed by the different weights.

Related to ....

SD41300 $SN_CEC_TABLE_ENABLE[t] Evaluation of the sag compensation table t is enabled

MD18342 $MN_CEC_MAX_SUM Maximum compensation value for sag compensation

41500	SW_CAM_MINUS_POS_TAB_1			-	N3	
mm/inch, degrees	Trigger points at falling cam 1-8			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: The cam positions of minus cams 1 - 8 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.

41501	SW_CAM_PLUS_POS_TAB_1			-	N3	
mm/inch, degrees	Trigger points at rising cam edge 1-8			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: The cam positions of plus cams 1 - 8 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.

41502	SW_CAM_MINUS_POS_TAB_2			-	N3	
mm/inch, degrees	Trigger points at falling cam edge 9-16			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: The cam positions of minus cams 9-16 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

Switching points with falling edges of cams 9 - 16.

When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.

41503	SW_CAM_PLUS_POS_TAB_2			-	N3	
mm/inch, degrees	Trigger points at rising cam edge 9-16			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: The cam positions of plus cams 9-16 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

Switching points with rising edges of cams 9 - 16.

When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.

41504	SW_CAM_MINUS_POS_TAB_3			-	N3	
mm/inch, degrees	Trigger points at falling cam edge 17-24			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: The cam positions of minus cams 17 - 24 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

Switching points with falling edges of cams 17 - 24.

When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.

41505	SW_CAM_PLUS_POS_TAB_3			-	N3	
mm/inch, degrees	Trigger points at rising cam edge 17-24			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: The cam positions of plus cams 17 - 24 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

Switching points with rising edges of cams 17 - 24

When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.

41506	SW_CAM_MINUS_POS_TAB_4			-	N3	
mm/inch, degrees	Trigger points at falling cam edge 25-32			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: The cam positions of minus cams 25 - 32 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

Switching points with falling edges of cams 25 - 32.

When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.

41507	SW_CAM_PLUS_POS_TAB_4			-	N3	
mm/inch, degrees	Trigger points at rising cam edge 25-32			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: The cam positions of plus cams 25 - 32 are entered in this machine data.

The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

Switching points with rising edges of cams 25 - 32.

When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.

41520	SW_CAM_MINUS_TIME_TAB_1			-	N3	
s	Rate time for '-' trigger points of cams 1-8			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: A lead or delay time can be assigned to each cam 1-8 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

This setting data is added to MD: MD10460 $MN_SW_CAM_MINUS_LEAD_TIME[n].

Related to ....

MD10460 $MN_SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)

41521	SW_CAM_PLUS_TIME_TAB_1			-	N3	
s	Rate time for '+' trigger points of cams 1-8			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: A lead or delay time can be assigned to each plus cam 1-8 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

This setting data is added to MD10461 $MN_SW_CAM_PLUS_LEAD_TIME[n].

Related to ....

MD10461 $MN_SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)

41522	SW_CAM_MINUS_TIME_TAB_2			-	N3	
s	Rate time for '-' trigger points of cams 9-16			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: A lead or delay time can be assigned to each minus cam 9 - 16 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

This setting data is added to MD10460 $MN_SW_CAM_MINUS_LEAD_TIME[n+8].

Related to ....

MD10460 $MN_SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)

41523	SW_CAM_PLUS_TIME_TAB_2			-	N3	
s	Rate time for '+' trigger points of cams 9-16			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: A lead or delay time can be assigned to each plus cam 9 - 16 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

This setting data is added to MD10461 $MN_SW_CAM_PLUS_LEAD_TIME[n+8].

Related to ....

MD10461 $MN_SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)

41524	SW_CAM_MINUS_TIME_TAB_3			-	N3	
s	Rate time for '-' trigger points of cams 17-24			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: A lead or delay time can be assigned to each minus cam 17-24 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

This setting data is added to MD10460 $MN_SW_CAM_MINUS_LEAD_TIME[n].

Related to ....

MD10460 $MN_SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)

41525	SW_CAM_PLUS_TIME_TAB_3			-	N3	
s	Rate time for '+' trigger points of cams 17-24			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: A lead or delay time can be assigned to each plus cam 17-24 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

This setting data is added to MD10461 $MN_SW_CAM_PLUS_LEAD_TIME[n].

Related to ....

MD10461 $MN_SW_CAM_PLUS_LEAD_TIME (lead or delay time on plus cams 1 - 16)

41526	SW_CAM_MINUS_TIME_TAB_4			-	N3	
s	Rate time for '-' trigger points of cams 25-32			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: A lead or delay time can be assigned to each minus cam 25-32 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

This setting data is added to MD10460 $MN_SW_CAM_MINUS_LEAD_TIME[n+8].

Related to ....

MD10460 $MN_SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)

41527	SW_CAM_PLUS_TIME_TAB_4			-	N3	
s	Rate time for '+' trigger points of cams 25-32			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: A lead or delay time can be assigned to each plus cam 25 - 32 in this setting data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the time value entered.

Positive value: Lead time

Negative value: Delay time

Index [n] of the setting data addresses the cam pair:

n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

This setting data is added to MD10461 $MN_SW_CAM_PLUS_LEAD_TIME[n+8].

Related to ....

MD10461 $MN_SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)

41600	COMPAR_THRESHOLD_1			-	A4	
-	Threshold value of the 1st comparator			DOUBLE	Immediately	
-						
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: COMPAR_THRESHOLD_1[b] defines the threshold values for the individual input bits [b] of comparator byte 1.

The output bit n of the 1st comparator is created by comparing the threshold value n according to the comparison type defined in bit n of COMPAR_TYPE_1.

For example:

COMPAR_ASSIGN_ANA_INPUT_1[2] = 4

COMPAR_TRESHOLD_1[2] = 5000.0

COMPAR_TYPE_1 = 5

The 3rd output bit of comparator 1 is set if the input value at AnalogIn 4 is greater than or equal to 5 volts.

Index [b]: Bits 0 - 7

Related to ....

MD10530 $MN_COMPAR_ASSIGN_ANA_INPUT_1

MD10531 $MN_COMPAR_ASSIGN_ANA_INPUT_2

MD10540 $MN_COMPAR_TYPE_1

MD10541 $MN_COMPAR_TYPE_2

41601	COMPAR_THRESHOLD_2		-	A4	
-	Threshold value of the 2nd comparator		DOUBLE	Immediately	
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7	U

Description: COMPAR_THRESHOLD_1[b] defines the threshold values for the individual input bits [b] of comparator byte 1.

Output bit n of the 1st comparator is created by comparing the threshold value n according to the comparison type defined in bit n of COMPAR_TYPE_2.

Index [b]: Bits 0 - 7

Related to ....

MD10530 $MN_COMPAR_ASSIGN_ANA_INPUT_1

MD10531 $MN_COMPAR_ASSIGN_ANA_INPUT_2

MD10540 $MN_COMPAR_TYPE_1

MD10541 $MN_COMPAR_TYPE_2

41700	AXCT_SWWIDTH			-	B3	
-	Default rotation of axis container			DWORD	NEW CONF	
CTDE						
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-32	32	7/7	U

Description: The number of entries (slots) by which the entries in the axis container are advanced on execution of the rotation. The value is interpreted modulo of the actually existing entries. Negative values reverse the direction of rotation.

Related to the container rotation command, container axes.

This machine data is distribued via the NCU-link.

Contrary to the the definition for setting data, this SD is not immediately active, but first with NEWCONF.

1.6.2 Channel-specific setting data

42000	THREAD_START_ANGLE			-	K1	
degrees	Starting angle for thread			DOUBLE	Immediately	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: In the case of multiple thread cutting, the offset of the individual threads can be programmed with the aid of this setting data.

This SD can be changed by the part program with the command SF.

Note:

MD10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

42010	THREAD_RAMP_DISP			-	V1	
mm	Acceleration behavior of axis when thread cutting			DOUBLE	Immediately	
-						
-	2	-1., -1.,-1., -1.,-1., -1.,-1., -1....	-1.	999999.	7/7	U

Description: The SD is active for thread cutting with G33 (G34, G35).

It features two elements that define the behavior of the thread axis during runup (1st element) and during deceleration/smoothing (2nd element).

The values have the same properties for thread run-in and thread run-out:

<0:

The thread axis is started/decelerated with configured acceleration. Jerk is according to the current programming of BRISK/SOFT. Behavior is compatible with MD 20650__THREAD_START_IS_HARD = FALSE used until now.

0:

Starting/deceleration of the feed axis during thread cutting is stepped. Behavior is compatible with MD 20650__THREAD_START_IS_HARD = TRUE used until now.

>0:

The maximum thread starting or deceleration path is specified. The specified distance can lead to acceleration overload of the axis. The SD is written from the block when DITR (displacement thread ramp) is programmed.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

42100	DRY_RUN_FEED			-	V1	
mm/min	Dry run feedrate			DOUBLE	Immediately	
-						
-	-	5000.,5000.,5000.,5000.,5000.,5000....	-	-	7/7	U

Description: The feedrate for the active dry run is entered in this setting data. The setting data can be altered on the operator panel in the "Parameters" operating area.

The entered dry run feedrate is always interpreted as a linear feed (G94). If the dry run feedrate is activated via the PLC interface, the dry run feedrate is used as the path feed after a reset instead of the programmed feed. The programmed velocity is used for traversing if it is greater than the velocity stored here.

Application example(s)

Program testing

Related to ....

NC/PLC interface signal DB21-30 DBX0.6 (Activate dry run feedrate)

NC/PLC interface signal DB21-30 DBX24.6 (Dry run feedrate selected)

42101	DRY_RUN_FEED_MODE		-	V1	
-	Mode for dry run velocity		BYTE	Immediately	
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	12	7/7	U

Description: This SD can be used to set the method of operation of the dry run velocity set by SD42100 $SC_DRY_RUN_FEED.

The following values are possible:

0:

The maximum of SD42100 $SC_DRY_RUN_FEED and the programmed velocity become active. This is the standard setting and corresponds to the behavior up to SW 5.

1:

The minimum of SD42100 $SC_DRY_RUN_FEED and the programmed velocity become active.

2:

SD42100 $SC_DRY_RUN_FEED becomes active directly, irrespective of the programmed velocity.

The values 3...9 are reserved for extensions.

10:

As configuration 0, except for thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

11:

As configuration 1, except for thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

12:

As configuration 2, except for thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.

42110	DEFAULT_FEED		-	V1,FBFA		
mm/min	Path feed default value		DOUBLE	Immediately		
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: Default value for path feedrate, This setting data is evaluated when the part program starts taking into account the feedrate type active at this time (see MD20150 $MC_GCODE_RESET_VALUES and MD20154 $MC_EXTERN_GCODE_RESET_VALUES).

42120	APPROACH_FEED		-	-		
mm/min	Path feedrate in approach blocks		DOUBLE	Immediately		
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: Default value for path feedrate in approach blocks (after repos., block search, SERUPRO etc).

The contents of this settting data are only used when it is non-zero.

It is evaluated like an F word programmed for G94.

42122	OVR_RAPID_FACTOR			-	$MN_OVR_FACTOR_RAPID_TRA,$AC_OVR	
%	Add. rapid traverse override can be specified through operation			DOUBLE	Immediately	
-						
-	-	100.,100.,100.,100.,100.,100.,100....	-	-	7/7	U

Description: Additional channel-specific rapid traverse override in %. The value is calculated to the path depending on OPI variable enablOvrRapidFactor. The value multiplies the other rapid traverse overrides (rapid traverse override of the machine control panel, override default through synchronized actions $AC_OVR).

42125	SERUPRO_SYNC_MASK			-	-	
-	Synchronization in approach blocks			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: A synchronized approach can be set for the search type SERUPRO with the setting data SERUPRO_SYNC_MASK.

SERUPRO uses the function REPOS to move from the current machine position to the target block of the search. A synchronization of the channels can be forced between the reapproach block and the target block via SERUPRO_SYNC_MASK which would correspond to the use of wait markers.

Note:

The user cannot program wait markers between reapproach block and target block in a part program.

SERUPRO_SYNC_MASK activates this intermal wait marker, and defines for which other channels this channel is to wait.

Example for channel 3: $SC_SERUPRO_SYNC_MASK= 0x55

A new block is now inserted in the Serupro approach between the reapproach block and the target block, the function of which corresponds to the following programming: WAITM(101, 1,3,5,7), i.e. a wait mark synchronizes the channels 1, 3, 5 and 7.

The wait marks used internally cannot be explicitly programmed by the user.

NOTICE:

Similarly to the part program, the user can make the error of not setting the mark in a channel, so that the other channels naturally wait for ever!

Comment: The bit mask can contain a channel that does not exist (channel gaps) without a

deadlock occurring.

Example for channel 3: $SC_SERUPRO_SYNC_MASK= 0x55 and channel 5 do not exist, so WAITM(101, 1,3,7) is set.

Note: The block content corresponds to "WAITM(101, 1,3,5,7)", the user does not see this block content, he sees REPOSA!

Note:

SERUPRO_SYNC_MASK is evaluated as soon as the part program command REPOSA is interpreted.

SERUPRO_SYNC_MASK can still be changed if SERUPRO is in the state "search target found".

If REPOSA has already been executed, a change to SERUPRO_SYNC_MASK can only become active if a new REPOS is set. This occurs, for example, by:

- Starting a new ASUB.
- STOP-JOG-AUTO-START
- STOP - select a new REPOS mode RMI/RMN/RME/RMB - START

Comment:

If one use the prog. event for search and if the NCK is at alarm 10208 then a change of SERUPRO_SYNC_MASK is not active unless one sets a new REPOS.

SERUPRO_SYNC_MASK == 0 A block is NOT inserted.

Note:

If the bit for the current channel is not set in SD42125 $SC_SERUPRO_SYNC_MASK then a block is NOT inserted.

Example:

If $SC_SERUPRO_SYNC_MASK= 0xE is programmed in channel 1, then a block is NOT inserted.

This assignment is reserved for a future function!

42140	DEFAULT_SCALE_FACTOR_P			-	FBFA	
-	Default scaling factor for address P			DWORD	Immediately	
-						
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/7	U

Description: The value in this machine data is active if no scaling factor P has been programmed in the block.

Related to:

WEIGHTING_FACTOR_FOR_SCALE

42150	DEFAULT_ROT_FACTOR_R			-	-	
-	Default rotation factor for address R			DOUBLE	Immediately	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: The value in this machine data is active if no factor for rotation R is programmed in the block.

42160	EXTERN_FIXED_FEEDRATE_F1_F9			-	FBFA	
-	Fixed feedrates F1 - F9			DOUBLE	Immediately	
-						
-	10	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7	U

Description: Fixed feedrate values for programming with F1 - F9. If the machine data $MC_FEEDRATE_F1_F9_ON = TRUE is set with the programming of F1 - F9, the feedrate values are read from SD42160 $SC_EXTERN_FIXED_FEEDRATE_F1_F9[0] - $SC_EXTERN_FIXED_FEEDRATE_F1_F9[8], and activated as the machining feedrate.

The rapid traverse feedrate must be entered in SD42160 $SC_EXTERN_FIXED_FEEDRATE_F1_F9[0].

42162	EXTERN_DOUBLE_TURRET_DIST			-	FBFA	
-	Double turret head tool distance			DOUBLE	Immediately	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: Distance between both tools of a double turret head.

The distance is activated using G68 as additive zero point offset if MD10812 $MN_EXTERN_DOUBLE_TURRET_ON is set to TRUE.

42200	SINGLEBLOCK2_STOPRE			-	BA	
-	Activate SBL2 debug mode			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: Value = TRUE:

A preprocessing stop is made with every block if SBL2 (single block with stop after every block) is active. This suppresses the premachining of part program blocks. This variant of the SBL2 is not true-to-contour.

This means that a different contour characteristic might be generated as a result of the preprocessing stop than without single block or with SBL1.

Application: Debug mode for testing part programs.

42300	COUPLE_RATIO_1			-	-	
-	Speed ratio for synchr. spindle mode, numerator, denominator			DOUBLE	Immediately	
-						
-	2	1.0, 1.0,1.0, 1.0,1.0, 1.0,1.0, 1.0...	-1.0e8	1.0e8	7/7	U

Description: This setting data defines the speed ratio parameters for the fixed coupling configuration defined with the channel-specific MD21300 $MC_COUPLE_AXIS_1[n].

-

k_Ü = Speed ratio parameter of numerator / Speed ratio parameter of denominator

= $SC_COUPLE_RATIO[0] / $SC_COUPLE_RATIO[1]

The speed ratio parameters can be altered in the NC part program with the language instruction COUPDEF provided that this is not locked by the channel-specific MD21340 $MC_COUPLE_IS_WRITE_PROT_1.

However, the parameterized values of SD42300 $SC_COUPLE_RATIO_1 are not changed.

The calculation of k_Ü is initiated with POWER ON.

SD irrelevant for ......

User-defined coupling

Related to ....

SD42300 $SC_COUPLE_RATIO_1 currently has the same action as a machine data (e.g. active after POWER ON). The SD data are therefore displayed and input in the same way as channel-specific machine data.

42400	PUNCH_DWELLTIME		-	N4	
s	Dwell time for punching and nibbling		DOUBLE	Immediately	
-					
-	-	1.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: This data sets the dwell time between reaching the position and triggering the stroke.

The set value is rounded to an integer multiple of the interpolation cycle. (This means that the value set here can only differ slightly from that which is actually executed.)

Note:

MD10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (i.e. the value is retained even after the reset).

42402	NIBPUNCH_PRE_START_TIME		-	N4		
s	Delay time (punch/nibble) with G603		DOUBLE	Immediately		
-						
-	-	.02,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: This setting data has exactly the same effect as MD26018 $MC_NIBBLE_PRE_START_TIME. Its primary purpose is to allow the pre-start time to be altered from the NC program so that it can be adapted to different metal sheet sizes and thicknesses. However, the setting data is active only when the machine data has been set to zero.

Related to .... NIBBLE_PRESTART_TIME

42404	MINTIME_BETWEEN_STROKES		-	N4		
s	Minimum time between 2 strokes in seconds		DOUBLE	Immediately		
-						
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7	U

Description: Minimum time between 2 strokes in seconds

42440	FRAME_OFFSET_INCR_PROG		-	K1,K2		
-	Traversing from zero offset with incr. programming		BOOLEAN	Immediately		
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: 0: When incremental programming is used on an axis, only the programmed position delta is traversed after a frame change. Zero offsets in FRAMES are only traversed when an absolute position is specified.

1: When incremental programming is used on an axis, changes to zero offsets are traversed after a frame change (standard response up to software version 3).

Related to ....

SD42442 $SC_TOOL_OFFSET_INCR_PROG

42442	TOOL_OFFSET_INCR_PROG			-	W1,K1	
-	Traversing from zero offset with incr. programming			BOOLEAN	Immediately	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: 0: When incremental programming is used on an axis, only the programmed position delta is traversed after a frame change. Tool length offsets in FRAMES are only traversed when an absolute position is specified.

1: When incremental programming is used on an axis, changes to tool length offsets are traversed after a tool change (standard response up to SW version 3).

Related to ....

SD42440 $SC_FRAME_OFFSET_INCR_PROG

42444	TARGET_BLOCK_INCR_PROG			-	BA	
-	Set down mode after search run with calculation			BOOLEAN	Immediately	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: If the first programming of an axis after "Search run with calculation to end of block" is incremental, the incremental value is added as a function of SD42444 $SC_TARGET_BLOCK_INCR_PROG to the value accumulated up to the search target :

SD = TRUE: Incremental value is added to accumulated position

SD = FALSE: Incremental value is added to current actual value

The setting data is evaluated on NC start for output of the action blocks.

42450	CONTPREC			-	B1,K6	
mm	Contour accuracy			DOUBLE	Immediately	
-						
-	-	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1...	0.000001	999999.	7/7	U

Description: Contour accuracy. This setting data can be used to define the accuracy to be maintained for the path of the geometry axes on curved contours. The lower the value and the lower the servogain factor of the geometry axes, the greater the reduction of path feed on curved contours.

Related to ....

MD20470 $MC_CPREC_WITH_FFW

SD42460 $SC_MINFEED

42460	MINFEED			-	B1,K6	
mm/min	Minimum path feedrate for CPRECON			DOUBLE	Immediately	
-						
-	-	1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1....	0.000001	999999.	7/7	U

Description: Minimum path feedrate with the "Contour accuracy" function active. The feedrate is not limited to below this value unless a lower F value has been programmed or the axis dynamics do not permit it.

Related to ....

MD20470 $MC_CPREC_WITH_FFW

SD42450 $SC_CONTPREC

42465	SMOOTH_CONTUR_TOL			-	B1	
mm	maximum contour tolerance on smoothing			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	999999.	7/7	U

Description: This setting data defines the maximum tolerance for smoothing the contour.

Related to:

MD20480 $MC_SMOOTHING_MODE,

SD42466 $SC_SMOOTH_ORI_TOL

42466	SMOOTH_ORI_TOL			-	B1	
degrees	Maximum deviation of tool orientation during smoothing.			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7	U

Description: This setting data defines the maximum tool orientation tolerance during smoothing.

The data determines the maximum permissible

angular displacement of the tool orientation.

This data only applies if an orientation tranformation

is active.

Related to:

MD20480 $MC_SMOOTHING_MODE,

SD42465 $SC_SMOOTH_CONTUR_TOL

42470	CRIT_SPLINE_ANGLE			-	W1,PGA	
degrees	Corner limit angle for compressor			DOUBLE	Immediately	
-						
-	-	36.0,36.0,36.0,36.0,36.0,36.0,36.0...	0.0	89.0	7/7	U

Description: The setting data defines the limit angle from which the compressor COMPCAD interprets a block transition as a corner. Practical values lie between 10 and 40 degrees. Values from 0 to 89 degrees inclusive are permitted.

The angle only serves as an approximate measure for corner detection. The compressor can also classify flatter block transitions as corners and eliminate larger angles as outliers on account of plausibility considerations.

42471	MIN_CURV_RADIUS			EXP, C09	-	
mm	Minimum radius of curvature			DOUBLE	Immediately	
-						
-	-	3.0,3.0,3.0,3.0,3.0,3.0,3.0,3.0,3.0...	-	-	7/7	U

Description: The setting data defines a typical tool radius. It is only evaluated in compressor COMPCAD. The lower the value, the greater the precision, but the slower the program execution.

42475	COMPRESS_CONTUR_TOL			-	F2,PGA	
mm	maximum contour deviation with compressor			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	999999.	7/7	U

Description: This setting data defines the maximum contour tolerance in the compressor.

42476	COMPRESS_ORI_TOL			-	F2,PGA	
degrees	Maximum deviation of tool orientation with compressor			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7	U

Description: This setting data defines the maximum tool orientation tolerance in the compressor. This data defines the maximum permissible angular displacement of the tool orientation.

This data is active only if an orientation transformation is active.

42477	COMPRESS_ORI_ROT_TOL			-	F2,PGA	
degrees	Maximum deviation of tool rotation with compressor			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7	U

Description: This setting data defines the maximum tolerance in the compressor for turning the tool orientation. This data defines the maximum permissible angular displacement of the tool rotation.

This data is only active if an orientation transformation is active.

Turning the tool orientation is only possible with 6-axis machines.

42480	STOP_CUTCOM_STOPRE			-	W1	
-	Alarm response with tool radius compensation and preproc. stop			BOOLEAN	Immediately	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: If this setting data is TRUE, block execution is stopped by preprocessing stop and active tool radius compensation, and does not resume until after a user acknowledgement (START).

If it is FALSE, machining is not interrupted at such a program point.

42490	CUTCOM_G40_STOPRE			-	W1	
-	Retraction behavior of tool radius compensation with prep. stop			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: FALSE:

If there is a preprocessing stop (either programmed or generated internally by the control) before the deselection block (G40) when tool radius compensation is active, then firstly the starting point of the deselection block is approached from the last end point before the preprocessing stop. The deselection block itself is then executed, i.e. the deselection block is usually replaced by two traversing blocks. Tool radius compensation is no longer active in these blocks. The behavior is thus identical with that before the introduction of this setting data.

TRUE:

If there is a preprocessing stop (either programmed or generated internally by the control) before the deselection block (G40) when tool radius compensation is active, the end point of the deselection point is traversed in a straight line from the last end point before the preprocessing stop.

42494	CUTCOM_ACT_DEACT_CTRL			-	W1	
-	Approach & retraction behavior with 2-1/2D tool radius compens.			DWORD	Immediately	
-						
-	-	2222,2222,2222,2222,2222,2222,2222...	-	-	7/7	U

Description: This setting data controls the approach and retraction behavior with tool radius compensation if the activation or deactivation block does not contain any traversing information. It is only evaluated with 2-1/2D TRC

(CUT2D or CUT2DF).

The decimal coding is as follows:

```
N N N N
|   |   |   |____  Approach behavior for tools with tool point
direction
|   |   |           (turning tools)
|   |   |______ Approach behavior for tools without tool point
direction
|   |           (milling tools)
|   |________  Retract behavior for tools with tool point direc-
tion
|              (turning tools)
|__________   Retract behavior for tools without tool point direc-
tion
             (milling tools)
```

If the position in question contains a 1, approach or retraction is always performed, even if G41/G42 or G40 stands alone in a block.

For example:

```
N100 x10 y0
N110 G41
N120 x20
```

If a tool radius of 10mm is assumed in the above example, position x10y10 is approached in block N110.

If the position in question contains the value 2, the approach or retraction movement is only performed if at least one geometry axis is programmed in the activation/deactivation block. To obtain the same results as the above example with this setting, the program must be altered as follows:

```
N100 x10 y0
N110 G41 x10
N120 x20
```

If axis information x10 is missing in block N110, activation of TRC is delayed by one block, i.e. the activation block would now be N120.

If the position in question contains a 3, retraction is not performed in a deactivation block (G40) if only the geometry axis perpendicular to the compensation plane is programmed. In this case, the motion perpendicular to the compensation plane is performed first. This is followed by the retraction motion in the compensation plane. In this case, the block after G40 must contain motion information in the compensation plane. The approach motions for values 2 and 3 are identical.

If the position in question contains a value other than 1, 2 or 3, i.e. in particular the value 0, an approach or retraction movement is not performed in a block that does not contain any traversing information.

About the term "Tools with tool point direction":

These are tools with tool numbers between 400 and 599 (turning and grinding tools), whose tool point direction has a value between 1 and 8. Turning and grinding tools with tool point direction 0 or 9 or other undefined values are treated like milling tools.

Note:

If the value of this setting data is changed within a program, we recommend programming a preprocessing stop (stopre) before the description to avoid the new value being used in program sections before that point. The opposite case is not serious, i.e. if the setting data is written, subsequent NC blocks will definitely access the new value.

42496	CUTCOM_CLSD_CONT			-	-	
-	Tool radius compensation behavior with closed contour			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: FALSE:

If two intersections are created on correction of the inner side of an (almost) closed contour consisting of two successive circle blocks or a circle and a linear block, the intersection that lies on the first part contour nearer to the block end will be selected as per the default behavior.

A contour will be considered as (almost) closed if the distance between the starting point of the first block and the end point of the second block is smaller than 10% of the active compensation radius, but not larger than 1000 path increments (corresponds to 1mm to 3 decimal places).

TRUE:

Under the same condition as described above, the intersection that lies on the first part contour nearer to block start is selected.

42500	SD_MAX_PATH_ACCEL			-	B2	
m/s²	maximum path acceleration			DOUBLE	Immediately	
-						
-	-	10000.,10000.,10000.,10000.,10000....	1.0e-3	-	7/7	U

Description: Setting data for additional limitation of (tangential) path acceleration

Related to ...

MD32300 $MA_MAX_AX_ACCEL

SD42502 $SC_IS_SD_MAX_PATH_ACCEL

42502	IS_SD_MAX_PATH_ACCEL		-	B2	
-	Evaluate SD42500 SC_SD_MAX_PATH_ACCEL		BOOLEAN	Immediately	
-					
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: SD42500 $SC_SD_MAX_PATH_ACCEL is included in the limit calculations if SD42502 $SC_IS_SD_MAX_PATH_ACCEL=TRUE

Related to ...

SD42500 $SC_SD_MAX_PATH_ACCEL

42510	SD_MAX_PATH_JERK			-	B2	
m/s³	maximum path-related jerk as setting data			DOUBLE	Immediately	
-						
-	-	100000.,100000.,100000.,100000....	1.e-9	-	7/7	U

Description: As well as MD20600 $MC_MAX_PATH_JERK, the maximum path-related jerk can also limit the jerk.

Related to ...

MD20600 $MC_MAX_PATH_JERK

SD42512 $SC_IS_SD_MAX_PATH_JERK

42512	IS_SD_MAX_PATH_JERK			-	B2	
-	Evaluate SD42510 SD_MAX_PATH_JERK			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: SD42510 $SC_SD_MAX_PATH_JERK is included in the limit calculations if SD42512 $SC_IS_SD_MAX_PATH_JERK=TRUE

Related to ...

SD42510 $SC_SD_MAX_PATH_JERK (SD for additional limitation of (tangential) path jerk)

42520	CORNER_SLOWDOWN_START			-	-	
mm	Start of feed reduction at G62.			DOUBLE	Immediately	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: Traverse path distance from which the feed is reduced before the corner with G62.

42522	CORNER_SLOWDOWN_END			-	-	
mm	End of feed reduction at G62.			DOUBLE	Immediately	
-						
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: Traverse path distance up to which the feed remains reduced after a corner with G62.

42524	CORNER_SLOWDOWN_OVR		-	-	
%	Feed override reduction at G62		DOUBLE	Immediately	
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: Override used to multiply the feed at the corner with G62.

42526	CORNER_SLOWDOWN_CRIT		-	-	
degrees	Corner detection at G62		DOUBLE	Immediately	
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7	U

Description: Angle from which a corner is taken into account when reducing the feed with G62.

For example SD42526 $SC_CORNER_SLOWDOWN_CRIT = 90 means that all corners of 90 degrees or a more acute angle are traversed slower with G62.

42528	CUTCOM_DECEL_LIMIT		-	-	
-	Feed lowering on circles with tool radius compensation		DOUBLE	Immediately	
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	0.	1.	7/7	U

Description: The setting data limits feed lowering of the tool center point on concave circle segments with tool radius compensation active and CFC or CFIN selected.

With CFC, the feed is defined at the contour. On concave circular arcs, feed lowering of the tool center point is created by the ratio of the contour curvature to the tool center point path curvature. The setting data is limiting this effect, reducing backing off and overheating of the tool.

For contours with varying curvatures, a mid-range curvature is used.

0: Provides the previous behavior: If the ratio between contour radius and tool center point path radius is less than or equal to 0.01 the feed is applied to the tool center point path. Less pronounced feed reductions are executed.

>0: Feed lowering is limited to the programmed factor. At 0.01, this means that the feed of the tool center point path is possibly only 1 percent of the programmed feed value.

1: On concave contours, the tool center point feed equals the programmed feed (the behavior then corresponds to CFTCP).

42600	JOG_FEED_PER_REV_SOURCE			-	V1	
-	Control revolutional feedrate in JOG			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-3	31	7/7	U

Description: The revolutional feedrate in JOG mode for geometry axes on which a frame with rotation acts.

0= No revolutional feedrate is active.

>0= Machine axis index of the rotary axis/spindle from which the revolutional feedrate is derived.

-1= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active.

-2= The revolutional feedrate is derived from the axis with machine axis index == 0.

-3= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. No revolutional feedrate is active if the master spindle is at a standstill.

Related to ....

SD43300: $SA_ASSIGN_FEED_PER_REV_SOURCE (revolutional feedrate for position axes/spindles)

42650	CART_JOG_MODE			-	H1	
-	Coordinate system for Cartesian jog traverse			DWORD	Immediately	
-						
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0404	7/7	U

Description: This SD can be used to set the reference coordinate system for Cartesian manual travel, with bits 0 to 7 provided for selecting the coordinate system for translation, bits 8 to 15 for selecting the reference system for orientation.

Cartesian manual travel will not be enabled if no bit is set or if just one bit is set for translation or for orientation. This means that one bit must always be set for translation and one for orientation. Cartesian manual travel will also not be enabled if more than one bit is set for translation or orientation.

The meaning of the individual bits is defined as follows :

Bit 0 : Translation in Basic Coordinate System

Bit 1 : Translation in Workpiece Coordinate System

Bit 2 : Translation in Tool Coordinate System

Bit 3 : reserved

Bit 4 : reserved

Bit 5 : reserved

Bit 6 : reserved

Bit 7 : reserved

Bit 8 : Orientation in Basic Coordinate System

Bit 9 : Orientation in Workpiece Coordinate System

Bit 10 : Orientation in Tool Coordinate System

Bit 11 : reserved

Bit 12 : reserved

Bit 13 : reserved

Bit 14 : reserved

Bit 15 : reserved

42660	ORI_JOG_MODE			-	-	
-	Definition of virtual kinematics for JOG			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	5	7/7	U

Description: This SD can be used to define virtual kinematics, which become active for the manual travel of orientations.

This setting data is evaluated only by the generic 5/6-axis transformation. This data has no meaning for OEM transformations.

The following setting options are available:

0: The virtual kinematics are defined by the transformation.

1: Euler angles are traversed during jog, that is the 1st axis turns round the Z direction, the 2nd axis turns around the X direction and, if present, the 3rd axis turns aound the new Z direction.

2: RPY angles are traversed during jog with the turning sequence XYZ, that is the 1st axis turns around the x direction, the 2nd axis turns around the Y direction and, if present, the 3rd axis turns around the new Z direction.

3: RPY angles are traversed during jog with the turning sequence ZYX, that is the 1st axis turns around the Z direction, the 2nd axis turns around the Y direction and, if present, the 3rd axis turns around the new X direction.

4: The turning sequence of the rotary axes is set by means of MD21120 $MC_ORIAX_TURN_TAB_1.

5: The turning sequence of the rotary axes is set by means of MD21130 $MC_ORIAX_TURN_TAB_2.

42670	ORIPATH_SMOOTH_DIST			-	-	
mm, degrees	Path for smoothing the orientation			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.0	-	7/7	U

Description: Displacement by which a jump in the tool orientation is smoothed with ORIPATH path-relative orientation interpolation. There is a deviation within this displacement from the relation of the orientation to the path tangent and the surface normal vector programmed with LEAD/TILT.

If zero is entered for this path length (SD42670 $SC_ORIPATH_SMOOTH_DIST = 0.0), an intermediate block is inserted for smoothing the orientation. This means that the path motion remains at a stop in a corner and the orientation is then turned separately.

42672	ORIPATH_SMOOTH_TOL			-	-	
degrees	Tolerance for smoothing the orientation			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	-	7/7	U

Description: Maximum angle (in degrees) for the deviation of the tool orientation with ORIPATH path-relative orientation interpolation. This angular tolerance is used for smoothing a "kink" in the orientation path.

42674	ORI_SMOOTH_DIST			-	-	
mm, degrees	Path for orientation smoothing during smoothing			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	-	7/7	U

Description: Path through which a tool orientation bend is smoothed on a block transition with G code OSD.

42676	ORI_SMOOTH_TOL			-	-	
degrees	Tolerance for orientation smoothing during smoothing			DOUBLE	Immediately	
-						
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	-	7/7	U

Description: Maximum angle (in degree) for the tool orientation deviation during orientation smoothing with G code OST with a bend in the orientation curve on block transitions.

42678	ORISON_TOL			-	-	
degrees	Tolerance for smoothing the orientation			DOUBLE	Immediately	
-						
-	-	10.00,10.00,10.00,10.00,10.00,10.00...	-	-	7/7	U

Description: Maximum angle (in degree) for the tool orientation deviation during orientation smoothing with G code ORISON over several blocks. However, smoothing is performed only via the path specified with SD42680 $SC_ORISON_DIST.

42680	ORISON_DIST			-	-	
mm, degrees	Path for orientation smoothing			DOUBLE	Immediately	
-						
-	-	5.00,5.00,5.00,5.00,5.00,5.00,5.00...	-	-	7/7	U

Description: Maximum path for orientation smoothing with G code ORISON across several blocks. The tolerance specified with SD42678 $SC_ORISON_TOL is not exceeded in any case.

42690	JOG_CIRCLE_CENTRE			-	-	
mm	Center of the circle			DOUBLE	Immediately	
-						
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	-	-	7/7	U

Description: This setting data is used to define the circle center point in the workpiece coordinate system during JOG of circles.

Only the relevant center point coordinates of the geometry axes in the active plane are evaluated, not the coordinate of the geometry axis vertical to the plane. This setting data is written via the user interface.

By default the coordinate of an axis with diameter programming is in the diameter. This can be changed with MD20360 $MC_TOOL_PARAMETER_DEF_MASK Bit 13 = 1 by indicating a radius.

42691	JOG_CIRCLE_RADIUS			-	-	
mm	Circle radius			DOUBLE	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: With this setting data, the circle radius in the WCS, the maximum circle during inner machining or the minimum circle during outer machining are defined when jogging circles. This setting data is written via the user interface.

42692	JOG_CIRCLE_MODE			-	-	
-	JOG of circles mode			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xf	7/7	U

Description: This setting data sets the following during JOG of circles:

Bit 0 = 0 :

Travel to + creates traversing on a circular path in counter-clockwise direction; travel to - creates traversing in clock-wise direction.

Bit 0 = 1 :

Travel to + creates traversing on a circular path in clockwise direction; travel to - creates traversing in counterclockwise direction.

Bit 1 = 0 :

The tool radius is not taken into account in checking the limitation produced by the specified circle or by the circle segment limited by the start and end angles.

Bit 1 = 1 :

The tool radius is taken into account in checking the limitation produced by the specified circle or by the circle segment limited by the start and end angles.

Bit 2 = 0 :

Internal machining is performed. The circle radius in SD42691 $SC_JOG_CIRCLE_RADIUS is the maximum possible radius.

Bit 2 = 1 :

External machining is performed. The circle radius in SD42691 $SC_JOG_CIRCLE_RADIUS is the minimum possible radius.

Bit 3 = 0 :

Given a full circle, the radius is enlarged starting from the circle center point in the direction of the ordinate (2nd geometry axis) of the plane.

Bit 3 = 1 :

Given a full circle, the radius is enlarged starting from the circle center point in the direction of the abscissa (1st geometry axis) of the plane.

This setting data should be written via the user interface.

42693	JOG_CIRCLE_START_ANGLE			-	-	
degrees	Circle start angle			DOUBLE	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	360	7/7	U

Description: This setting data defines the start angle during JOG of circles.

The start angle refers to the abscissa of the current plane. Traversing is only possible within the range

between the start and the end angle. SD42692 $SC_JOG_CIRCLE_MODE bit 0 defines the direction from the start to the end angle. If start and end angle equal zero, no limitation is active.

This setting data is written via the user interface.

42694	JOG_CIRCLE_END_ANGLE			-	-	
degrees	Circle end angle			DOUBLE	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	360	7/7	U

Description: This setting data defines the end angle during JOG of circles.

The end angle refers to the abscissa of the current plane. Traversing is only possible within the range

between the start and the end angle. SD42692 $SC_JOG_CIRCLE_MODE bit 0 defines the direction from the start to the end angle. If start and end angle equal zero, no limitation is active.

This setting data is written via the user interface.

42700	EXT_PROG_PATH			-	K1	
-	Program path for external subroutine call EXTCALL			STRING	Immediately	
-						
-	-		-	-	7/7	U

Description: The total path results from the string chaining of SD42700 $SC_EXT_PROG_PATH + the programmed subprogram identifier.

42750	ABSBLOCK_ENABLE			-	K1	
-	Enable base block display			BOOLEAN	Immediately	
-						
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7	U

Description: Value 0: Disable basic blocks with absolute values (basic block display)

Value 1: Enable basic blocks with absolute values (basic block display)

42800	SPIND_ASSIGN_TAB			-	S1	
-	Spindle number converter.			BYTE	Immediately	
-						
-	21	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17...	0	21	7/7	U

Description: The spindle converter converts the programmed (= logical) spindle number to the physical (= internal, configured) spindle number.

The index of the setting data (SD) corresponds to the programmed spindle number or the programmed address extension.

The SD contains the physical spindle which actually exists.

Special cases, errors, ...

Notes:

- The zero index (SPIND_ASSIGN_TAB[0]) is only used to display the master spindle selected in the channel and must not be overwritten.
- Changes to the spindle converter take effect immediately. It is therefore not advisable to change the spindle converter for spindles used in a part program from the HMI or PLC while a part program is running.
- After "delete SRAM", the numbers of the logical and physical spindles are identical.

42900	MIRROR_TOOL_LENGTH			-	W1	
-	Sign change of tool length with mirror image machining			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: TRUE:

If a frame with mirror image machining is active, the tool components

($TC_DP3[..., ...] to $TC_DP5[..., ...]) and the components of the base dimensions

($TC_DP21[..., ...] to $TC_DP23[..., ...]) whose associated axes

are mirrored, are also mirrored, i.e. their sign is inverted. The wear values

are not mirrored. If the wear values are to be mirrored too,

SD42910 $SC_MIRROR_TOOL_WEAR must be set.

FALSE:

The sign for tool length components is unaffected by whether a frame with mirror image machining is active.

42910	MIRROR_TOOL_WEAR			-	W1	
-	Sign change of tool wear with mirror image machining			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: TRUE:

If a frame with mirror image machining is activated, the signs of the wear values of the components in question are inverted. The wear values of the components that are not assigned to mirrored axes remain unchanged.

FALSE:

The signs for wear values are unaffected by whether a frame with mirror image machining is active.

42920	WEAR_SIGN_CUTPOS			-	W1	
-	Sign of tool wear depending on tool point direction			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: TRUE:

In the case of tools with a relevant tool point direction (turning and grinding tools), the sign for wear of the tool length components depends on the tool point direction.

The sign is inverted in the following cases (marked with an X):

Tool point direction	Length 1	Length 2
1		
2	X	
3	X	X
4		X
5		
6		
7	X	
8		X
9		

The sign for wear value of length 3 is not influenced by this setting data.

The SD42930 $SC_WEAR_SIGN acts in addition to this setting data.

FALSE:

The sign for wear of the tool length components is unaffected by the tool point direction.

42930	WEAR_SIGN			-	W1	
-	Sign of wear			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: TRUE:

The sign for wear of the tool length components and the tool radius are inverted, i.e. if a positive value in entered, the total dimension is decreased.

FALSE:

The sign for wear of the tool length components and the tool radius is not inverted.

42935	WEAR_TRANSFORM			-	W1,W4	
-	Transformations for tool components			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This setting data is bit-coded.

It determines which of the three wear components

wear

($TC_DP12 - $TC_DP14),

additive offsets fine ($TC_SCPx3 - $TC_SCPx5),

and additive offsets coarse ($TC_ECPx3 - $TC_ECPx5)

are subject to adapter transformation and transformation by an orientable tool holder, if one of the two G codes TOWMCS or TOWWCS from G code group 56 is active. If initial-setting G code TOWSTD is active, this setting data will not become active.

Then, the following assignment is valid:

Bit 0 = TRUE: Do not apply transformations to $TC_DP12 - $TC_DP14.

Bit 1 = TRUE: Do not apply transformations to $TC_SCPx3 - $TC_SCPx5.

Bit 2 = TRUE: Do not apply transformations to $TC_ECPx3 - $TC_ECPx5.

The bits not mentioned here are (currently) not assigned.

42940	TOOL_LENGTH_CONST			-	W1	
-	Change of tool length components with change of active plane			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: If this setting data is not equal to 0, the assignment of tool length components (length, wear, base dimensions) to geometry axes is not changed when the machining plane (G17 - G19) is changed.

The assignment of tool length components to geometry axes can be derived from the value of the setting data acc. to the following tables.

A distinction is made between turning and grinding tools (tool types 400 to 599) and other tools (typically milling tools) in the assignment.

Representation of this information in tables assumes that geometry axes 1 to 3 are called X, Y and Z. For assignment of an offset to an axis, not the axis identifier but the axis sequence is relevant.

Assignment for turning tools and grinding tools (tool types 400 to 599):

Content	Length 1	Length 2	Length 3
17	Y	X	Z
18*	X	Z	Y
19	Z	Y	X
-17	X	Y	Z
-18	Z	X	Y
-19	Y	Z	X

* Any value which is not 0 and is not one of the six values listed, is treated as value 18.

For values that are the same but with a different sign, assignment of length 3 is always the same, lengths 1 and 2 are reversed.
Assignment for all tools which are neither turning nor grinding tools (tool types < 400 or > 599):

Content	Length 1	Length 2	Length 3
17*	Z	Y	X
18	Y	X	Z
19	X	Z	Y
-17	Z	X	Y
-18	Y	Z	X
-19	X	Y	Z

* Any value which is not 0 and is not one of the six values listed, is treated as value 17.

For values that are the same but with a different sign, assignment of length 1 is always the same, lengths 2 and 3 are reversed.

42950	TOOL_LENGTH_TYPE			-	W1	
-	Assignment of tool length compensation independent of tool type			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description: This setting data defines the assignment of the tool length components to the geometry axes independently of the tool type. It can assume any value between 0 and 2. Any other value is interpreted as 0.

Value

0: Standard assignment. A distinction is made between turning and grinding tools (tool types 400 to 599) and other tools (milling tools).

1: The assignment of the tool length components is independent of the actual tool type, always as for milling tools.

2. The assignment of the tool length components is independent of the actual tool type, always as for turning tools.

The setting data also affects the wear values assigned to the length components.

If SD42940 $SC_TOOL_LENGTH_CONST is set, the tables defined there access the table for milling and turning tools defined by SD42950 $SC_TOOL_LENGTH_TYPE irrespective of the actual tool type, if the value of the table is not equal to 0.

42960	TOOL_TEMP_COMP			-	W1	
-	Temperature compensation for tool			DOUBLE	Immediately	
-						
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7	U

Description: Temperature compensation value for the tool. The compensation value acts as vector according to the current rotation of the tool direction.

This setting data will only be evaluated, if temperature compensation has been activated for tools with MD20390 $MC_TOOL_TEMP_COMP_ON.

Apart from that, the temperature compensation type must be set in bit 2 for the "Compensation in tool direction" MD32750 $MA_TEP_COMP_TYPE.

The "Temperature compensation" is an option that has to be previously enabled.

42970	TOFF_LIMIT			-	F2	
mm	Upper limit of correction value via $AA_TOFF			DOUBLE	Immediately	
-						
-	3	100000000.0, 100000000.0, 100000000.0...	-	-	7/7	U

Description: Upper limit of the offset value which can be defined by means of synchronized actions via the $AA_TOFF system variable.

This limit value influences the absolutely effective amount of offset through $AA_TOFF.

Whether the offset value is within the limit range can be checked via the $AA_TOFF_LIMIT system variable.

42974	TOCARR_FINE_CORRECTION			C08	-	
-	Fine offset TCARR ON / OFF			BOOLEAN	Immediately	
-						
-	-	FALSE,FALSE,FALSE, FALSE,FALSE,FALSE...	-	-	7/7	U

Description: TRUE:

On activating an orientable tool holder, the fine offset values are considered.

FALSE:

On activating an orientable tool holder, the fine offset are not considered.

42980	TOFRAME_MODE			-	K2	
-	Frame definition at TOFRAME, TOROT and PAROT			DWORD	Immediately	
-						
-	-	1000,1000,1000,1000,1000,1000,1000...	-	-	7/7	U

Description: This setting data defines the direction of the geometry axes on the machining plane (XY in the case of G17) in the case of the frame definition by means of (TOROTY, TOROTX) or for PAROT.

When a frame is calculated, the tool direction (Z in the case of G17) is uniquely defined so that the tool direction and vertical axis (Z in the case of G17) of the frame are parallel and lie perpendicular on the machining plane.

Rotation around the tool axis is free at first. This free rotation can be defined using this setting data so that the newly defined frame deviates as little as possible from a previously active frame.

In all cases in which the setting data is not zero, an active frame remains unchanged if the tool direction (Z in the case of G17) of the old and the new frame are the same.

SD42980 >= 2000:

In the case of TOROT (or TOROTY and TOROTX), the rotations and translations of the frame chain are used to calculate a frame in the tool reference system frame ($P_TOOLFRAME) berechnet.

Machine data 21110 $MC_X_AXIS_IN_OLD_X_Z_PLANE is not evaluated.

The explantory notes below refer to the G17 plane with the XY axes in the machining plane and the tool axis being Z.

SD42980 = 2000:

Rotation around the Z axis is selected so that the angle between the new X axis and the old X-Z plane has the same absolute value as the angle between the new Y axis and the old Y-Z plane. This setting corresponds to the mean value of both settings which would result for values 2001 and 2002 of this setting data.

It is also applied if the value of the units digit is greater than 2.

SD42980 = 2001:

The new X direction is selected so that it lies in the X-Z plane of the old coordinate system. The angular difference between the old and new Y axes is minimal with this setting.

SD42980 = 2002:

The new Y direction is selected so that it lies in the Y-Z plane of the old coordinate system. The angular difference between the old and new X axes is minimal with this setting.

None of the other settings of SD42980 (0,1,2,...1000,1001..) should be used for recommissioning.

For compatibility reasons, the following settings remain valid:

0: The orientation of the coordinate system is determined by the value of machine data 21110 $MC_X_AXIS_IN_OLD_X_Z_PLANE.

1: The new X direction is selected so that it lies in the X-Z plane of the old coordinate system. The angular difference between the old and new Y axes is minimal with this setting.

2: The new Y direction is selected so that it lies in the Y-Z plane of the old coordinate system. The angular difference between the old and new X axes is minimal with this setting.

3: The average of the two settings resulting from 1 and 2 is selected.

Addition of 100: In the case of a plane change from G17 to G18 or G19, a tool matrix is generated, in which the new axis directions are parallel to the old directions. The axes are swapped cyclically accordingly (standard transformation on plane changes). If the hundreds digit equals zero, a matrix is supplied in the cases of G18 and G19 which is derived from the unit matrix by simply rotating through 90 degrees around the X axis (G18) or through 90 degrees around the Y axis (G19). Thus in each case one axis is antiparallel to an initial axis. This setting is required to remain compatible with old software versions.

Addition of 1000: The tool-frame is linked to any active basic frames and settable frames. The response is thus compatible with earlier software versions (before 5.3). If the thousands digit is not set, the tool frame is calculated so that any active basic frames and settable frames are taken into account.

42984	CUTDIRMOD			C08	-	
-	Modification of $P_AD[2] or $P_AD[11]			STRING	Immediately	
-						
-	-		-	-	7/7	U

Description: States whether the tool point direction and cutting direction are to be modified on reading the corresponding system variables $P_AD[2] and $P_AD[11].

Modification is made by rotating the vector of the tool point direction or cutting direction by a specific angle in the active machining plane (G17-G19). The resulting output value is always the tool point direction or cutting direction created by the rotation or to which the rotated value is closest. the angle of rotation can be defined by one of the following six options:

1: The string is empty. The stated data are output unchanged.

2: The contents of the string is "P_TOTFRAME". The resulting rotation is determined from the total frame.

3: The contents of the string is a valid frame name (e.g. $P_NCBFRAME[3]). The resulting rotation is then calculated from this frame.

4: The contents of the string has the form "Frame1 : Frame2". The resulting rotation is determined from the part frame chain that is created by chaining all frames from Frame1 to Frame2 (in each case inclusive). Frame1 and Frame2 are valid frame names such as $P_PFRAME or $P_CHBFRAME[5]"

5: The contents of the frame is the valid name of a rotary axis (machine axis). The resulting rotation is determined from the programmed end position of this rotary axis. Additionally, an offset can be stated (in degrees, e.g. "A+90).

6: The rotation is programmed explicitly (in degrees).

Optionally, the first character of the string can be written as sign (+ or -). A plus sign will not have any effect on the angle calculation, but a minus sign will invert the sign of the calculated angle.

42990	MAX_BLOCKS_IN_IPOBUFFER			-	K1	
-	maximum number of blocks in IPO buffer			DWORD	Immediately	
-						
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/7	U

Description: This setting data can be used to limit the maximum number of blocks in the interpolation buffer to the maximum number specified in MD28060 $MC_MM_IPO_BUFFER_SIZE.

A negative value means that no limitation of the number of blocks is active in the interpolation buffer, and the number of blocks is determined solely by MD28060 $MC_MM_IPO_BUFFER_SIZE (default setting).

42995	CONE_ANGLE			-	-	
-	Taper angle			DOUBLE	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-90	90	7/7	U

Description: This setting data writes the taper angle for taper turning. This setting data is written via the operator interface.

42996	JOG_GEOAX_MODE_MASK			-	-	
-	JOG of geometry axis mode			DWORD	Immediately	
-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0x7	7/7	U

Description: This setting data sets the following during JOG of geometry axes:

Bit 0 = 1 :

A traversing request for the 1st geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to - .

Bit 1 = 1 :

A traversing request for the 2nd geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to -.

Bit 2 = 1:

A traversing request for the 3rd geometry axis is inverted, i.e. a traversing request to + triggers a traversing motion to -.

1.6.3 Axis-specific setting data

43100	LEAD_TYPE			-	M3	
-	Defines what is used as master value			DWORD	Reset	
CTEQ						
-	-	1	0	2	7/7	U

Description: Defines which value is to be used as master value:

0: Actual value

1: Setpoint

2: Simulated master value

43102	LEAD_OFFSET_IN_POS			-	M3	
-	Offset of master value if coupled to this axis			DOUBLE	Reset	
-						
-	-	0.0	-1e15	1e15	7/7	U

Description:

```
Offset of the master value before use on the coupling.
If this axis is a master value coupled following axis with CTABP
as the curve table and X as the master value, then its position
setpoint is calculated from LEAD_OFFSET_OUT_POS +
LEAD_SCALE_OUT_POS * CTABP( LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS
* X)
Related to ....
   SD43104 $SA_LEAD_SCALE_IN_POS
   SD43106 $SA_LEAD_OFFSET_OUT_POS
   SD43108 $SA_LEAD_SCALE_OUT_POS
```

43104	LEAD_SCALE_IN_POS			-	M3	
-	Scaling of master value if coupled to this axis			DOUBLE	Reset	
-						
-	-	1.0	-1e15	1e15	7/7	U

Description:

```
Scaling of the master value before use on the coupling.
If this axis is a master value coupled following axis with CTABP
as the curve table and X as the master value, then its position
setpoint is calculated from LEAD_OFFSET_OUT_POS +
LEAD_SCALE_OUT_POS * CTABP( LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS
* X)
Related to ....
   SD43102 $SA_LEAD_OFFSET_IN_POS
   SD43106 $SA_LEAD_OFFSET_OUT_POS
   SD43108 $SA_LEAD_SCALE_OUT_POS
```

43106	LEAD_OFFSET_OUT_POS			-	M3	
mm, degrees	Offset of the functional value of the curve table			DOUBLE	Reset	
-						
-	-	0.0	-1e15	1e15	7/7	U

Description:

```
Offset of the master value before use on the coupling.
If this axis is a master value coupled following axis with CTABP
as the curve table and X as the master value, then its position
setpoint is calculated from LEAD_OFFSET_OUT_POS +
LEAD_SCALE_OUT_POS * CTABP( LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS
* X)
Related to ....
   SD43102 $SA_LEAD_OFFSET_IN_POS
   SD43104 $SA_LEAD_SCALE_IN_POS
   SD43108 $SA_LEAD_SCALE_OUT_POS
```

43108	LEAD_SCALE_OUT_POS			-	M3	
-	Scaling of functional value of the curve table			DOUBLE	Reset	
-						
-	-	1.0	-1e15	1e15	7/7	U

Description: Scaling of the function value before use of the curve table.

If this axis is a master value coupled following axis with CTABP as the curve table and X as the master value, then its position setpoint is calculated from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP(LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS * X)

Related to ....

SD43102 $SA_LEAD_OFFSET_IN_POS
SD43104 $SA_LEAD_SCALE_IN_POS
SD43106 $SA_LEAD_OFFSET_OUT_POS

43120	DEFAULT_SCALE_FACTOR_AXIS			-	FBFA	
-	Axial default scaling factor with G51 active			DWORD	Immediately	
-						
-	-	1	-	-	7/7	U

Description: If no axial scaling factor I, J, or K is programmed in the G51 block, SD43120 $SA_DEFAULT_SCALE_FACTOR_AXIS is active. The scaling factor is only active if MD22914 $MC_AXES_SCALE_ENABLE is set.

Related to:

MD22914 $MC_AXES_SCALE_ENABLE,
MD22910 $MC_WEIGHTING_FACTOR_FOR_SCALE

43200	SPIND_S			-	S1	
rev/min	Speed for spindle start by VDI			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Spindle speed at spindle start by NC/PLC interface signals DB31, ... DBX30.1 (Spindle start clockwise rotation) and DB31, ... DBX30.2 (Spindle start counterclockwise rotation).

Example: $SA_SPIND_S[S1] = 600

Spindle 1 is started at a speed of 600 rpm upon detection of the positive edge of one of the above-mentioned VDI starting signals.

Speed programming values are entered in the SD by setting bit 4=1 in MD35035 $MA_SPIND_FUNCTION_MASK.

The SD becomes active in JOG mode as a default speed by setting bit 5=1 in MD35035 $MA_SPIND_FUNCTION_MASK (exception: the value is zero).

Related to:

MD35035 $MA_SPIND_FUNCTION_MASK
MD10709 $MN_PROG_SD_POWERON_INIT_TAB
MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43202	SPIND_CONSTCUT_S			-	S1	
m/min	Const cut speed for spindle start by VDI			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Definition of the constant cutting speed for the master spindle.

The setting data is evaluated at spindle start by the NC/PLC interface signals DB31, ... DBX30.1 (Spindle start clockwise rotation) and DB31, ... DBX30.2 (Spindle start counterclockwise rotation)

Cutting speed programming values are entered in the SD by setting bit 8=1 in MD35035 $MA_SPIND_FUNCTION_MASK.

Related to:

MD35035 $MA_SPIND_FUNCTION_MASK

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43206	SPIND_SPEED_TYPE			A06	-	
-	Spindle speed type for spindle start through VDI			DWORD	Immediately	
-						
-	-	94	93	972	7/7	U

Description: Definition of the spindle speed type for the master spindle.

The range of values and the functionality correspond to the 15th G group "feed type".

Permissible values are the G values: 93, 94, 95, 96, 961, 97, and 971.

The stated values make a functional distinction between the following variants:

==> 93, 94, 95, 97 and 971: The spindle is started at the speed in SD 43200 $SA_SPIND_S.

==> 96 and 961: The speed of the spindle is derived from the cutting speed of SD 43202 $SA_SPIND_CONSTCUT_S and the radius of the transverse axis.

The default value is 94 (corresponds to G94).

The default value becomes active if the SD is written with impermissible values.

43210	SPIND_MIN_VELO_G25		-	S1	
rev/min	Programmed spindle speed limitation G25		DOUBLE	Immediately	
-					
-	- 0.0	-	-	7/7	U

Description: A minimum spindle speed limit below which the spindle must not fall is entered in SPIND_MIN_VELO_G25. The NCK limits the set spindle speed to this value if it is too low.

The spindle speed may only fall below the minimum as a result of:

- Spindle offset 0%
- M5
- S0
- NC/PLC interface signal DB31, ... DBX4.3 (Spindle stop)
- NC/PLC interface signal DB31, ... DBX2.1 (Servo enable)
- NC/PLC interface signal DB21-30 DBX35.7 (Channel status: Reset)
- NC/PLC interface signal DB31, ... DBX2.2 (Delete distance-to-go/Spindle reset)
- NC/PLC interface signal DB31, ... DBX18.5 (Oscillation speed)
- Cancel S value

SD irrelevant to ......

other spindle modes used in open-loop control mode (SPOS, M19, SPOSA)

Related to:

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43220	SPIND_MAX_VELO_G26		-	S1	
rev/min	Programmable upper spindle speed limitation G26		DOUBLE	Immediately	
-					
-	- 1000.0	-	-	7/7	U

Description: A maximum spindle speed is entered in SD43220 $SA_SPIND_MAX_VELO_G26, which the spindle must not exceed. The NCK limits an excessive spindle speed setpoint to this value.

SD irrelevant for ......

all spindle modes except open-loop control mode.

Special cases, errors, ...

The value in SD43210 $SA_SPIND_MIN_VELO_G26 can be altered by means of:

- G26 S.... in the part program
- Operator commands via HMI

The value in SD43210 $SA_SPIND_MIN_VELO_G26 is retained after a reset or Power Off.

Related to ....

SD43210 $SA_SPIND_MIN_VELO_G25 (programmed spindle speed limit G25)

SD43230 $SA_SPIND_MAX_VELO_LIMS (programmed spindle speed limit G96/961)

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43230	SPIND_MAX_VELO_LIMS			-	S1,Z1	
rev/min	Spindle speed limitation with G96			DOUBLE	Immediately	
-						
-	-	100.0	-	-	7/7	U

Description: Limits the spindle speed with G96, G961, G97 to the stated maximum value [degrees/second]. This setting data can be written from the block with LIMS.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (that is the value is retained after reset).

Related to ....

SD43210 $SA_SPIND_MIN_VELO_G25 (programmed spindle speed limit G25)

SD43230 $SA_SPIND_MAX_VELO_LIMS (programmed spindle speed limit with G96/961)

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43235	SPIND_USER_VELO_LIMIT			A06	S1,Z1	
rev/min	Maximum spindle speed			DOUBLE	Immediately	
-						
-	-	10000.0	-	-	7/7	U

Description: The user can enter a maximum spindle speed.

The NCK limits an excessive spindle setpoint speed to this value. The SD is effective immediately.

Corresponds with:

MD35100 $MA_SPIND_VELO_LIMIT (maximum spindle speed)

MD35110 $MA_GEAR_STEP_MAX_VELO (maxmum speed for gear stage change)

43240	M19_SPOS			-, A12	S1	
degrees	Spindle position for spindle positioning with M19.			DOUBLE	Immediately	
-						
-	-	0.0	-10000000.0	10000000.0	7/7	U

Description: Spindle position in [DEGREES] for spindle positioning with M19.

The position approach mode is defined in $SA_M19_SPOSMODE.

Default positions must lie in the range 0 <= pos < MD30330 $MA_MODULO_RANGE.

Path defaults (SD43250 $SA_M19_SPOSMODE = 2) can be positive or negative and are only limited by the input format.

43250	M19_SPOSMODE			-, A12	S1	
-	Spindle position approach mode for spindle positioning with M19.			DWORD	Immediately	
-						
-	-	0	0	5	7/7	U

Description: Spindle position approach mode for spindle positioning with M19.

In which signify:

0: DC (default) approach position on the shortest path.

1: AC approach position normally.

2: IC approach incrementally (as path), sign gives the traversing direction

3: DC approach position on the shortest path.

4: ACP approach position from the positive direction.

5: ACN approach position from the negative direction.

43300	ASSIGN_FEED_PER_REV_SOURCE			-	V1,P2,S1	
-	Revolutional feedrate for positioning axes/spindles			DWORD	Immediately	
CTEQ						
-	-	0	-3	31	7/7	U

Description: 0= No revolutional feedrate is active.

>0= Machine axis index of the rotary axis/spindle, from which the revolutional feedrate is derived.

-1= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active

-2= The revolutional feedrate is derived from the axis with machine axis index == 0 or the axis with an index in MD10002 $MN_AXCONF_LOGIC_MACHAX_TAB == 0.

-3= The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. No revolutional feedrate is active if the master spindle is at a standstill.

Related to ....

SD42600 $SC_JOG_FEED_PER_REV_SOURCE (revolutional feedrate for geometry axes on which a frame with rotation acts in JOG mode.)

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43320	JOG_POSITION			-	-	
mm, degrees	JOG position			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Position to be approached in JOG. Depending on MD10735 $MN_JOG_MODE_MASK bit 4 axial frames and, with an axis configured as geometry axis, the tool length offset are considered.

43340	EXTERN_REF_POSITION_G30_1			-, A12	FBFA	
-	Reference point position for G30.1			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Reference point position for G30.1.

This setting data will be evaluated in CYCLE328.

43350	AA_OFF_LIMIT			-	S5,FBSY	
mm, degrees	Upper limit of offset value $AA_OFF with clearance control			DOUBLE	PowerOn	
CTEQ						
-	-	100000000.0	0.0	1e15	7/7	U

Description: The upper limit of the offset value, which can be defined by means of synchronized actions via the variable $AA_OFF.

This limit value acts on the absolutely effective amount of offset by means of $AA_OFF.

It is used for clearance control in laser machining:

The offset value is limited so that the laser head cannot get caught in the plate recesses.

Whether the offset value lies within the limit range can be queried via system variable $AA_OFF_LIMIT.

43400	WORKAREA_PLUS_ENABLE			-	A3	
-	Working area limitation active in positive direction			BOOLEAN	Immediately	
CTEQ						
-	-	FALSE	-	-	7/7	U

Description: 1: The working area limitation of the axis concerned is active in the positive direction.

0: The working area limitation of the axis concerned is switched off in the positive direction.

The setting data is parameterized via the operator panel in the operating area "Parameters" by activating/deactivating the working area limitation.

SD irrelevant for ......

G code: WALIMOF

43410	WORKAREA_MINUS_ENABLE			-	A3	
-	Working area limitation active in the negative direction			BOOLEAN	Immediately	
CTEQ						
-	-	FALSE	-	-	7/7	U

Description: 1: The working area limitation of the axis concerned is active in the negative direction.

0: The working area limitation of the axis concerned is switched off in the negative direction.

The setting data is parameterized via the operator panel in the operating area "Parameters" by activating/deactivating the working area limitation.

SD irrelevant for ......

G code: WALIMOF

43420	WORKAREA_LIMIT_PLUS			-	A3	
mm, degrees	Working area limitation plus			DOUBLE	Immediately	
-						
-	-	1.0e+8	-	-	7/7	U

Description: The working area defined in the basic coordinate system in the positive direction of the axis concerned can be limited with axial working area limitation.

The setting data can be changed on the operator panel in the operating area "Parameters".

The positive working area limitation can be changed in the program with G26.

SD irrelevant for ......

G code: WALIMOF

Related to ....

SD43400 $SA_WORKAREA_PLUS_ENABLE

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43430	WORKAREA_LIMIT_MINUS			-	A3	
mm, degrees	Working area limitation minus			DOUBLE	Immediately	
-						
-	-	-1.0e+8	-	-	7/7	U

Description: The working area defined in the basic coordinate system in the negative direction of the axis concerned can be limited with axial working area limitation.

The setting data can be changed on the operator panel in the operating area "Parameters".

The negative working area limitation can be changed in the program with G25.

SD irrelevant for ......

G code: WALIMOF

Related to ....

SD43410 $SA_WORKAREA_MINUS_ENABLE

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43500	FIXED_STOP_SWITCH			-	F1	
-	Selection of travel to fixed stop			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: The "Travel to fixed stop" function can be selected and deselected with this setting data.

SD=0 Deselect "Travel to fixed stop"

SD=1 Select "Travel to fixed stop"

The setting data can only be overwritten by the part program with the command FXS[x]=1/0 when software version 2.x is installed.

The status of the setting data is indicated on the operator panel in the "Parameters" area.

43510	FIXED_STOP_TORQUE			-	F1	
%	Fixed stop clamping torque			DOUBLE	Immediately	
-						
-	-	5.0	0.0	800.0	7/7	U

Description: The clamping torque is entered in this setting data as a % of the maximum motor torque (corresponds to % of max. current value with FDD).

The setting data is active only if the fixed stop has been reached.

The fixed stop is considered reached when,

- with MD: MD37060 $MA_FIXED_STOP_ACKN_MASK, bit 1 = 0 (no acknowledgment required), the interface signal DB31, ... DBX62.5 (Fixed stop reached) is set by the NC
- with MD37060 $MA_FIXED_STOP_ACKN_MASK, bit 1 = 1 (acknowledg-ment required), the interface signal DB31, ... DBX62.5 (Fixed stop reached) is set by the NC and acknowledged by interface signal DB31, ... DBX1.1 (Acknowledge fixed stop reached)

The status of the setting data is indicated on the operator panel in the "Parameters" area.

The FXST[x] command effects a block-synchronous change to this setting data. It can also be changed by the user or via the PLC. Otherwise the value is transferred from MD37010 $MA_FIXED_STOP_TORQUE_DEF to the setting data when "Travel to fixed stop" is active.

Related to ....

MD37010 $MA_FIXED_STOP_TORQUE_DEF(default setting for clamping torque)

43520	FIXED_STOP_WINDOW			-	F1	
mm, degrees	Fixed stop monitoring window			DOUBLE	Immediately	
-						
-	-	1.0	-	-	7/7	U

Description: The fixed stop monitoring window is entered in this setting data.

The setting data is active only if the fixed stop has been reached.

The fixed stop is considered reached when,

- with MD37060 $MA_FIXED_STOP_ACKN_MASK, bit 1 = 0 (no acknowledgment required) interface signal DB31, ... DBX62.5 (Fixed stop reached) is set by the NC
- with MD37060 $MA_FIXED_STOP_ACKN_MASK, bit 1 = 1 (acknowledgment required) interface signal DB31, ... DBX62.5 (Fixed stop reached) is set by the NC and acknowledged by interface signal DB31, ... DBX1.1 (Acknowledge fixed stop reached)

If the position at which the fixed stop was detected leaves the tolerance band by more than the amount specified in SD43520 $SA_FIXED_STOP_WINDOW, then alarm 20093 "Fixed stop monitoring has responded" is output and the "FXS" function is deselected.

The status of the setting data is indicated on the operator panel in the "Parameters" area.

The FXSW[x] command effects a block-synchronous change to this setting data. It can also be changed by the user or via the PLC.

The value is otherwise transferred from MD37020 $MA_FIXED_STOP_WINDOW_DEF to the setting data when "Travel to fixed stop" is active.

Related to ....

MD37020 $MA_FIXED_STOP_WINDOW_DEF (default setting for fixed stop monitoring window)

43600	IPOBRAKE_BLOCK_EXCHANGE			A06, A10	K1	
%	Block change criterion 'braking ramp'			DOUBLE	Immediately	
-						
-	-	0.0	0	100.0	7/7	U

Description: Specifies the application time at single axis interpolation for the block change criterion braking ramp: At 100%, the block change criterion is fulfilled at the time of application of the braking ramp. At 0%, the block change criterion is identical with IPOENDA.

Note:

MD10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (i.e. the value is retained even after reset).

43610	ADISPOSA_VALUE			A06, A10	P2	
mm, degrees	Tolerance window 'braking ramp'			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: In case of single-axis interpolation, this value defines the size of the tolerance window which the axis must have reached in order to enable a block change in case of the block-change criterion 'braking ramp with tolerance window valid' and when reaching the corresponding % value of the braking ramp (SD43600 $SA_IPOBRAKE_BLOCK_EXCHANGE).

Note:

By means of the MD 10710 $MN_PROG_SD_RESET_SAVE_TAB, the user can specify that the value written by the part program is transferred into the active file system in case of a reset (i.e. the value is retained even after the reset).

43700	OSCILL_REVERSE_POS1			-	P5	
mm, degrees	Oscillation reversal point 1			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Position of the oscillating axis at reversal point 1.

Note:

MD10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after RESET.)

Application example(s)

NC language: OSP1[Axis]=Position

Related to ....

SD43710 $SA_OSCILL_REVERSE_POS2

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43710	OSCILL_REVERSE_POS2			-	P5	
mm, degrees	Oscillation reversal point 2			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Position of the oscillating axis at reversal point 2.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: OSP2[Axis]=Position

Related to ....

SD43700 $SA_OSCILL_REVERSE_POS1

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43720	OSCILL_DWELL_TIME1			-	P5	
s	Hold time at oscillation reversal point 1			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Hold time of the oscillating axis at reversal point 1.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: OST1[Axis]=Position

Related to ....

SD43730 $SA_OSCILL_DWELL_TIME2
MD10709 $MN_PROG_SD_POWERON_INIT_TAB
MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43730	OSCILL_DWELL_TIME2			-	P5	
s	Hold time at oscillation reversal point 2			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Hold time of the oscillating axis at reversal point 2.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: OST2[Axis]=Position

Related to ....

SD43720 $SA_OSCILL_DWELL_TIME1
MD10709 $MN_PROG_SD_POWERON_INIT_TAB
MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43740	OSCILL_VELO			-	P5	
mm/min, rev/min	Feedrate of reciprocating axis			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Feed rate of the oscillating axis

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: FA[Axis]=F value

Related to ....

MD10709 $MN_PROG_SD_POWERON_INIT_TAB
MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43750	OSCILL_NUM_SPARK_CYCLES		-	P5	
-	Number of spark-out strokes		DWORD	Immediately	
-					
-	-	0	-	-	7/7	U

Description: Number of sparking-out strokes performed after ending the oscillating movement

Application example(s)

NC language: OSNSC[Axis]=Stroke number

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Related to ....

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43760	OSCILL_END_POS			-	P5	
mm, degrees	End position of the reciprocating axis			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Position the oscillating axis travels to after ending the sparking-out strokes.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: OSE[Axis]=Position

Related to ....

MD10709 $MN_PROG_SD_POWERON_INIT_TAB

MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43770	OSCILL_CTRL_MASK			-	P5	
-	Oscillation sequence control mask			DWORD	Immediately	
-						
-	-	0	-	-	7/7	U

Description:

```
Bit mask:
Bit no.       | Meaning in OSCILL_CTRL_MASK
-----------------------------------------------------------------
-------------
0(LSB)-1      | 0: Stop at the next reversal point if the
              |    oscillating movement is switched off
              |
              | 1: Stop at reversal point 1 if the
              |    oscillating movement is switched off
              | 2: Stop at reversal point 2 if the
              |    oscillating movement is switched off
              | 3: Do not approach a reversal point when the oscil-
lating movement is switched off
              |    if no sparking-out strokes are programmed
-----------------------------------------------------------------
-------------
2             | 1: Approach end position after sparking out
-----------------------------------------------------------------
-------------
3            | 1: If the oscillating movement is aborted by delete
distance-to-go,
             |    then the sparking-out strokes are to be executed
afterwards
              |    and the end position approached if necessary
-----------------------------------------------------------------
-------------
4            | 1: If the oscillating movement is aborted by delete
distance-to-go,
              |    then the corresponding reversal point
              |    is approached on switch off
-----------------------------------------------------------------
-------------
5           | 1: Changed feedrate does not become active until the
next reversal point
-----------------------------------------------------------------
-------------
6             | 1: Path override is active if the feed rate is 0,
              |    otherwise speed override is active
-----------------------------------------------------------------
-------------
7             | 1: In the case of rotary axes DC (shortest path)
-----------------------------------------------------------------
-------------
8            | 1: Execute sparking-out stroke as single stroke not
as double stroke
-----------------------------------------------------------------
-------------
```

```
9           | 1: On starting, first approach the starting posi-
tion, see
            |    SD43790 $SA_OSCILL_START_POS
-----------------------------------------------------------------
-------------
Application example(s)
NC language:      OSCTRL[Axis]=(setting options, reset options)
Related to ....
     MD10709 $MN_PROG_SD_POWERON_INIT_TAB
     MD10710 $MN_PROG_SD_RESET_SAVE_TAB
```

43780	OSCILL_IS_ACTIVE			-	P5	
-	Activate oscillation movement			BOOLEAN	Immediately	
-						
-	-	FALSE	-	-	7/7	U

Description: Switching the oscillating movement on and off

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

Application example(s)

NC language: OS[Axis]=1, OS[Axis]=0

Related to ....

MD10709 $MN_PROG_SD_POWERON_INIT_TAB
MD10710 $MN_PROG_SD_RESET_SAVE_TAB

43790	OSCILL_START_POS			-	-	
mm, degrees	Start position of reciprocating axis			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: Position approached by the oscillating axis at the start of oscillation if this is set in SD43770 $SA_OSCILL_CTRL_MASK.

Note:

MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)

43900	TEMP_COMP_ABS_VALUE			-	K3	
-	Position-independent temperature compensation value			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: The position-independent temperature compensation value is defined by SD43900 $SA_TEMP_COMP_ABS_VALUE.

-

The machine axis traverses this additional compensation value as soon as the position-independent temperature compensation has been activated (MD32750 $MA_TEMP_COMP_TYPE = 1 oder 3).

SD irrelevant for ......

MD32750 $MA_TEMP_COMP_TYPE = 0 or 2

Related to ....

MD32750 $MA_TEMP_COMP_TYPE Temperature compensation type

MD32760 $MA_COMP_ADD_VELO_FACTOR Velocity overshoot caused by compensation

43910	TEMP_COMP_SLOPE			-	K3	
-	Lead angle for position-dependent temperature compensation			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: In the case of position-dependent temperature compensation, the error curve characteristic of the temperature-dependent actual-value deviation can often be approximated by a straight line. This straight line is defined by a reference point P_0 and a slope tanß.

SD43910 $SA_TEMP_COMP_SLOPE defines the slope tanß. This slope can be changed by the PLC user program as a function of the current temperature.

The axis traverses additionally the compensation value calculated for the current actual position as soon as the position-dependent temperature compensation becomes active (MD32750 $MA_TEMP_COMP_TYPE = = 2 or 3).

MD32760 $MA_COMP_ADD_VELO_FACTOR limits the maximum angle of slope tanß_max of the error curve. This maximum angle of slope cannot be exceeded.

SD irrelevant for ......

MD32750 $MA_TEMP_COMP_TYPE = 0 or 1

Special cases, errors, ...

When SD43910 $SA_TEMP_COMP_SLOPE is greater than tanß_max, the slope tanß_max is used to calculate the position-dependent temperature compensation value internally. No alarm is output.

Related to ....

MD32750 $MA_TEMP_COMP_TYPE Temperature compensation type

SD43920 $SA_TEMP_COMP_REF_POSITION Reference position for position-dependent temperature compensation

MD32760 $MA_COMP_ADD_VELO_FACTOR Velocity overshoot caused by compensation

43920	TEMP_COMP_REF_POSITION			-	K3	
-	Ref. position of position-dependent temperature compensation			DOUBLE	Immediately	
-						
-	-	0.0	-	-	7/7	U

Description: In the case of position-dependent temperature compensation, the error curve characteristic of the temperature-dependent actual-value deviation can often be approximated by a straight line. This straight line is defined by a reference point P_0 and a slope tanß.

SD43920 $SA_TEMP_COMP_REF_POSITION defines the position of the reference point P_0. This reference position can be changed by the PLC user program as a function of the current temperature.

The axis traverses additionally the compensation value calculated for the current actual position as soon as the position-dependent temperature compensation becomes active (MD32750 $MA_TEMP_COMP_TYPE = 2 or 3).

SD irrelevant for ......

MD32750 $MA_TEMP_COMP_TYPE = 0 or 1

Related to ....

MD32750 $MA_TEMP_COMP_TYPE Temperature compensation type

SD43910 $SA_TEMP_COMP_SLOPE Angle of slope for position-dependent temperature compensation

1.7 Machine data cycles

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Description: Description

1.7.1 General configuration machine data

51000	DISP_RES_MM			-	-	
-	Display resolution in mm			BYTE	PowerOn	
-						
-	-	3	0	6	7/3	M

Description: Display resolution in mm

51001	DISP_RES_MM_FEED_PER_REV			-	-	
-	Display resolution in mm feedrate/rev			BYTE	Immediately	
-						
-	-	3	0	6	7/3	M

Description: Display resolution in mm feedrate/rev

51002	DISP_RES_MM_FEED_PER_TIME			-	-	
-	Display resolution in mm feedrate/min			BYTE	Immediately	
-						
-	-	3	0	6	7/3	M

Description: Display resolution in mm feedrate/min

51003	DISP_RES_MM_FEED_PER_TOOTH			-	-	
-	Display resolution in mm feedrate/tooth			BYTE	Immediately	
-						
-	-	3	0	6	7/3	M

Description: Display resolution in mm feedrate/tooth

51004	DISP_RES_MM_CONST_CUT_RATE			-	-	
-	Display resolution constant cutting speed m/min			BYTE	Immediately	
-						
-	-	3	0	6	7/3	M

Description: Display resolution constant cutting speed m/min

51010	DISP_RES_INCH			-	-	
-	Display resolution in inch			BYTE	PowerOn	
-						
-	-	4	0	6	7/3	M

Description: Display resolution in inch

51011	DISP_RES_INCH_FEED_P_REV			-	-	
-	Display resolution in inch feedrate/rev			BYTE	Immediately	
-						
-	-	4	0	6	7/3	M

Description: Display resolution in inch feedrate/rev

51012	DISP_RES_INCH_FEED_P_TIME			-	-	
-	Display resolution in inch feedrate/min			BYTE	Immediately	
-						
-	-	4	0	6	7/3	M

Description: Display resolution in inch feedrate/min

51013	DISP_RES_INCH_FEED_P_TOOTH			-	-	
-	Display resolution in inch feedrate/tooth			BYTE	Immediately	
-						
-	-	4	0	6	7/3	M

Description: Display resolution in inch feedrate/tooth

51014	DISP_RES_INCH_CUT_RATE			-	-	
-	Display resolution constant cutting speed ft/min			BYTE	Immediately	
-						
-	-	4	0	6	7/3	M

Description: Display resolution constant cutting speed ft/min

51020	DISP_RES_ANGLE			-	-	
-	Display resolution of angle			BYTE	Immediately	
-						
-	-	3	0	6	7/3	M

Description: Display resolution of angle

51021	DISP_RES_SPINDLE			-	-	
-	Display resolution of spindles			BYTE	Immediately	
-						
-	-	0	0	6	7/3	M

Description: Decimal places in speed entry field

51022	DISP_RES_ROT_AX_FEED			-	-	
-	Display resolution of rotary axis feedrate			BYTE	Immediately	
-						
-	-	0	0	6	7/3	M

Description: Display resolution of rotary axis feedrate

51023	ACT_VALUE_SPIND_MODE			-	-	
-	Only display spindles in actual values window when in axis mode			BYTE	PowerOn	
-						
-	-	1	0	1	3/4	M

Description: This affects the display of the spindles in the axis actual values window. If the value is set to 1, only those spindles in axis mode are displayed, those in spindle mode are shown as gaps. If the value is set to 0, all spindles are displayed.

51025	FRAMES_ACT_IMMEDIATELY			-	-	
-	Activate active offset immediately			BYTE	PowerOn	
-						
-	-	1	0	1	4/3	M

Description: Active data (frames) are activated immediately after change

51026	AXES_SHOW_GEO_FIRST			-	-	
-	Actual value display with leading axes			BYTE	PowerOn	
-						
-	-	1	0	1	4/3	M

Description: When the machine data value is 1, the geometry axes of the channel are displayed first.

51027	ONLY_MKS_DIST_TO_GO			-	-	
-	Distance-to-go display in work window			BYTE	PowerOn	
-						
-	-	0	0	1	4/3	M

Description: Distance-to-go display in work window

51028	BLOCK_SEARCH_MODE_MASK			-	-	
-	Bit mask for available block search modes			BYTE	PowerOn	
-						
-	-	51	-	-	4/3	M

Description: Bit mask for available search modes

Bit 0:Block search with calculation but no approach

Bit 1:Block search with calculation and approach

Bit 2:

Bit 3:Skip EXTCALL programs

Bit 4:Block search without calculation

Bit 5:Block search with test run

51029	MAX_SKP_LEVEL			-	-	
-	Maximum number of skip levels in the NC program			BYTE	PowerOn	
-						
-	-	1	1	10	4/3	M

Description: The machine data defines how many skip levels are made available for operation.

51030	SPIND_MAX_POWER			-	-	
%	Maximum value of spindle power rating display			DWORD	PowerOn	
-						
-	-	100	0	255	4/3	M

Description: Maximum value of the permissible spindle power rating in percent; the display bar in the machine image is shown in green within the range between 0 and the value stored in SPIND_MAX_POWER.

51031	SPIND_POWER_RANGE			-	-	
%	Display range of spindle power rating display			DWORD	PowerOn	
-						
-	-	100	0	255	4/3	M

Description: Scale end value for spindle power rating in percent; value must be equal to or greater than SPIND_MAX_POWER.

The display bar in the machine image is shown in red in the range between the values of SPIND_MAX_POWER and SPIND_POWER_RANGE.

51032	STAT_DISPLAY_BASE			-	-	
-	Number basis for display of articulated joint STAT			BYTE	PowerOn	
-						
-	-	2	0	16	4/3	M

Description: Number basis for display of articulated joint STAT

00: no display

02: binary value display

10: decimal value display

16: hexadecimal value display

51033	TU_DISPLAY_BASE			-	-	
-	Number basis for display of rotary axis position TU			BYTE	PowerOn	
-						
-	-	2	0	16	4/3	M

Description: Number basis for display of rotary axis position TU

00: no display

02: binary value display

10: decimal value display

16: hexadecimal value display

51034	TEACH_MODE			-	-	
-	Teach mode to be activated			DWORD	PowerOn	
-						
-	-	1	-	-	4/3	M

Description: Teach mode to be activated

Bit 0: default teach-in

Taught-in block is transferred to the program using the Accept softkey.

Bit 1: acceptance of teach block can be blocked by the PLC.

DB19.DBX13.0 = 0 block is accepted.

DB19.DBX13.0 = 1 block is not accepted.

Bit 2: block selection only explicitely

Bit 16-31 reserved for OEM.

51035	WRITE_FRAMES_FINE_LIMIT			-	-	
-	Input limit for all WO fine			DOUBLE	PowerOn	
-						
-	-	0.999	-	-	4/3	M

Description: Input limit for all work offsets fine

51036	ENABLE_COORDINATE_REL			-	-	
-	Enable REL coordinate system			BYTE	PowerOn	
-						
-	-	0	0	1	7/3	M

Description: Display REL coordinate system

0 = no relative coordinate system selectable

1 = REL coordinate system can be selected as an alternative of the WCS/SZS coordinate system

51037	ENABLE_COORDINATE_ACS			-	-	
-	Enable settable coordinate system			BYTE	PowerOn	
-						
-	-	0	0	1	7/3	M

Description: Activate settable coordinate system

0 = WCS coordinate system is displayed

1 = SZS coordinate system is displayed

(SZS is WCS reduced by the offset components defined in MD24030)

51038	SET_ACT_VALUE			-	-	
-	Set actual value selection			BYTE	PowerOn	
-						
-	-	1	0	1	7/3	M

Description: Set actual value selection

0 = Set actual value is not offered.

1 = if a user frame (settable work offset e.g. G54) is active, it will be used. In G500 Set actual values is not offered (system frame is no longer used).

51039	PROGRAM_CONTROL_MODE_MASK			-	-	
-	Options for machine - program influence			DWORD	PowerOn	
-						
-	-	1	-	-	7/3	M

Description: Options for machine - program influence:

Bit 0: program test function available

51040	SWITCH_TO_MACHINE_MASK			-	-	
-	Automatic operating area switchover to machine			BYTE	PowerOn	
-						
-	-	0	-	-	7/3	M

Description: Automatic area switchover dependent upon machine

Bit 0: No automatic switch to Machine operating area when the program is selected in the Program Manager.

Bit 1: No automatic switch to Machine operating area when the operating mode is changed over via the machine control panel (MCP).

Bit 2: No automatic switch to Machine operating area when the program is selected in the Programs operating area.

Bit 3: No automatic start of block search when the program is selected / executed in the Programs operating area.

51041	ENABLE_PROGLIST_USER			-	-	
-	Activation of PLC program list, USER area			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: Activates the PLC program list of the USER area. The programs entered there can be selected by the PLC for processing.

51043	ENABLE_PROGLIST_MANUFACT			-	-	
-	Activation of PLC program list, MANUFACTURER area			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: Activates the PLC program list of the MANUFACTURER area. The programs entered here can be selected by the PLC for processing.

51044	ACCESS_SHOW_SBL2			-	-	
-	Display protection level SBL2			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Display protection level SBL2

51045	ACCESS_TEACH_IN			-	-	
-	Protection level TEACH IN			BYTE	PowerOn	
-						
-	-	4	0	7	4/3	M

Description: Protection level TEACH IN

51046	ACCESS_CLEAR_RPA			-	-	
-	Protection level delete R variables			BYTE	PowerOn	
-						
-	-	4	0	7	4/3	M

Description: Protection level delete R variables

51047	ACCESS_READ_GUD_LUD			-	-	
-	Read user variable protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Read user variable protection level

51048	ACCESS_WRITE_GUD_LUD			-	-	
-	Write protection level of user variables			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write protection level of user variables

51049	ACCESS_WRITE_PRG_COND			-	-	
-	Write program control protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write program control protection level

51050	ACCESS_WRITE_PROGRAM			-	-	
-	Write part program protection level			BYTE	PowerOn	
-						
-	-	4	0	7	4/3	M

Description: Write part program protection level

51051	ACCESS_WRITE_RPA			-	-	
-	Protection level write R variables			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Protection level write R variables

51052	ACCESS_WRITE_SEA			-	-	
-	Protection level write setting data			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Protection level write setting data

51053	ACCESS_WRITE_BASEFRAME			-	-	
-	Write basic work offset protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write basic work offset (basic frame) protection level

51054	ACCESS_WRITE_CYCFRAME			-	-	
-	Write cycle frame protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write cycle frame protection level

51055	ACCESS_WRITE_EXTFRAME			-	-	
-	Write external WO protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write external work offset protection level

51056	ACCESS_WRITE_PARTFRAME			-	-	
-	Write table reference protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write table reference protection level

51057	ACCESS_WRITE_SETFRAME			-	-	
-	Write basic reference protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write basic reference protection level

51058	ACCESS_WRITE_TOOLFRAME			-	-	
-	Write basic tool reference protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write basic tool reference protection level

51059	ACCESS_WRITE_TRAFRAME			-	-	
-	Write transformation frame protec. level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write transformation frame protec. level

51060	ACCESS_WRITE_USERFRAME			-	-	
-	Write settable work offset protection level			BYTE	PowerOn	
-						
-	-	4	0	7	4/3	M

Description: Write settable work offset (G54 ... G599) protection level

51061	ACCESS_WRITE_WPFRAME			-	-	
-	Write workpiece reference protection level			BYTE	PowerOn	
-						
-	-	7	0	7	4/3	M

Description: Write workpiece reference protection level

51062	ACCESS_WRITE_FINE			-	-	
-	Write protection level for fine offset of all work offsets			BYTE	PowerOn	
-						
-	-	6	0	7	4/3	M

Description: Write protection level for fine offset of all work offsets

51063	ACCESS_SET_ACT_VALUE			-	-	
-	Set actual value protection level			BYTE	PowerOn	
-						
-	-	4	0	7	4/3	M

Description: Set actual value protection level

51064	ACCESS_WRITE_PROGLIST			-	-	
-	Write protection level of program list in USER area			BYTE	Immediately	
-						
-	-	4	0	7	4/3	M

Description: Minimum protection level required to change the program list in the USER area (program manager)

51065	NUM_DISPLAYED_CHANNELS			-	-	
-	Number of channels displayed simultaneously			BYTE	PowerOn	
-						
-	-	1	1	2	4/3	M

Description: Setting of the number of channels to be displayed simultaneously in the machine operating area and in the multi-channel editor.

51066	ORDER_DISPLAYED_CHANNELS			-	-	
-	Channel numbers of the channels displayed			STRING	PowerOn	
-						
-	-	1;	-	-	4/3	M

Description: Contains the numbers of the channels to be displayed under machine in the multi-channel view, in the desired order and separated by commas, semicolons or spaces.

51067	ENABLE_HANDWHEEL_WINDOW			-	-	
-	Show handwheel window			BYTE	PowerOn	
-						
-	-	1	0	1	4/2	M

Description: If the machine data is set to 0, the window for handwheel assignment is hidden

51068	SPIND_DRIVELOAD_FROM_PLC1			-	-	
-	Machine axis index of spindle 1 utilization display from PLC			BYTE	PowerOn	
-						
-	-	0	0	31	4/2	M

Description: Machine axis index of a spindle (analog), which refers to the data for the utilization display in the T,F,S window from the PLC (DB19.DBB6).

51069	SPIND_DRIVELOAD_FROM_PLC2			-	-	
-	Machine axis index of spindle 2 utilization display from PLC			BYTE	PowerOn	
-						
-	-	0	0	31	4/2	M

Description: Machine axis index of a spindle (analog), which refers to the data for the utilization display in the T,F,S window from the PLC (DB19.DBB7).

51200	ACCESS_WRITE_TM_GEO			-	-	
-	Write tool offset geometry data protection level			BYTE	PowerOn	
-						
-	-	5	0	7	7/4	M

Description: Write tool offset geometry data protection level

51201	ACCESS_WRITE_TM_WEAR			-	-	
-	Write tool offset wear data protection level			BYTE	PowerOn	
-						
-	-	6	0	7	7/4	M

Description: Write tool offset wear data protection level

51202	ACCESS_WRITE_TM_WEAR_DELTA			-	-	
-	Protection level for tool offset restricted writing of wear data			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Protection level for restricted writing of tool wear values

S. MD 54213: TM_WRITE_DELTA_LIMIT

51203	ACCESS_WRITE_TM_SC			-	-	
-	Write tool offset sum offset protection level			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Write tool offset sum offset protection level

51204	ACCESS_WRITE_TM_EC			-	-	
-	Write tool offset use offsets protection level			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Write tool offset use offsets protection level

51205	ACCESS_WRITE_TM_SUPVIS			-	-	
-	Write tool offset monitoring data protection level			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Write tool offset monitoring data protection level

One authorization applies to all limit values: quantity, service life, wear and the monitoring type.

51206	ACCESS_WRITE_TM_ASSDNO			-	-	
-	Write tool offset unique D number protection level			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Write tool offset unique D number protection level

51207	ACCESS_WRITE_TM_WGROUP			-	-	
-	Write tool offset wear groups protection level			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Write tool offset wear groups (magazine location / magazine) protection level

51208	ACCESS_WRITE_TM_ADAPT			-	-	
-	Write tool offset adapter data protection level			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Write tool offset tool adapter geometry data protection level

51209	ACCESS_WRITE_TM_NAME			-	-	
-	Write tool offset tool name protection level			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Write tool offset tool name and duplo data protection level

51210	ACCESS_WRITE_TM_TYPE			-	-	
-	Write tool offset tool type protection level			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Write tool offset tool type protection level

51211	ACCESS_READ_TM			-	-	
-	Read tool offset data protection level			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Read tool offset data protection level

51212	TM_WRITE_WEAR_ABS_LIMIT			-	-	
mm	Maximum tool wear value			DOUBLE	PowerOn	
-						
-	-	0.999	0	10	7/4	M

Description: With TM_WRITE_WEAR_ABS_LIMIT, the max. possible value of a tool wear is limited absolutely, independently of the current protection level (keyswitch position), i.e. also independently of ACCESS_WRITE_TM_WEAR. Absolute and incremental wear limitation can be combined, i.e. the wear can be changed incrementally up to the absolute limit. S. MD 51213.

51213	TM_WRITE_WEAR_DELTA_LIMIT			-	-	
mm	Maximum difference value restricted tool wear input			DOUBLE	PowerOn	
-						
-	-	0	0	10	7/4	M

Description: When entering tool offsets, the value of the change from the previous value to the new value cannot exceed the value set here.

With TM_WRITE_WEAR_DELTA_LIMIT, the change to a tool wear can be limited incrementally, if the current protection level is the same as or higher than the one set in ACCESS_WRITE_TM_WEAR_DELTA. With the current protection level being the same or higher than ACCESS_WRITE_TM_WEAR, an incremental limitation is no longer performed. Absolute and

incremental wear limitation can be combined, i.e. the wear can be changed up to the absolute limit. S. MD 51212

51214	TM_WRITE_LIMIT_MASK			-	-	
-	Validity of the restricted tool wear input			BYTE	PowerOn	
-						
-	-	7	0	7	7/4	M

Description: Validity of the restricted tool wear input

Bit 0:use for cutting edge data, wear

Bit 1:use for SC data, sum offsets

Bit 2:use for EC data, use offsets

Bit 0+1+2:use for all data, wear, SC, EC

51215	ACCESS_WRITE_TM_ALL_PARAM			-	-	
-	Protection level TM details - write all parameters			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM details - write all parameters

51216	ACCESS_TM_TOOL_CREATE			-	-	
-	Protection level TM create tool			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM create tool

51217	ACCESS_TM_TOOL_DELETE			-	-	
-	Protection level TM delete tool			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM delete tool

51218	ACCESS_TM_TOOL_LOAD			-	-	
-	Protection level TM load tool			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM load tool

51219	ACCESS_TM_TOOL_UNLOAD			-	-	
-	Protection level TM unload tool			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM unload tool

51220	ACCESS_TM_TOOL_MOVE			-	-	
-	Protection level TM relocate tool			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM relocate tool

51221	ACCESS_TM_TOOL_REACTIVATE			-	-	
-	Protection level TM reactivate tool			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM reactivate tool

51222	ACCESS_TM_TOOL_MEASURE			-	-	
-	Protection level TM measure tool			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM measure tool
Direct jump from tool list to measuring screen

51223	ACCESS_TM_TOOLEDGE_CREATE			-	-	
-	Protection level TM create tool cutting edge			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM create tool cutting edge

51224	ACCESS_TM_TOOLEDGE_DELETE			-	-	
-	Protection level TM delete tool cutting edge			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM delete tool cutting edge

51225	ACCESS_TM_MAGAZINE_POS			-	-	
-	Protection level TM position magazine			BYTE	PowerOn	
-						
-	-	4	0	7	7/4	M

Description: Protection level TM position magazine

51226	FUNCTION_MASK_SIM			-	-	
-	Function mask Simulation			DWORD	PowerOn	
-						
-	-	0	-	-	7/3	M

Description: Function mask Simulation
Bit 0: No automatic start on simulation selection

51228	FUNCTION_MASK_TECH			-	-	
-	Function mask Cross-technology			DWORD	PowerOn	
-						
-	-	0	-	-	7/3	M

Description: Function mask, all technologies
Bit 0: G code programming without multi-channel data
If bit 0 = 1, no multi-channel data will be offered for job lists which only contain G code programs.

51235	ACCESS_RESET_SERV_PLANNER			-	-	
-	Protection level for acknowledgement of maintenance tasks			BYTE	Immediately	
-						
-	-	3	0	7	4/2	M

Description: Protection level for acknowledgement of maintenance tasks

1.7.2 General cycle machine data

51600	MEA_CAL_WP_NUM			-	-	
-	Number of calibration data fields for workpiece probes			BYTE	Immediately	
-						
-	-	12	0	12	7/2	I

Description: The workpiece probe calibration data refer to the workpiece coordinate system (WCS) !

In the data fields, the workpiece probe calibration data of the technologies Milling and

Turning are stored!

51601	MEA_CAL_EDGE_NUM			-	-	
-	Number of geometry data fields of gauging block, workpiece probe			BYTE	Immediately	
-						
-	-	3	0	3	7/2	I

Description: The gauging block is exclusively used to calibrate the workpiece probe of the Turning technology!

51602	MEA_CAL_TP_NUM			-	-	
-	Number of calibration data fields for tool probes			BYTE	Immediately	
-						
-	-	3	0	3	7/2	I

Description: The geometry data and calibration data of the tool probe refer to the machine coordinate system (MCS)!

51603	MEA_CAL_TPW_NUM			-	-	
-	Number of calibration data fields for tool probes			BYTE	Immediately	
-						
-	-	3	0	3	7/2	I

Description: The geometry data and calibration data of the tool probe refer to the workpiece coordinate system (WCS)!

51606	MEA_INPUT_PIECE_PROBE			-	-	
-	Workpiece probe measuring input			BYTE	Immediately	
-						
-	2	0,1	0	1	7/2	I

Description: Selection of NC measuring input for measuring the workpiece

$MCS_MEA_INPUT_PIECE_PROBE[0]

$MCS_MEA_INPUT_PIECE_PROBE[1] not currently used.

This parameter must be applied in conjunction with $MCS_MEA_INPUT_TOOL_PROBE[n].

Either a workpiece probe or a tool probe can be connected to each of the NC measuring inputs.

Value:

=0: Workpiece probe at NC measuring input 1, active (corresponds to default setting)

=1: Workpiece probe at NC measuring input 2, active

51607	MEA_INPUT_TOOL_PROBE			-	-	
-	Tool probe measuring input			BYTE	Immediately	
-						
-	2	1,0	0	1	7/2	I

Description: Selection of NC measuring input for measuring the tool

$MCS_MEA_INPUT_TOOL_PROBE[0]

$MCS_MEA_INPUT_TOOL_PROBE[1] not currently used.

This parameter must be applied in conjunction with $MCS_MEA_INPUT_PIECE_PROBE[n].

Either a workpiece probe or a tool probe can be connected to each of the NC measuring inputs.

Value:

=0: Tool probe at NC measuring input 1, active

=1: Tool probe at NC measuring input 2, active (corresponds to default setting)

51608	MEA_WP_PROBE_INPUT_SUB			-	-	
-	Workpiece probe available/active on the counterspindle			BYTE	Immediately	
-						
-	-	0	-	-	7/2	I

Description: Workpiece probe available/active on the counterspindle

=0: workpiece probe not available/active on the counterspindle

=1: workpiece probe available/active on the counterspindle

51609	MEA_T_PROBE_INPUT_SUB			-	-	
-	Tool probe available/active on the counterspindle			BYTE	Immediately	
-						
-	-	0	-	-	7/2	I

Description: Tool probe available/active on the counterspindle

=0: tool probe not available/active on the counterspindle

=1: tool probe available/active on the counterspindle

51610	MEA_TOOLCARR_ENABLE			-	-	
-	Support of orientable toolholders			BYTE	Immediately	
-						
-	-	0	0	1	7/3	I

Description: Support of orientable toolholders

0: no support of orientable toolholders.

1: support of a probe or tool positioned using an orientable tool-holder (kinematics type "T") with reference to the special tool-holder positions 0°, 90°, 180° and 270°.

51612	MEA_MONO_COR_POS_ACTIVE			-	-	
-	Monoprobe orientation offset			BYTE	Immediately	
-						
-	-	1	0	1	7/3	I

Description: Monoprobe position offset

0: no offset

1: if the workpiece probe is a monoprobe, the orientation of its switching direction (spindle position) is offset by the angle value in _CORA.

51614	MEA_PROBE_LENGTH_RELATE			-	-	
-	Length reference of the workpiece probe, measurement technology milling			BYTE	Immediately	
-						
-	-	1	0	1	7/5	I

Description: Length reference of the workpiece probe, measurement technology milling

0: tool length L1, referring to the center of the probe sphere

1: tool length L1, referring to the sphere volume of the probe sphere

51616	MEA_CAL_MONITORING			-	-	
-	Calibration status monitoring, for measuring in automatic mode			BYTE	Immediately	
-						
-	-	1	0	1	7/3	I

Description: Activation of calibration status monitoring for measuring in automatic mode

0: Calibration monitoring inactive

1: Calibration monitoring active

Between calibration and measuring the status of the following states is monitored:

- Working plane (G17, 18, 19)
- Probe type (monoprobe, multiprobe)
- Length reference of the probe (center point of the probe sphere, probe sphere volume)
- Programmed probe speed

For "Measure in JOG" these monitoring modes are always active and cannot be deactivated.

51618	MEA_CM_ROT_AX_POS_TOL			-	-	
degrees	Tolerance of the rotary axis positions			DOUBLE	Immediately	
-						
-	-	0.5	-1	1	7/3	I

Description: Entries in parameter $MN_MEA_CM_ROT_AX_POS_TOL are effective only if $MN_MEA_TOOLCARR_ENABLE=1

The real angle position of the rotary axes can deviate from the programmed one (exact stop fine window).

This deviation depends on the position control features of the axis. The maximum deviation expected on the concrete axis

must be entered in this parameter. When the tolerance is exceeded, alarm 61442 "Toolholder not in parallel with the geometry axes" is displayed.

51750	J_MEA_M_DIST			-	-	
mm	Measuring path for measuring with ShopMill, in automatic mode			DOUBLE	Immediately	
-						
-	-	5	-10000	10000	7/5	I

Description: This parameter defines the measuring path in front of and behind the measuring setpoint.

51751	J_MEA_M_DIST_MANUELL			-	-	
mm	Measuring path, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	-	10	-10000	10000	7/5	I

Description: This parameter defines the measuring path in front of and behind the measuring setpoint.

51752	J_MEA_M_DIST_TOOL_LENGTH			-	-	
mm	Measuring path for tool length measuring, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	-	2	-10000	10000	7/5	I

Description: This parameter defines the measuring path in front of and behind the measuring setpoint.

51753	J_MEA_M_DIST_TOOL_RADIUS			-	-	
mm	Measuring path for tool radius measuring, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	-	1	-10000	10000	7/5	I

Description: This parameter defines the measuring path in front of and behind the measuring setpoint.

51755	J_MEA_MEASURING_FEED			-	-	
mm/min	Measuring feed for workpiece measurement and calibr., for "Measure in JOG"			DOUBLE	Immediately	
-						
-	-	300	0	100000	7/5	I

Description: Measuring feed for workpiece measurem. and calibration of the workpiece probe, for "Measure in JOG"

51757	J_MEA_COLL_MONIT_FEED			-	-	
mm/min	Feedrate in the plane w. active collision detection, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	-	1000	0	100000	7/5	I

Description: Feedrate in the working plane w. active collision detection

51758	J_MEA_COLL_MONIT_POS_FEED			-	-	
mm/min	Infeed rate with active collision detection, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	-	1000	0	100000	7/5	I

Description: Feedrate of the infeed axis with active collision detection, for "Measure in JOG".

51770	J_MEA_CAL_RING_DIAM			-	-	
mm	Calibration ring diameter, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	12	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1	-1	10000	7/5	I

Description: Calibration ring diameter, for probe sphere calibration in the plane, for "Measure in JOG"

51772	J_MEA_CAL_HEIGHT_FEEDAX			-	-	
mm	Calibration height in the infeed axis, for probe length calibration			DOUBLE	Immediately	
-						
-	12	-99999,-99999,-99999,-99999,-99999...	-100000	100000	7/5	I

Description: Calibration height in the infeed axis for probe length calibration, for "Measure in JOG"

The calibration height must be entered with reference to the the workpiece coordinate system (WCS)!

51774	J_MEA_T_PROBE_TYPE			-	-	
-	Geometry of the tool probe type "cube", for "Measure in JOG"			DWORD	Immediately	
-						
-	3	0,0,0	0	999	7/5	I

Description: For the "cube" tool probe type, the three-dimensional geometric dimensions of the cube probe are entered in the three field elements of this parameter.

Cube-shaped probes are mainly used for turning tool measuring.

51776	J_MEA_T_PROBE_ALLOW_AX_DIR			-	-	
-	Axis directions for tool probe calibration, for "Measure in JOG"			DWORD	Immediately	
-						
-	3	133,133,133	0	999	7/5	I

Description: Permissible axis directions during tool probe calibration for milling tool measuring, for "Measure in JOG"

In the default setting, X and Y correspond to the plus and minus direction, Z only to the minus direction.

The parameter is divided into three elements the functions of which must be assigned to calibration data records 1, 2 and 3!

The calibration data records are assigned to tool measuring in working planes G17 (1), G18 (2) and G19 (3)!

Meaning of the parameter elements

Decimal position:

Ones: 1st geometry axis (X)

Tens: 2nd geometry axis (Y)

Hundreds: 3rd geometry axis (Z)

Value:

= 0: axis not possible

= 1: only minus direction possible

= 2: only plus direction possible

= 3: both directions possible

51778	J_MEA_T_PROBE_DIAM_LENGTH			-	-	
mm	Diameter of the tool probe for length measurement, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	3	0,0,0	0	10000	7/5	I

Description: Effective grinding wheel diameter of the tool probe for length measurement on milling tools, for "Measure in JOG"

51780	J_MEA_T_PROBE_DIAM_RAD			-	-	
mm	Diameter of the tool probe for radius measurement, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	3	0,0,0	0	10000	7/5	I

Description: Effective grinding wheel diameter of the tool probe for radius measurement on milling tools, for "Measure in JOG"

51782	J_MEA_T_PROBE_T_EDGE_DIST			-	-	
mm	Distance between tool probe and tool, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	3	2,2,2	-10000	10000	7/5	I

Description: Distance between the upper edge of the tool probe and the lower edge of the tool for radius measurement on milling tools, for "Measure in JOG"

51784	J_MEA_T_PROBE_APPR_AX_DIR			-	-	
-	Approach direction in the plane on the tool probe, for "Measure in JOG"			DWORD	Immediately	
-						
-	3	-1,-1,-1	-	-	7/5	I

Description: Approach direction in the plane on the tool probe, for "Measure in JOG"

= 0 positive direction

= -1 negative direction

51786	J_MEA_T_PROBE_MEASURE_DIST			-	-	
mm	Measur. path for tool measurem. w. stationary spindle, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	-	10	-10000	10000	7/5	I

Description: Measuring path for tool probe calibration and tool measuring with stationary spindle, in front of and behind the expected switching position.

51787	J_MEA_T_PROBE_MEASURE_FEED			-	-	
mm/min	Measur. feed tool measuring with stationary spindle, for "Measure in JOG"			DOUBLE	Immediately	
-						
-	-	100	0	100000	7/5	I

Description: Measuring feed for tool probe calibration and tool measuring with stationary spindle, for "Measure in JOG".

1.7.3 Channel-specific configurations machine data

52000	DISP_COORDINATE_SYSTEM			-	-	
-	Coordinate system position			BYTE	PowerOn	
-						
-	-	0	0	47	7/3	M

Description: With this MD you adapt the operator panel of the coordinate system to the machine's coordinate system. Depending on the selected position, all help screens, the sequence graphic, the simulation and the input fields with the circular direction specified will change automatically.

Also note MD 52210 $MCS_FUNCTION_MASK_DISP, bit 1.

52005	DISP_PLANE_MILL			-	-	
-	Plane selection Milling			BYTE	Immediately	
-						
-	-	17	0	19	7/3	M

Description: Plane selection Milling

0: plane selection on the operator panel

17: always G17

18: always G18

19: always G19

52006	DISP_PLANE_TURN			-	-	
-	Plane selection Turning			BYTE	Immediately	
-						
-	-	18	0	19	7/3	M

Description: Plane selection Turning

0: plane selection on the operator panel

17: always G17

18: always G18

19: always G19

52010	DISP_NUM_AXIS_BIG_FONT			-	-	
-	Number of actual values with large font			BYTE	PowerOn	
-						
-	-	3	0	31	7/3	M

Description: Number of actual values with large font

52011	ADJUST_NUM_AXIS_BIG_FONT			-	-	
-	Adapt number of act val w large font dynamically to no. of geometry axes			BYTE	PowerOn	
-						
-	-	0	0	2	7/3	M

Description: Adapt the number of actual values with large font if the number of geometry axes changes, e.g. due to transformations like TRANSMIT or TRACYL.

0 = Only MD 52010 "DISP_NUM_AXIS_BIG_FONT" is valid. The number is assigned as a fixed value.

1 = Only the geometry axes are displayed in large font. MD 52010 "DISP_NUM_AXIS_BIG_FONT" is ignored.

2 = The number of geometry axes plus the content of MD 52010 "DISP_NUM_AXIS_BIG_FONT" are displayed in large font.

52200	TECHNOLOGY			-	-	
-	Technology			BYTE	PowerOn	
-						
-	-	0	0	2	7/1	M

Description: Technology

0: no specific configuration

1: turning

2: milling

Also note MD 52201 $MCS_TECHNOLOGY_EXTENSION.

52201	TECHNOLOGY_EXTENSION			-	-	
-	Extended technology			BYTE	PowerOn	
-						
-	-	0	0	2	7/1	M

Description:
Extended technology
0: no specific configuration
1: turning
2: milling
Also note MD 52200 $MCS_TECHNOLOGY.
Example:
Turning machine with milling technology
MD 52200 $MCS_TECHNOLOGY = 1
MD 52201 $MCS_TECHNOLOGY_EXTENSION = 2

52206	AXIS_USAGE			-	-	
-	Meaning of the axes in the channel			BYTE	PowerOn	
-						
-	20	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	0	10	7/3	M

Description:
Meaning of the axes in the channel
0 = no special meaning
1 = tool spindle (driven tool)
2 = auxiliary spindle (driven tool)
3 = main spindle (turning)
4 = C axis of the main spindle (turning)
5 = counterspindle (turning)
6 = C axis of the counterspindle (turning)
7 = linear axis of the counterspindle (turning)
8 = tailstock (turning)
9 = steady rest (turning)
10 = B axis (turning)

52207	AXIS_USAGE_ATTRIB			-	-	
-	Axis attributes			BYTE	PowerOn	
-						
-	20	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	-	-	7/3	M

Description:
Axis attributes
Bit 0: Rotates around 1st axis (in the case of rotary axes)
Bit 1: Rotates around 2nd axis (in the case of rotary axes)
Bit 2: Rotates around 3rd axis (in the case of rotary axes)
Bit 3: Displayed positive direction of rotation is counterclock-wise (in the case of rotary axes)
Bit 4: Displayed direction of rotation for M3 is counterclockwise (in the case of spindles)
Bit 5: Direction of rotation M3 corresponds to minus rotary axis (in the case of spindles)
This bit must be set in the same way as PLC bit DBnn.DBX17.6!
(nn = 31 + machine axis index)
Bit 6: Display rotary axis as offset target for measuring

52210	FUNCTION_MASK_DISP			-	-	
-	Function mask Display			BYTE	PowerOn	
-						
-	-	3	-	-	7/3	M

Description: Function mask, display

Bit 0: Measuring system for programs always in basic system

Bit 1: Front view for turning in school coordinate system

Bit 2: Hide "T,S,M" softkey in JOG area

Bit 3: Generate automatic end-of-program in MDI (with the "Delete blocks" softkey)

Bit 4: Show follow-on tool in T, F, S window

52212	FUNCTION_MASK_TECH			-	-	
-	Function mask Cross-technology			BYTE	Immediately	
-						
-	-	0	-	-	7/3	M

Description: Function mask, all technologies

Bit 0: Enable swivel

Bit 1: No optimized travel along software limit switches

Bit 2: Startup logic for step drill (ShopTurn)

Bit 3: Call block search cycle for ShopMill/ShopTurn

Bit 4: Startup logic via cycle (ShopTurn)

Bit 5: Call block search cycle for SERUPRO

Bit 6: Work offset value ZV cannot be entered (ShopTurn)

52214	FUNCTION_MASK_MILL			-	-	
-	Function mask Milling			DWORD	Immediately	
-						
-	-	0	-	-	7/3	M

Description: Function mask Milling

Bit 0: reserved

Bit 1:reserved

Bit 2:reserved

Bit 3: Enable inside/rear machining

Bit 4: Enable spindle clamping (C axis)

52216	FUNCTION_MASK_DRILL			-	-	
-	Function mask Drilling			DWORD	Immediately	
-						
-	-	0	-	-	7/3	M

Description: Function mask Drilling

Bit 0:CYCLE84 Unhide input fields Technology

Bit 1:CYCLE840 Unhide input fields Technology

52218	FUNCTION_MASK_TURN			-	-	
-	Function mask Turning			BYTE	Immediately	
-						
-	-	0	-	-	7/3	M

Description: Function mask Turning
Bit 0: Enable zoom under manual for tool measurement
Bit 1: Enable parts gripper for cut-off
Bit 2: Enable tailstock
Bit 3: Reserved
Bit 4: Enable spindle control of main spindle above surface
Bit 5: Enable spindle control of tool spindle above surface

52229	ENABLE_QUICK_M_CODES			-	-	
-	Enable fast M functions			BYTE	Immediately	
-						
-	-	0	-	-	7/3	M

Description: Enable fast M functions
Bit 0:Coolant OFF
Bit 1:Coolant 1 ON
Bit 2:Coolant 2 ON
Bit 3:Coolant 1 and 2 ON

52230	M_CODE_ALL_COOLANTS_OFF			-	-	
-	M code for all coolants OFF			DWORD	Immediately	
-						
-	-	9	-1	32767	7/3	M

Description: M code for all coolants OFF

52231	M_CODE_COOLANT_1_ON			-	-	
-	M code for coolant 1 ON			DWORD	Immediately	
-						
-	-	8	-1	32767	7/3	M

Description: M code for coolant 1 ON

52232	M_CODE_COOLANT_2_ON			-	-	
-	M code for coolant 2 ON			DWORD	Immediately	
-						
-	-	7	-1	32767	7/3	M

Description: M code for coolant 2 ON

52233	M_CODE_COOLANT_1_AND_2_ON			-	-	
-	M code for both coolants ON			DWORD	Immediately	
-						
-	-	-1	-1	32767	7/3	M

Description: M code for coolant 1 + 2 ON

52240	NAME_TOOL_CHANGE_PROG			-	-	
-	Tool change program for G code steps			STRING	Immediately	
-						
-	-		-	-	7/3	M

Description: Tool change program for G code steps

52244	SUB_SPINDLE_PARK_POS_Y			-	-	
mm	Parking position of the Y axis with counterspindle			DOUBLE	Immediately	
-						
-	-	0	-	-	7/3	U

Description: Parking position of the Y axis with counterspindle

52250	M_CODE_CHUCK_OPEN			-	-	
-	M code for Open chuck with non-rotating spindle			STRING	Immediately	
-						
-	2	-	-	-	7/3	M

Description: M code for Open chuck with non-rotating spindle.

Example: "M34" or "M1=34"

Elements:

[0]: Main spindle

[1]: Counterspindle

52251	M_CODE_CHUCK_OPEN_ROT			-	-	
-	M code for Open chuck with rotating spindle			STRING	Immediately	
-						
-	2	-	-	-	7/3	M

Description: M code for Open chuck with rotating spindle.

Example: "M34" or "M1=34"

Elements:

[0]: Main spindle

[1]: Counterspindle

52252	M_CODE_CHUCK_CLOSE			-	-	
-	M code for Close chuck			STRING	Immediately	
-						
-	2	-	-	-	7/3	M

Description: M code for Close chuck

Example: "M34" or "M1=34"

Elements:

[0]: Main spindle

[1]: Counterspindle

52260	MACHINE_JOG_INTERRUPT_PRIO			-	-	
-	Priority for start ASUB under machine JOG			BYTE	Immediately	
-						
-	-	1	1	8	7/3	S

Description: Priority for start ASUB under machine JOG

52270	TM_FUNCTION_MASK			-	-	
-	Function mask Tool management			DWORD	PowerOn	
-						
-	-	0	-	-	7/3	M

Description: Function mask Tool management

Bit 0:Create tool on magazine location not allowed. Tools can only be created outside the magazine.

Bit 1:Load/unload disable, if machine is in reset. Tools can only be loaded/unloaded, if the appropriate channel is in reset state.

Bit 2:Load/unload disable on Emergency stop. Tools can only be loaded/unloaded, if Emergency stop is not active.

Bit 3:Load/unload tool to/from spindle is disabled. Tools cannot be loaded to or unloaded from the spindle.

Bit 4:Loading is executed directly in the spindle. Tools are loaded exclusively directly in the the spindle.

Bit 5:reserved

Bit 6:reserved

Bit 7:Create tool using the tool number. Specify the tool's T number when creating the tool.

Bit 8:Fade out Relocate tool. The function 'Relocate tool" is faded out on the user interface.

Bit 9:Fade out Position magazine. The function 'Position magazine' is faded out on the user interface.

Bit 10:Reactivate tool using Position magazine. Prior to reactivating the tool is positioned on the loading position.

Bit 11:Reactivate tool in all monitoring modes. When reactivating a tool, all monitoring modes enabled in the NC are reactivated for this tool, even the monitoring modes, which have not been set for the relevant tool, but are available in the background only.

Bit 12:Fade out Reactivate tool. The function 'Reactivate tool' is faded out on the user interface.

52271	TM_MAG_PLACE_DISTANCE			-	-	
mm	Distance betw. indiv. magazine locations			DOUBLE	PowerOn	
-						
-	-	70	0	10000	0/0	M

Description: Distance between individual magazine locations.

Is used for graphical display of magazine and tools in tool management.

52272	TM_TOOL_LOAD_DEFAULT_MAG			-	-	
-	Default magazine for tool loading			BYTE	PowerOn	
-						
-	-	0	0	30	0/0	M

Description: Default magazine for tool loading

0 = no default magazine

52273	TM_TOOL_MOVE_DEFAULT_MAG			-	-	
-	Default magazine for tool relocation			BYTE	PowerOn	
-						
-	-	0	0	30	0/0	M

Description: Default magazine for tool relocation

0 = no default magazine

52281	TOOL_MCODE_FUNC_ON			-	-	
-	M code for tool-specific function ON			DWORD	Immediately	
-						
-	4	-1, -1, -1, -1	-1	32767	7/3	M

Description: M code for tool-specific function ON

Value -1 means that the M function is not output. If both M commands of a function equal -1, the corresponding field will not be displayed in the user interface

52282	TOOL_MCODE_FUNC_OFF			-	-	
-	M code for tool-specific function OFF			DWORD	Immediately	
-						
-	4	-1, -1, -1, -1	-1	32767	7/3	M

Description: M code for tool-specific function OFF

Value -1 means that the M function is not output. If both M commands of a function equal -1, the corresponding field will not be displayed in the user interface

1.7.4 Channel-specific cycle machine data

52605	MEA_TURN_CYC_SPECIAL_MODE			-	-	
-	Functional behavior of third geometry axis (Y), turning technology			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: Functional behavior of a third geometry axis (Y axis) in the turning technology based on the G18 working plane!

=0: an existing third geometry axis (Y axis; applicate); is not supported by the measuring cycles!

=1: specified setpoint and parameterization (SETVAL, _TUL, _TLL, SZO) refer to the third geometry axis (Y axis).

However, tool length offset or work offset are performed in the components active in the second geometry axis (X axis, ordinate)

(i.e. measurement in Y and offset in X). The offset target can be influenced using the _KNUM parameter!

52750	J_MEA_FIXPOINT			-	-	
mm	Z value for measuring fixed point			DOUBLE	Immediately	
-						
-	-	0	-	-	7/3	I

Description: Z value for measuring against fixed point

52800	ISO_M_ENABLE_POLAR_COORD			-	-	
-	Polar coordinates			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: Polar coordinates

0: OFF

1: ON

52802	ISO_ENABLE_INTERRUPTS			-	-	
-	Interrupt process			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: Interrupt process
0: OFF
1: ON

52804	ISO_ENABLE_DRYRUN			-	-	
-	Machining skipped at DRYRUN			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: Maching skipped during tapping G74/G84 at DRYRUN
0: OFF
1: ON

52806	ISO_SCALING_SYSTEM			-	-	
-	Basic system			BYTE	Immediately	
-						
-	-	0	0	2	7/7	M

Description: Basic system:
0: not defined
1: METRIC
2: INCH

52808	ISO_SIMULTAN_AXES_START			-	-	
-	Simultaneous approach to the boring position on all programmed axes			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: Simultaneous approach to the boring position on all programmed axes
0: OFF
1: ON

52810	ISO_T_DEEPHOLE_DRILL_MODE			-	-	
-	Deep hole drilling with chipbreaking/stock removal			BYTE	Immediately	
-						
-	-	0	0	1	7/3	M

Description: Select the type of deep hole drilling
0: deep hole drilling with chipbreaking
1: deep hole drilling with stock removal

1.7.5 Axis-specific configuration machine data

53230	SIM_START_POSITION			-	-	
mm	Axis position at start of simulation			DOUBLE	Immediately	
-						
-	-	0	-	-	7/3	M

Description: Axis position at start of simulation

Simulation is only possible if a value not equal to 0 has been set for at least one geometry axs.

53240	SPINDLE_PARAMETER			-	-	
mm	Spindle chuck data			DOUBLE	Immediately	
-						
-	3	0	-	-	7/3	U

Description: Spindle chuck data:

[0]: Chuck dimension
[1]: Stop dimension
[2]: Jaw dimension

53241	SPINDLE_CHUCK_TYPE			-	-	
-	Spindle jaw type			BYTE	Immediately	
-						
-	-	0	-	-	7/3	U

Description: Spindle jaw type:

0 = Clamping from outside
1 = Clamping from inside

53242	TAILSTOCK_PARAMETER			-	-	
mm	Tailstock data			DOUBLE	Immediately	
-						
-	2	0	-	-	7/3	M

Description: Tailstock data:

[0]: Tailstock diameter
[1]: Tailstock length

1.7.6 General configuration setting data

54215	TM_FUNCTION_MASK_SET			-	-	
-	Function mask Tool management			DWORD	PowerOn	
-						
-	-	0	-	-	7/4	M

Description: Function mask, tool management

Bit 0:Diameter display for rotary tools. It is not the radius value but the diameter that is displayed for rotary tools.

Bit 1:Default direction of rotation for all turning tools is M4. Direction of rotation M4 is assigned by default when turning tools are created.

Bit 2:Create tool without suggesting name.

Bit 3:Input disable for tool name and tool type in the case of loaded tools. Once tools have been loaded, the tool name and the tool type cannot be changed.

Bit 4:Input disable for loaded tools unless the channel is not in reset.

Bit 5:Accrue tool wear entries additively. Tool wear data entries are added to the existing wear value.

Bit 6:Entry of tool ID in numerical format. The tool ID may only be entered using numbers.

Bit 7:Hide tool monitoring parameters. The tool monitoring parameters are hidden on the user interface.

Bit 8:Diameter display for transverse axis geometry. The geometry value for the transverse axis is displayed as the diameter value.

Bit 9:Diameter display for transverse axis wear. The wear value for the transverse axis is displayed as the diameter value.

Bit 10:Enable loading / relocation of tool in buffer locations. The magazine number can be entered in the load dialog box. The magazine number 9998 is then used to access the buffer location.

Bit 11:Creation of new tools in gripper locations is disabled.

1.7.7 General cycle setting data

54600	MEA_WP_BALL_DIAM			-	-	
mm	Effective diameter of the probe sphere for the workpiece probe			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	10000	7/7	U

Description: Effective sphere diameter of the probe sphere for the workpiece probe.

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54601	MEA_WP_TRIG_MINUS_DIR_AX1			-	-	
mm	Trigger point of the 1st measuring axis in negative direction			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/7	U

Description: Trigger point of the 1st measuring axis (abscissa) in negative traversing direction (X at G17) of the workpiece probe.

The term "negative traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54602	MEA_WP_TRIG_PLUS_DIR_AX1			-	-	
mm	Trigger point of the 1st measuring axis in positive direction			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/7	U

Description: Trigger point of the 1st measuring axis (abscissa) in positive traversing direction (X at G17) of the workpiece probe.

The term "positive traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54603	MEA_WP_TRIG_MINUS_DIR_AX2			-	-	
mm	Trigger point of the 2nd measuring axis in negative direction			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/7	U

Description: Trigger point of the 2nd measuring axis (ordinate) in negative traversing direction (Y at G17) of the workpiece probe.

The term "negative traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54604	MEA_WP_TRIG_PLUS_DIR_AX2			-	-	
mm	Trigger point of the 2nd measuring axis in positive direction			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/7	U

Description: Trigger point of the 2nd measuring axis (ordinate) in positive traversing direction (Y at G17) of the workpiece probe.

The term "positive traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54605	MEA_WP_TRIG_MINUS_DIR_AX3			-	-	
mm	Trigger point of the 3rd measuring axis in negative direction			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/7	U

Description: Trigger point of the 3rd measuring axis (applicate) in negative traversing direction (Z at G17) of the workpiece probe.

The term "negative traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54606	MEA_WP_TRIG_PLUS_DIR_AX3			-	-	
mm	Trigger point of the 3rd measuring axis in positive direction			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/7	U

Description: Trigger point of the 3rd measuring axis (applicate) in positive traversing direction (Z at G17) of the workpiece probe.

The term "positive traversing direction" refers to the currently active workpiece zero point reference!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54607	MEA_WP_POS_DEV_AX1			-	-	
mm	Position deviation of the probe sphere in the 1st measuring axis			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/7	U

Description: The position deviation in the 1st measuring axis represents a geometrical offset of the center point of the probe sphere

related to the electrical center point of the probe in this axis!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54608	MEA_WP_POS_DEV_AX2			-	-	
mm	Position deviation of the probe sphere in the 2nd measuring axis			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-100000	100000	7/7	U

Description: The position deviation in the 2nd measuring axis represents a geometrical offset of the center point of the probe sphere

related to the electrical center point of the probe in this axis!

The value of this parameter is created by the operation "Calibrate workpiece probe"!

54609	MEA_WP_STATUS_RT			-	-	
-	Calibration status axis positions			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/7	U

Description: Calibration status of the axis positions reserved for internal use!
The value of this parameter is created by the operation "Calibrate workpiece probe"!

54610	MEA_WP_STATUS_GEN			-	-	
-	Calibration status in general			DOUBLE	Immediately	
-						
-	12	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/7	U

Description: Calibration status in general reserved for internal use!
The value of this parameter is created by the operation "Calibrate workpiece probe"!

54615	MEA_CAL_EDGE_BASE_AX1			-	-	
mm	Calibration groove base of the 1st measuring axis			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Calibration groove base of the 1st measuring axis (abscissa, Z at G18)
This parameter is a geometrical component of the calibration groove and must be supplied by the user!

54617	MEA_CAL_EDGE_PLUS_DIR_AX1			-	-	
mm	Calibration groove edge in positive direction of the 1st measuring axis			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Calibration groove edge in positive direction of the 1st measuring axis (abscissa, Z at G18)
This parameter is a geometrical component of the calibration groove and must be supplied by the user!

54618	MEA_CAL_EDGE_MINUS_DIR_AX1			-	-	
mm	Calibration groove edge in negative direction of the 1st measuring axis			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Calibration groove edge in negative direction of the 1st measuring axis (abscissa, Z at G18)
This parameter is a geometrical component of the calibration groove and must be supplied by the user!

54619	MEA_CAL_EDGE_BASE_AX2		-	-	
mm	Calibration groove base of the 2nd measuring axis		DOUBLE	Immediately	
-					
-	3	0,0,0,0,0,0,0,0,0,0,0,0 -100000	100000	7/7	U

Description: Calibration groove base of the 2nd measuring axis (ordinate, X at G18)

This parameter is a geometrical component of the calibration groove and must be supplied by the user!

54620	MEA_CAL_EDGE_UPPER_AX2		-	-	
mm	Calibration groove upper edge of the 2nd measuring axis		DOUBLE	Immediately	
-					
-	3	0,0,0,0,0,0,0,0,0,0,0,0 -100000	100000	7/7	U

Description: Calibration groove upper edge of the 2nd measuring axis (ordinate, X at G18)

This parameter is a geometrical component of the calibration groove and must be supplied by the user!

54621	MEA_CAL_EDGE_PLUS_DIR_AX2		-	-	
mm	Calibration groove edge in positive direction of the 2nd measuring axis		DOUBLE	Immediately	
-					
-	3	0,0,0,0,0,0,0,0,0,0,0,0 -100000	100000	7/7	U

Description: Calibration groove edge in positive direction of the 2nd measuring axis (ordinate, X at G18)

This parameter is a geometrical component of the calibration groove and must be supplied by the user!

54622	MEA_CAL_EDGE_MINUS_DIR_AX2		-	-	
mm	Calibration groove edge in negative direction of the 2nd measuring axis		DOUBLE	Immediately	
-					
-	3	0,0,0,0,0,0,0,0,0,0,0,0 -100000	100000	7/7	U

Description: Calibration groove edge in negative direction of the 2nd measuring axis (ordinate, X at G18)

This parameter is a geometrical component of the calibration groove and must be supplied by the user!

54625	MEA_TP_TRIG_MINUS_DIR_AX1		-	-	
mm	Trigger point of the 1st measuring axis in negative direction		DOUBLE	Immediately	
-					
-	3	0,0,0,0,0,0,0,0,0,0,0,0 -100000	100000	7/7	U

Description: Trigger point of the 1st measuring axis in negative direction (abscissa, X at G17, Z at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54626	MEA_TP_TRIG_PLUS_DIR_AX1			-	-	
mm	Trigger point of the 1st measuring axis in positive direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 1st measuring axis in positive direction (abscissa, X at G17, Z at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54627	MEA_TP_TRIG_MINUS_DIR_AX2			-	-	
mm	Trigger point of the 2nd measuring axis in negative direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 2nd measuring axis in negative direction (ordinate, Y at G17, X at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54628	MEA_TP_TRIG_PLUS_DIR_AX2			-	-	
mm	Trigger point of the 2nd measuring axis in positive direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 2nd measuring axis in positive direction (ordinate, Y at G17, X at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54629	MEA_TP_TRIG_MINUS_DIR_AX3			-	-	
mm	Trigger point of the 3rd measuring axis in negative direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 3rd measuring axis in negative direction (applicate, Z at G17, Y at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54630	MEA_TP_TRIG_PLUS_DIR_AX3			-	-	
mm	Trigger point of the 3rd measuring axis in positive direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 3rd measuring axis in positive direction (applicate, Z at G17, Y at G18)

The trigger point refers to the machine coordinate system (MCS).

Prior to calibration the approximate trigger point must be entered in the machine coordinate system!

The exact value of this parameter is created by the operation "Calibrate workpiece probe"!

54631	MEA_TP_EDGE_DISK_SIZE			-	-	
mm	Tool probe edge length/wheel diameter			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	0	1000	7/7	U

Description: Effective edge length or grinding wheel diameter of the tool probe.

Milling tools are normally measured with wheel-shaped probes while turning tools

are measured with square probes.

54632	MEA_TP_AX_DIR_AUTO_CAL			-	-	
-	Automatic tool probe calibration, enable axes/directions			DWORD	Immediately	
-						
-	3	133,133,133,133,133,133,133,133,133...	-	-	7/7	U

Description: Enabling axes and traversing directions for "Automatic calibration" of milling tool probes.

The default setting refers in X and Y to the plus and minus direction respectively, in Z only to the minus direction.

The parameter is divided into three components the functions of which are to be assigned to calibration data records 1, 2 or 3.

The calibration data records are firmly assigned to tool measuring in the working planes G17 (1), G18 (2) and G19 (3)!

Meaning of the parameter components

Decimal position:

Ones 1st geometry axis (X)

Tens: 2nd geometry axis (Y)

Hundreds: 3rd geometry axis (Z)

Value:

=0: axis not enabled

=1: only minus direction possible

=2: only plus direction possible

=3: both directions possible

54633	MEA_TP_TYPE			-	-	
-	Tool probe type cube / wheel			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	0	999	7/7	U

Description: Tool probe type

0: cube

101: wheel in XY, working plane G17

201: wheel in ZX, working plane G18

301: wheel in YZ, working plane G19

54634	MEA_TP_CAL_MEASURE_DEPTH			-	-	
mm	Distance between the upper tool probe edge and the lower milling tool edge			DOUBLE	Immediately	
-						
-	3	2,2,2,2,2,2,2,2,2,2,2,2	-1000	1000	7/7	U

Description: Distance between the upper tool probe edge and the lower milling tool edge.

For tool probe calibration this distance defines the calibration depth and

for milling tool measuring the measuring depth!

This parameter does not apply to turning tool measuring!

54635	MEA_TP_STATUS_GEN			-	-	
-	Calibration status in general			DOUBLE	Immediately	
-						
-	3	0,0,0	-	-	7/7	U

Description: Calibration status general, reserved for internal use

The value of this parameter is assigned when the "Calibrate tool probe" procedure is executed.

54640	MEA_TPW_TRIG_MINUS_DIR_AX1			-	-	
mm	Trigger point of the 1st measuring axis in negative direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 1st measuring axis in negative direction (abscissa, X at G17, Z at G18)

The trigger point refers to the workpiece coordinate system (WCS).

Prior to calibration the approximate trigger point must be entered in the workpiece coordinate system!

The exact value of this parameter is created by the operation "Calibrate tool probe"!

54641	MEA_TPW_TRIG_PLUS_DIR_AX1			-	-	
mm	Trigger point of the 1st measuring axis in positive direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 1st measuring axis in positive direction (abscissa, X at G17, Z at G18)

The trigger point refers to the workpiece coordinate system (WCS).

Prior to calibration the approximate trigger point must be entered in the workpiece coordinate system!

The exact value of this parameter is created by the operation "Calibrate tool probe"!

54642	MEA_TPW_TRIG_MINUS_DIR_AX2			-	-	
mm	Trigger point of the 2nd measuring axis in negative direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 2nd measuring axis in negative direction (ordinate, Y at G17, X at G18)

The trigger point refers to the workpiece coordinate system (WCS).

Prior to calibration the approximate trigger point must be entered in the workpiece coordinate system!

The exact value of this parameter is created by the operation "Calibrate tool probe"!

54643	MEA_TPW_TRIG_PLUS_DIR_AX2			-	-	
mm	Trigger point of the 2nd measuring axis in positive direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 2nd measuring axis in positive direction (ordinate, Y at G17, X at G18)

The trigger point refers to the workpiece coordinate system (WCS).

Prior to calibration the approximate trigger point must be entered in the workpiece coordinate system!

The exact value of this parameter is created by the operation "Calibrate tool probe"!

54644	MEA_TPW_TRIG_MINUS_DIR_AX3			-	-	
mm	Trigger point of the 3rd measuring axis in negative direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 3rd measuring axis in negative direction (applicate, Z at G17, Y at G18)

The trigger point refers to the workpiece coordinate system (WCS).

Prior to calibration the approximate trigger point must be entered in the workpiece coordinate system!

The exact value of this parameter is created by the operation "Calibrate tool probe"!

54645	MEA_TPW_TRIG_PLUS_DIR_AX3			-	-	
mm	Trigger point of the 3rd measuring axis in positive direction			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-100000	100000	7/7	U

Description: Trigger point of the 3rd measuring axis in positive direction (applicate, Z at G17, Y at G18)

The trigger point refers to the workpiece coordinate system (WCS).

Prior to calibration the approximate trigger point must be entered in the workpiece coordinate system!

The exact value of this parameter is created by the operation "Calibrate tool probe"!

54646	MEA_TPW_EDGE_DISK_SIZE			-	-	
mm	Tool probe edge length/wheel diameter			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	0	1000	7/7	U

Description:

```
Effective edge length or grinding wheel diameter of the tool
probe.
Milling tools are normally measured with wheel-shaped probes while
turning tools
are measured with square probes.
```

54647	MEA_TPW_AX_DIR_AUTO_CAL			-	-	
-	Automatic tool probe calibration, enable axes/directions			DWORD	Immediately	
-						
-	3	133,133,133,133,133,133,133,133,133...	-	-	7/7	U

Description:

```
Enabling axes and traversing directions for "Automatic calibra-
tion" of milling tool probes.
The default setting refers in X and Y to the plus and minus direc-
tion respectively, in Z only to the minus direction.
The parameter is divided into three components the functions of
which are to be assigned to calibration data records 1, 2 or 3.
The calibration data records are firmly assigned to tool measuring
in the working planes G17 (1), G18 (2) and G19 (3)!
Meaning of the parameter components
 Decimal position:
 Ones          1st geometry axis (X)
 Tens:         2nd geometry axis (Y)
 Hundreds: 3rd geometry axis (Z)
 Value:
 =0: axis not enabled
 =1: only minus direction possible
 =2: only plus direction possible
 =3: both directions possible
```

54648	MEA_TPW_TYPE			-	-	
-	Tool probe type cube / wheel			DOUBLE	Immediately	
-						
-	3	0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7	U

Description:

```
Tool probe type
0:     cube
101: wheel in XY, working plane G17
201: wheel in ZX, working plane G18
301: wheel in YZ, working plane G19
```

54649	MEA_TPW_CAL_MEASURE_DEPTH			-	-	
mm	Distance between the upper tool probe edge and the lower milling tool edge			DOUBLE	Immediately	
-						
-	3	2,2,2,2,2,2,2,2,2,2,2,2	0	999	7/7	U

Description: Distance between the upper tool probe edge and the lower milling tool edge.

For tool probe calibration this distance defines the calibration depth and

for milling tool measuring the measuring depth!

This parameter does not apply to turning tool measuring!

54650	MEA_TPW_STATUS_GEN			-	-	
-	Calibration status in general			DOUBLE	Immediately	
-						
-	3	0,0,0	-	-	7/7	U

Description: Calibration status general, reserved for internal use

The value of this parameter is assigned when the "Calibrate tool probe" procedure is executed.

54655	MEA_REPEAT_ACTIVE			-	-	
-	Measurem. repetitions after exceeding dimens. difference and safety margin			BYTE	Immediately	
-						
-	-	0	0	1	7/5	U

Description: Measurement repetitions after exceeding of the dimensional difference (parameter _TDIF) and/or the safety margin (parameter _TSA)

=0: when the dimensional difference and/or safety margin is exceeded, the measurement is not repeated. A corresponding alarm is displayed that can be acknowledged with "RESET".

=1: when the dimensional difference and/or safety margin is exceeded, the measurement is repeated 4 times max.

54656	MEA_REPEAT_WITH_M0			-	-	
-	Alarm and M0 is included in measurement repetitions.			BYTE	Immediately	
-						
-	-	0	0	1	7/5	U

Description: This parameter refers to SD54655 $SNS_MEA_REPEAT_ACTIVE, provided that it is set to "1"!

In this case one of the following behaviors can be selected:

=0: no alarm, no M0 in the measurement repetitions

=1: NC command "M0" is generated in all measurement repetitions; the repetition must be started with NC-START.

The corresponding alarm that can be acknowledged with "NC-START" is displayed for each measurement repetition,

[default = 0]

54657	MEA_TOL_ALARM_SET_M0			-	-	
-	M0, when allowance, undersize or permissible dimens. difference is exceeded			BYTE	Immediately	
-						
-	-	0	0	1	7/5	U

Description: M0 with tolerance alarms 62304 Allowance, 62305 Undersize, 62306 Permissible dimensional difference exceeded

=0: no M0 is generated when alarms 62304 "Allowance", 62305 "Undersize" or 62306 "Permissible dimensional difference exceeded" are output.

These alarms are merely displayed, but do not cause program execution to be interrupted!

=1: NC command "M0" is generated when these alarms are displayed.

54659	MEA_TOOL_MEASURE_RELATE			-	-	
-	Tool measuring and calibration in machine workpiece coordinate system			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Tool measuring and calibration in the machine workpiece coordinate system.

The function of this parameter only refers to CYCLE982.

=0: tool probe calibration and tool measuring are performed in the machine coordinate system (MCS).

Tool probe calibration data are stored in the $SNS_MEA_TP_..... parameter fields.

=1: tool probe calibration and tool measuring are performed in the active workpiece coordinate system (WCS).

Calibration and measurement must be performed under the same environmental conditions (frames). Thus, tools can be measured even at

active transformations, e.g. TRAANG.

Notice: the $SNS_MEA_TP_..... parameter fields are used for calibration and measurement here, too.

54660	MEA_PROBE_BALL_RAD_IN_TOA			-	-	
-	Accept the calibrated workpiece probe radius in the tool data.			BYTE	Immediately	
-						
-	-	0	0	1	7/5	U

Description: Accept the calibrated workpiece probe radius in the tool data.

The function of this parameter only refers to CYCLE976.

0: calibrated workpiece probe radius is not accepted in the tool data

1: for the calibration type "with probe sphere calculation" the determined "effective probe sphere diameter" (54600 $SNS_MEA_WP_BALL_DIAM)

is converted into a radius value and entered in the tool radius geometry memory of the active workpiece probe.

54670	MEA_CM_MAX_PERI_SPEED			-	-	
m/min	Max. permissible peripheral speed of the tool to be measured			DOUBLE	Immediately	
-						
-	2	100,100	0	100000	7/7	U

Description: Max. permissible peripheral speed of the tool to be measured when the spindle rotates.

Monitoring parameter for tool measuring with rotating spindle

only effective with SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 10 = 0!

54671	MEA_CM_MAX_REVOLUTIONS			-	-	
rev/min	Maximum tool speed for tool measuring			DOUBLE	Immediately	
-						
-	2	1000,1000	0	100000	7/7	U

Description: Max. permissible tool speed for tool measuring with rotating spindle.

The speed is automatically reduced when this value is exceeded.

Monitoring parameter for tool measuring with rotating spindle

only effective with SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 10 = 0!

54672	MEA_CM_MAX_FEEDRATE			-	-	
mm/min	Maximum feed for contact of the tool with the probe			DOUBLE	Immediately	
-						
-	2	20,20	0	100000	7/7	U

Description: Max. permissible feed for contact of the tool to be measured with the probe when the spindle rotates.

Monitoring parameter for tool measuring with rotating spindle

only effective with SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 10 = 0!

54673	MEA_CM_MIN_FEEDRATE			-	-	
mm/min	Minimum feed for 1st contact of the tool with the probe			DOUBLE	Immediately	
-						
-	2	1,1	0	100000	7/7	U

Description: Min. feed for first contact of the tool to be measured with the probe when the spindle rotates.

Too small feeds for large tool radii are thus avoided!

Monitoring parameter for tool measuring with rotating spindle

only effective with SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 10 = 0!

54674	MEA_CM_SPIND_ROT_DIR			-	-	
-	Direction of spindle rotation for tool measuring			DOUBLE	Immediately	
-						
-	2	4,4	3	4	7/7	U

Description: Direction of spindle rotation for tool measuring with rotating spindle (default: 4 = M4)

Notice: if the spindle is already rotating when the measuring cycle is called, the direction of rotation is maintained

independently of $SNS_MEA_CM_SPIND_ROT_DIR!

Monitoring parameter for tool measuring with rotating spindle

only effective with SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 10 = 0!

54675	MEA_CM_FEEDFACTOR_1			-	-	
-	Feedrate factor 1, for tool measuring			DOUBLE	Immediately	
-						
-	2	10,10	-	-	7/7	U

Description: Feedrate factor 1, for tool measuring with rotating spindle

=0: single probing with the feedrate calculated by the cycle (but at least with the value of $SNS_MEA_CM_MIN_FEEDRATE)

>=1: first probing with calculated feedrate (but at least with the value of $SNS_MEA_CM_MIN_FEEDRATE).

Monitoring parameter for tool measuring with rotating spindle

only effective with SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 10 = 0!

54676	MEA_CM_FEEDFACTOR_2			-	-	
-	Feedrate factor 2, for tool measuring			DOUBLE	Immediately	
-						
-	2	0,0	-	-	7/7	U

Description: Feedrate factor 2, for tool measuring with rotating spindle

=0: second probing with the feedrate calculated by the cycle (only effective with MEA_CM_FEEDFACTOR_1 > 0)

>=1: second probing with calculated feedrate, feedrate factor 2

Third probing with calculated feedrate (tool speed is influenced by SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 12)

Notice: - Feedrate factor 2 should be smaller than feedrate factor 1!

- If the value of feedrate factor 2 is 0, a third probing will not be not performed!

Monitoring parameter for tool measuring with rotating spindle

only effective with SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 10 = 0!

54677	MEA_CM_MEASURING_ACCURACY			-	-	
mm	Required measuring accuracy, for tool measuring			DOUBLE	Immediately	
-						
-	2	0.005,0.005	0	100000	7/7	U

Description: Required measuring accuracy for tool measuring

The value of this parameter always refers to the last contact of the tool with the probe!

Monitoring parameter for tool measuring with rotating spindle

only effective with SD54749 $SNS_MEA_FUNCTION_MASK_TOOL, Bit 10 = 0!

54689	MEA_T_PROBE_MANUFACTURER			-	-	
-	Tool probe type (manufacturer)			BYTE	Immediately	
-						
-	-	0	0	2	7/5	U

Description: Tool probe type (manufacturer)

These indications are required for tool measuring with rotating spindle.

=0: no indication

=1: TT130 (Heidenhain)

=2: TS27R (Renishaw)

54691	MEA_T_PROBE_OFFSET			-	-	
-	Measurement result offset for tool measuring			BYTE	Immediately	
-						
-	-	0	0	2	7/5	U

Description: Measurement result offset for tool measuring with rotating spindle.

=0: no offset

=1: cycle-internal offset (only effective with SD54690 $SNS_MEA_T_PROBE_MANUFACTURER<>0)

=2: offset through user-defined offset table

54695	MEA_RESULT_OFFSET_TAB_RAD1			-	-	
mm	Offset table (measure tool radius with rotating spindle)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_RAD1[0] ... this element always has value ZERO

$SNS_MEA_RESULT_OFFSET_TAB_RAD1[1] ... 1st tool radius

$SNS_MEA_RESULT_OFFSET_TAB_RAD1[2] ... 2nd tool radius

$SNS_MEA_RESULT_OFFSET_TAB_RAD1[3] ... 3rd tool radius

$SNS_MEA_RESULT_OFFSET_TAB_RAD1[4] ... 4th tool radius

54696	MEA_RESULT_OFFSET_TAB_RAD2			-	-	
mm	Offset table 1st peripheral speed (radius)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_RAD2[0] ... 1st peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD2[1] ... offset value for radius regarding 1st radius and 1st peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD2[2] ... offset value for radius regarding 2nd radius and 1st peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD2[3] ... offset value for radius regarding 3rd radius and 1st peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD2[4] ... offset value for radius regarding 4th radius and 1st peripheral speed

54697	MEA_RESULT_OFFSET_TAB_RAD3			-	-	
mm	Offset table 2nd peripheral speed (radius)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_RAD3[0] ... 2nd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD3[1] ... offset value for radius regarding 1st radius and 2nd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD3[2] ... offset value for radius regarding 2nd radius and 2nd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD3[3] ... offset value for radius regarding 3rd radius and 2nd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD3[4] ... offset value for radius regarding 4th radius and 2nd peripheral speed

54698	MEA_RESULT_OFFSET_TAB_RAD4			-	-	
mm	Offset table 3rd peripheral speed (radius)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_RAD4[0] ... 3rd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD4[1] ... offset value for radius regarding 1st radius and 3rd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD4[2] ... offset value for radius regarding 2nd radius and 3rd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD4[3] ... offset value for radius regarding 3rd radius and 3rd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD4[4] ... offset value for radius regarding 4th radius and 3rd peripheral speed

54699	MEA_RESULT_OFFSET_TAB_RAD5			-	-	
mm	Offset table 4th peripheral speed (radius)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_RAD5[0] ... 4th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD5[1] ... offset value for radius regarding 1st radius and 4th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD5[2] ... offset value for radius regarding 2nd radius and 4th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD5[3] ... offset value for radius regarding 3rd radius and 4th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD5[4] ... offset value for radius regarding 4th radius and 4th peripheral speed

54700	MEA_RESULT_OFFSET_TAB_RAD6			-	-	
mm	Offset table 5th peripheral speed (radius)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_RAD6[0] ... 5th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD6[1] ... offset value for radius regarding 1st radius and 5th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD6[2] ... offset value for radius regarding 2nd radius and 5th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD6[3] ... offset value for radius regarding 3rd radius and 5th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_RAD6[4] ... offset value for radius regarding 4th radius and 5th peripheral speed

54705	MEA_RESULT_OFFSET_TAB_LEN1			-	-	
mm	Offset table (measure tool length with rotating spindle)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_LEN1[0] ... this element always has value ZERO

$SNS_MEA_RESULT_OFFSET_TAB_LEN1[1] ... 1st tool radius

$SNS_MEA_RESULT_OFFSET_TAB_LEN1[2] ... 2nd tool radius

$SNS_MEA_RESULT_OFFSET_TAB_LEN1[3] ... 3rd tool radius

$SNS_MEA_RESULT_OFFSET_TAB_LEN1[4] ... 4th tool radius

54706	MEA_RESULT_OFFSET_TAB_LEN2			-	-	
mm	Offset table 1st peripheral speed (length)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_LEN2[0] ... 1st peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN2[1] ... offset value for radius regarding 1st radius and 1st peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN2[2] ... offset value for radius regarding 2nd radius and 1st peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN2[3] ... offset value for radius regarding 3rd radius and 1st peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN2[4] ... offset value for radius regarding 4th radius and 1st peripheral speed

54707	MEA_RESULT_OFFSET_TAB_LEN3			-	-	
mm	Offset table 2nd peripheral speed (length)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_LEN3[0] ... 2nd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN3[1] ... offset value for radius regarding 1st radius and 2nd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN3[2] ... offset value for radius regarding 2nd radius and 2nd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN3[3] ... offset value for radius regarding 3rd radius and 2nd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN3[4] ... offset value for radius regarding 4th radius and 2nd peripheral speed

54708	MEA_RESULT_OFFSET_TAB_LEN4			-	-	
mm	Offset table 3rd peripheral speed (length)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_LEN4[0] ... 3rd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN4[1] ... offset value for radius regarding 1st radius and 3rd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN4[2] ... offset value for radius regarding 2nd radius and 3rd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN4[3] ... offset value for radius regarding 3rd radius and 3rd peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN4[4] ... offset value for radius regarding 4th radius and 3rd peripheral speed

54709	MEA_RESULT_OFFSET_TAB_LEN5			-	-	
mm	Offset table 4th peripheral speed (length)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_LEN5[0] ... 4th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN5[1] ... offset value for radius regarding 1st radius and 4th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN5[2] ... offset value for radius regarding 2nd radius and 4th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN5[3] ... offset value for radius regarding 3rd radius and 4th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN5[4] ... offset value for radius regarding 4th radius and 4th peripheral speed

54710	MEA_RESULT_OFFSET_TAB_LEN6			-	-	
mm	Offset table 5th peripheral speed (length)			DOUBLE	Immediately	
-						
-	5	0,0,0,0,0	-	-	7/5	U

Description: Parameter for user-defined measurement result offset for tool measuring with rotating spindle

$SNS_MEA_RESULT_OFFSET_TAB_LEN6[0] ... 5th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN6[1] ... offset value for radius regarding 1st radius and 5th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN6[2] ... offset value for radius regarding 2nd radius and 5th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN6[3] ... offset value for radius regarding 3rd radius and 5th peripheral speed

$SNS_MEA_RESULT_OFFSET_TAB_LEN6[4] ... offset value for radius regarding 4th radius and 5th peripheral speed

54750	MEA_ALARM_MASK			-	-	
-	Expert mode for cycle alarms			DWORD	Immediately	
-						
-	-	0	-	-	7/5	U

Description: Bit 0-7 workpiece measurement

Bit 0 =1 alarms with cycle-internal states and codings are displayed (expert mode)!

Bit 1-7 reserved

Bit 8-16 tool measuring

Bit 0-7 reserved

54798	J_MEA_FUNCTION_MASK_PIECE			-	-	
-	Setting for input screen, Measure in JOG, workpiece measurement			DWORD	Immediately	
-						
-	-	512	-	-	7/5	U

Description: Setting for input screen, measuring cycles in JOG, workpiece measurement

Bit0 not used
Bit1 not used
Bit2 Enable calibration for electronic workpiece probe
Bit3 Select probe calibration data field, enable
Bit4 not used
Bit5 Select WO as measurement basis
Bit6 Select WO compensation in basic reference (SETFRAME), enable
Bit7 Select WO compensation in channel-specific basic frame, enable
Bit8 Select WO compensation in global basic frame, enable
Bit9 Select WO compensation in settable frame, enable

54799	J_MEA_FUNCTION_MASK_TOOL			-	-	
-	Setting for input screen, Measure in JOG, workpiece measurement			DWORD	Immediately	
-						
-	-	0	-	-	7/5	U

Description: Setting for input screen "Measure in JOG", tool measuring

Bit0 not used
Bit1 not used
Bit2 Activate calibration of electronic tool probe
Bit3 Enable selection of tool probe calibration data field
Bit4 not used
Bit5 not used

1.7.8 Cannel-specific configuration setting data

55200	MAX_INP_FEED_PER_REV			-	-	
mm/rev	Upper limit feedrate/rev			DOUBLE	Immediately	
-						
-	-	1	0	5	7/4	M

Description: Feedrate input upper limit for mm/rev

55201	MAX_INP_FEED_PER_TIME			-	-	
mm/min	Upper limit feedrate/min			DOUBLE	Immediately	
-						
-	-	10000	0	100000	7/4	M

Description: Feedrate input upper limit for mm/min

55202	MAX_INP_FEED_PER_TOOTH			-	-	
mm	Upper limit feedrate/tooth			DOUBLE	Immediately	
-						
-	-	1	0	2	7/4	M

Description: Feedrate input upper limit for mm/tooth

55212	FUNCTION_MASK_TECH_SET			-	-	
-	Function mask Cross-technology			BYTE	Immediately	
-						
-	-	6	-	-	7/4	M

Description: Function mask Cross-technology

Bit 0: Tool preselection active

Bit 1: Calculate thread depth from thread pitch

Bit 2: Refer to Table for thread diameter and depth

55214	FUNCTION_MASK_MILL_SET			-	-	
-	Function mask Milling			DWORD	Immediately	
-						
-	-	5	-	-	7/4	M

Description: Function mask Milling

Bit 0: Default setting - milling cycles with synchronous operation

Bit 1: empty

Bit 2: Depth calculation in milling cycles without parameter SC

55216	FUNCTION_MASK_DRILL_SET			-	-	
-	Function mask Drilling			DWORD	Immediately	
-						
-	-	24	-	-	7/4	M

Description: Function mask Drilling

Bit 0:tapping CYCLE84: reverse the direction of spindle rotation in the cycle

Bit 1: -boring CYCLE86: consider rotation of the tool plane when positioning the spindle

Bit 2: -boring CYCLE86: consider swiveled table kinematics when positioning the spindle (tool carrier)

Bit 3:tapping CYCLE84: monitoring machine data 31050 and 31060 of the spindle

Bit 4:tapping CYCLE840: monitoring machine data 31050 and 31060 of the spindle

Bit 5:tapping CYCLE84: calculation of the brake point at G33

55218	FUNCTION_MASK_TURN_SET			-	-	
-	Function mask Turning			DWORD	Immediately	
-						
-	-	1	-	-	7/4	M

Description: Function mask Turning

Bit 0: new thread table during thread cutting

Bit 1:reserved (CYCLE93)

Bit 2:reserved (CYCLE93)

55220	FUNCTION_MASK_MILL_TOL_SET			-	-	
-	Function mask High Speed Settings CYCLE832			DWORD	Immediately	
-						
-	-	0	-	-	7/5	M

Description: Function mask High Speed Settings CYCLE832

Bit 0: Display input fields technology

Bit 1: Settings as agreed in the following setting data:

$SCS_MILL_TOL_FACTOR_NORM

$SCS_MILL_TOL_FACTOR_ROUGH

$SCS_MILL_TOL_FACTOR_SEMIFIN

$SCS_MILL_TOL_FACTOR_FINISH

$SCS_MILL_TOL_VALUE_NORM

$SCS_MILL_TOL_VALUE_ROUGH

$SCS_MILL_TOL_VALUE_SEMIFIN

$SCS_MILL_TOL_VALUE_FINISH

55221	FUNCTION_MASK_SWIVEL_SET			-	-	
-	Function mask Swivel CYCLE800			DWORD	Immediately	
-						
-	-	0	-	-	7/3	M

Description: Function mask Swivel CYCLE800

Bit 0: Display input field "No swivel"

Bit 1: =0: Retract Z or retract Z XY

=1: Retract to fixed position 1 or 2

Bit 2: Allow selection "Deselection" of the swivel data block

Bit 3: Show active swivel plane under Swivel in JOG

The settings of the Swivel function mask affect all swivel data records.

55230	CIRCLE_RAPID_FEED			-	-	
mm/min	Positional feed on circular paths			DOUBLE	Immediately	
-						
-	-	10000	100	100000	7/4	M

Description: Rapid traverse feedrate in mm/min for positioning on circle path

55231	MAX_INP_RANGE_GAMMA			-	-	
degrees	Maximum input area alignment angle gamma			DOUBLE	Immediately	
-						
-	-	5	0	90	7/4	M

Description: Maximum input area alignment angle gamma

55232	SUB_SPINDLE_REL_POS			-	-	
mm	Retract position Z for counterspindle			DOUBLE	Immediately	
-						
-	-	0	-	-	7/4	M

Description: Z retraction position for the counterspindle

55260	MAJOG_SAFETY_CLEARANCE			-	-	
mm	Safety clearance for machine JOG			DOUBLE	Immediately	
-						
-	-	0	-	-	7/4	M

Description: This is the safety clearance
for the cycle masks under JOG

55261	MAJOG_RELEASE_PLANE			-	-	
mm	Retraction plane for machine JOG			DOUBLE	Immediately	
-						
-	-	0	-	-	7/4	M

Description: This is the retraction plane
for the cycle masks under JOG

1.7.9 Channel-specific cycle setting data

55410	MILL_SWIVEL_ALARM_MASK			-	-	
-	Hide and unhide cycle alarms for CYCLE800			DWORD	Immediately	
-						
-	-	0	-	-	7/5	M

Description: Hide and unhide cycle alarms CYCLE800

Bit 0: error analysis 62186 - active work offset G%4 and base (base relation) include rotations

Bit 1: error analysis 62187 - active base and base relation (G500) include rotations

55440	MILL_TOL_FACTOR_NORM			-	-	
-	Rotary axes tolerance factor for CYCLE832 (High Speed Settings), G group 59			DOUBLE	Immediately	
-						
-	-	10	0	1000	7/5	U

Description: Settings at deselection of CYCLE832 of G group 59

55441	MILL_TOL_FACTOR_ROUGH			-	-	
-	Rotary axes tolerance factor for roughing CYCLE832 of G group 59			DOUBLE	Immediately	
-						
-	-	10	0	1000	7/5	U

Description: Rotary axes tolerance factor for roughing CYCLE832 of G group 59

55442	MILL_TOL_FACTOR_SEMIFIN			-	-	
-	Rotary axes tolerance factor for prefinishing CYCLE832 of G group 59			DOUBLE	Immediately	
-						
-	-	10	0	1000	7/5	U

Description: Rotary axes tolerance factor for prefinishing CYCLE832 of G group 59

55443	MILL_TOL_FACTOR_FINISH			-	-	
-	Rotary axes tolerance factor for finishing CYCLE832 of G group 59			DOUBLE	Immediately	
-						
-	-	10	0	1000	7/5	U

Description: Rotary axes tolerance factor for finishing CYCLE832 of G group 59

55445	MILL_TOL_VALUE_NORM			-	-	
mm	Tolerance value on deselecting High Speed Settings cycle CYCLE832			DOUBLE	Immediately	
-						
-	-	0.01	0	10	7/5	U

Description: Tolerance value on deselecting High Speed Settings cycle CYCLE832

55446	MILL_TOL_VALUE_ROUGH			-	-	
mm	Tolerance value for roughing CYCLE832 (High Speed Settings)			DOUBLE	Immediately	
-						
-	-	0.1	0	10	7/5	U

Description: Tolerance value for roughing CYCLE832

55447	MILL_TOL_VALUE_SEMIFIN			-	-	
mm	Tolerance value for smooth-finishing CYCLE832 (High Speed Settings)			DOUBLE	Immediately	
-						
-	-	0.05	0	10	7/5	U

Description: Tolerance value for prefinishing CYCLE832

55448	MILL_TOL_VALUE_FINISH			-	-	
mm	Tolerance value for finishing CYCLE832 (High Speed Settings)			DOUBLE	Immediately	
-						
-	-	0.01	0	10	7/5	U

Description: Tolerance value for finishing CYCLE832

55460	MILL_CONT_INITIAL_RAD_FIN			-	-	
mm	Contour pocket milling: approach circle radius finishing			DOUBLE	Immediately	
-						
-	-	0	0	100	7/4	M

Description: This data affects the radius of the approach circle during contour pocket finishing.

0: the radius is selected to maintain a safety clearance to the finishing allowance in the starting point.

>0: the radius is selected to maintain the value of this setting data to the finishing allowance in the starting point.

55480	DRILLING_AXIS_IS_Z			-	-	
-	Drilling axis depends on plane or always Z			BYTE	Immediately	
-						
-	-	0	0	1	7/6	M

Description: Drilling axis depends on plane (G17, G18, G19) or always Z

55481	DRILL_TAPPING_SET_GG12			-	-	
-	Setting tapping G group 12: block change behavior at exact stop			DOUBLE	Immediately	
-						
-	2	0	0	3	7/4	M

Description: Settings for tapping G group 12 cycle CYCLE84 and CYCLE840:
G group 12: block change behavior at exact stop (G60)

55482	DRILL_TAPPING_SET_GG21			-	-	
-	Setting tapping G group 21: acceleration profile			DOUBLE	Immediately	
-						
-	2	0	0	3	7/4	M

Description: Settings for tapping G group 21 cycle CYCLE84
G group 21: acceleration profile (SOFT, BRISK, ...)

55483	DRILL_TAPPING_SET_GG24			-	-	
-	Setting tapping G group 24: precontrol			DOUBLE	Immediately	
-						
-	2	0	0	2	7/4	M

Description: Settings for tapping G group 24 cycle CYCLE84 and CYCLE840:
G group 24: precontrol (FFWON, FFWOF)

55484	DRILL_TAPPING_SET_MC			-	-	
-	Setting tapping: spindle operation at MCALL			DOUBLE	Immediately	
-						
-	2	0	0	1	7/4	M

Description: Setting for tapping cycle CYCLE84 spindle operation at MCALL
0= reactivate spindle operation at MCALL
1= maintain position-controlled spindle operation at MCALL

55489	DRILL_MID_MAX_ECCENT			-	-	
mm	Max. center offset f. center boring			DOUBLE	Immediately	
-						
-	-	0.5	0	10	7/4	M

Description: Maximum center offset for center boring

55490	DRILL_SPOT_DIST			-	-	
mm	Preboring depth drill and thread milling			DOUBLE	Immediately	
-						
-	-	1	0	100	7/4	M

Description: Preboring depth for drill and thread milling

55500	TURN_FIN_FEED_PERCENT			-	-	
%	Roughing feedrate for complete machining in %			BYTE	Immediately	
-						
-	-	100	1	100	7/4	M

Description: When selecting Complete machining (roughing and finishing), the percentage of the entered feedrate F as specified in this setting data is used for finishing.

55505	TURN_ROUGH_O_RELEASE_DIST			-	-	
mm	Return distance stock removal for external machining			DOUBLE	Immediately	
-						
-	-	1	-1	100	7/4	M

Description: This setting data defines the distance by which the tool is returned from the contour during stock removal of an outer corner. This does not apply to stock removal of a contour.

-1: the distance is specified internally.

55506	TURN_ROUGH_I_RELEASE_DIST			-	-	
mm	Return distance stock removal for internal machining			DOUBLE	Immediately	
-						
-	-	0.5	-1	100	7/4	M

Description: This setting data defines the distance by which the tool is returned from the contour during stock removal of an inner corner. This does not apply to stock removal of a contour.

-1: the distance is specified internally.

55510	TURN_GROOVE_DWELL_TIME			-	-	
s	Tool clearance time for grooving at the base (neg. value=rotations)			DOUBLE	Immediately	
-						
-	-	-1	-100	100	7/4	M

Description: If a tool clearance time occurs in a cycle, e.g. deep hole drilling, grooving, the value of this setting data is used

- negative value in spindle revolutions
- positive value in seconds

55540	TURN_PART_OFF_CTRL_DIST			-	-	
mm	Path for cut-off check			DOUBLE	Immediately	
-						
-	-	0.1	0	10	7/4	M

Description: Path for cut-off check

55541	TURN_PART_OFF_CTRL_FEED			-	-	
mm/min	Feedrate for cut-off check			DOUBLE	Immediately	
-						
-	-	0	-	-	7/4	M

Description: Feedrate for cut-off check

55542	TURN_PART_OFF_CTRL_FORCE			-	-	
%	Force for cut-off check in %			DOUBLE	Immediately	
-						
-	-	10	1	100	7/4	M

Description: Force in percent for cut-off check

55543	TURN_PART_OFF_RETRACTION			-	-	
mm	Retraction path prior to cut-off with counterspindle			DOUBLE	Immediately	
-						
-	-	0	0	1	7/4	M

Description: Retraction path prior to cut-off with counterspindle

55550	TURN_FIXED_STOP_DIST			-	-	
mm	Counterspindle: path for travel to fixed stop			DOUBLE	Immediately	
-						
-	-	10	0.001	1000	7/4	M

Description: In this setting data you specify the distance to the programmed target position, after which the counterspindle travels with a special feedrate during travel to fixed stop (see 55551 $SCS_TURN_FIXED_STOP_FEED).

55551	TURN_FIXED_STOP_FEED			-	-	
mm/min	Counterspindle: feedrate for travel to fixed stop			DOUBLE	Immediately	
-						
-	-	0	-	-	7/4	M

Description: In this setting data you specify the feedrate with which the counterspindle travels to a fixed stop. In setting data 55550 $SCS_TURN_FIXED_STOP_DIST you specify the distance after which the tool travels in this feedrate.

55552	TURN_FIXED_STOP_FORCE			-	-	
%	Counterspindle: force for travel to fixed stop in %			DOUBLE	Immediately	
-						
-	-	10	1	100	7/4	M

Description: In this setting data you specify at which percentage of the driving force the counterspindle is to stop during travel to fixed stop.

55553	TURN_FIXED_STOP_RETRACTION			-	-	
mm	Counterspindle: retraction path prior to chucking after fixed stop			DOUBLE	Immediately	
-						
-	-	0	0	1	7/4	M

Description: Retraction path prior to chucking after travel to fixed stop

55580	TURN_CONT_RELEASE_ANGLE			-	-	
degrees	Contour turning: retraction angle			DOUBLE	Immediately	
-						
-	-	45	0	90	7/4	M

Description: This setting data defines the angle by which the tool is retracted from the contour during contour turning roughing.

55581	TURN_CONT_RELEASE_DIST			-	-	
mm	Contour turning: retraction value			DOUBLE	Immediately	
-						
-	-	1	0	10	7/4	M

Description: This setting data defines the value by which the tool is retracted in both axes during contour turning roughing.

55582	TURN_CONT_TRACE_ANGLE			-	-	
degrees	Contour turning: minimum angle for rounding along contour			DOUBLE	Immediately	
-						
-	-	5	0	90	7/4	M

Description: This setting data specifies the angle between the cutting edge and the contour, at which the contour is rounded in order to remove residual material.

55583	TURN_CONT_VARIABLE_DEPTH			-	-	
%	Contour turning: percentage for variable cutting depth			BYTE	Immediately	
-						
-	-	20	0	50	7/4	M

Description: Percentage for variable cutting depth during contour turning

55584	TURN_CONT_BLANK_OFFSET			-	-	
mm	Contour turning: blank allowance			DOUBLE	Immediately	
-						
-	-	1	0	100	7/4	M

Description: This setting data specifies the distance to the blank, after which contour turning is switched from G0 to G1 in order to adjust any possible blank allowances.

55585	TURN_CONT_INTERRUPT_TIME			-	-	
s	Contour turning: feed interrupt time (neg. values = revolutions)			DOUBLE	Immediately	
-						
-	-	-1	-	-	7/4	M

Description: Feed interrupt time during contour turning, contour grooving and plunge turning

- negative value in spindle revolutions
- positive value in seconds

This setting data is effective only if setting data 55586 is $SCS_TURN_CONT_INTER_RETRACTION = 0.

55586	TURN_CONT_INTER_RETRACTION			-	-	
mm	Contour turning: retraction path after feed interrupt			DOUBLE	Immediately	
-						
-	-	1	0	10	7/4	M

Description: Retraction path feed interrupt during contour turning, contour grooving and plunge turning:

>0: retraction path after feed interrupt (setting data 55585 $SCS_TURN_CONT_INTERRUPT_TIME is ineffective!)

=0: no retraction path

55587	TURN_CONT_MIN_REST_MAT_AX1			-	-	
%	Contour turning: minimum difference dimension residual machining axis 1			DOUBLE	Immediately	
-						
-	-	50	0	1000	7/4	M

Description: This MD defines the limit value for stock removal of residual material in the direction of the 1st axis.

Example:

If this MD is set to 50% and if the finishing allowance is 0.5mm, the residual material which is thinner than 0.25mm is not removed in a separate machining step, but during finishing.

55588	TURN_CONT_MIN_REST_MAT_AX2			-	-	
%	Contour turning: minimum difference dimension residual machining axis 2			DOUBLE	Immediately	
-						
-	-	50	0	1000	7/4	M

Description: This MD defines the limit value for stock removal of residual material in the direction of the 2nd axis.

Example:

If this MD is set to 50% and if the finishing allowance is 0.5mm, the residual material which is thinner than 0.25mm is not removed in a separate machining step, but during finishing.

55595	TURN_CONT_TOOL_BEND_RETR			-	-	
mm	Contour plunge turning: retraction path due to tool bending			DOUBLE	Immediately	
-						
-	-	0.1	0	1	7/4	M

Description: Retraction due to tool bending during plunge turning

55596	TURN_CONT_TURN_RETRACTION			-	-	
mm	Contour plunge turning: retraction depth prior to turning			DOUBLE	Immediately	
-						
-	-	0.1	0	1	7/4	M

Description: Retraction depth prior to plunge turning

55600	MEA_COLLISION_MONITORING			-	-	
-	Collision detection with tool probe for intermediate positioning			BYTE	Immediately	
-						
-	-	1	0	1	7/5	U

Description: Collision detection with tool probe for intermediate positioning

=0: no collision detection

=1: the movement of positioning operations calculated by the measuring cycles and performed between the measuring points

is stopped as soon as the probe provides a switching signal. A corresponding alarm message is displayed.

55602	MEA_COUPL_SPIND_COORD			-	-	
-	Coupling spindle orientation with coordinate rotation in the active plane			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Coupling of spindle orientation and coordinate rotation in the active plane, in the case of workpiece measurement with multiprobe in Automatic mode

=0: no coupling of spindle orientation and coordinate rotation in the plane.

=1: when multiprobes are used, the spindle is oriented depending on the active coordinate rotation in the plane (rotations around the infeed axis (applicate)).

Thus, the axis-parallel orientation of the probe sphere contact points (calibrated trigger points) is maintained with regard to the geometry axis.

The direction of spindle rotation is defined by SD55604 $SCS_MEA_SPIND_MOVE_DIR!

Note:

Coordinate rotation in the active plane means: - Rotation around the Z axis at G17,

- Rotation around the Y axis at G18
- Rotation around the X axis at G19.

Notice:

The coupling is annulled by the measuring cycle, if

- rotations around the 1st or 2nd measuring axis (abscissa or ordinate at G17) between calibration and actual measuring are not identical !!!
- the working spindle is not position-controlled (no SPOS possible)
- a monoprobe is used (_PRNUM=x1xx)!

When the coupling is annulled by the measuring cycle, no alarm or message is displayed!

55604	MEA_SPIND_MOVE_DIR			-	-	
-	Direction of rotation of spindle positioning			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Direction of rotation of spindle positioning with regard to active coupling of spindle orientation and coordinate rotation in the active plane

=0: the spindle is positioned as specified by the default.

- coordinate rotation angle in the plane 0°: spindle positioning 0°
- coordinate rotation angle in the plane 90°: spindle positioning 270°

=1: the spindle is positioned in the opposite direction (adjusted angle values).

- coordinate rotation angle in the plane 0°: spindle positioning 0°
- coordinate rotation angle in the plane 90°: spindle positioning 90°

55606	MEA_NUM_OF_MEASURE			-	-	
-	Number of measurement repetitions, if the probe does not switch			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Number of measurement repetitions, if the probe does not switch

=0: max. 5 measuring attempts are performed before measuring cycle alarm "Probe does not switch" is output.

=1: after the first unsuccessful measuring attempt measuring cycle alarm "Probe does not switch" is generated.

55608	MEA_RETRACTION_FEED			-	-	
-	Retraction velocity from the measuring point			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Retraction velocity from the measuring point

=0: retraction of the measuring point is performed with the same velocity as in intermediate positioning (SD55631 $SCS_MEA_FEED_PLANE_VALUE).

=1: the retraction velocity depends on the rapid traverse velocity in percent as specified in SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT and is only
effective with active collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1).

55610	MEA_FEED_TYP			-	-	
-	Selection of measuring feed function, normal/rapid			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Measuring feed

=0: for the measuring travel the feedrate generated in the cycle or the feedrate programmed in parameter _VMS is used.

=1: travel is first performed with "rapid measuring feed" SD55633 $SCS_MEA_FEED_FAST_MEASURE; after contact of the probe with the measuring object
a retraction of 2mm from the measuring point is performed. Now the measuring travel itself with the feedrate from _VMS is performed.

The function "Rapid measuring feed" is realized only if the value in parameter is _FA >=1!

55613	MEA_RESULT_DISPLAY			-	-	
-	Selection of measurement result display			BYTE	Immediately	
-						
-	-	0	0	10	7/7	U

Description: Measurement results screen display

=0: No measurement results screen

=1: The measurement results screen is visible for a fixed time of 8 seconds

=2: Not used, n.u.

=3: When the measurement results screen is visible, the cycle is stopped by an internal M0;

on NC start the measuring cycle is resumed and the measurement results screen is deselected.

=4: The measurement results screen only appears in the case of cycle alarms 61303, 61304, 61305, 61306.

55618	MEA_SIM_ENABLE			-	-	
-	Selection of measuring cycle response in a simulated environment			BYTE	Immediately	
-						
-	-	1	0	1	7/5	U

Description: Selection of measuring cycle response in an environment simulated in HMI Advanced or in ShopMill / ShopTurn

= 0: measuring cycles are not executed (measuring cycle is skipped internally)

= 1: measuring cycles are executed; real axes are required!

During calibration no values are entered in the probe data fields,

no measurement result is displayed,

the measuring cycle is not logged,

the travel is performed without collision detection.

55619	MEA_SIM_MEASURE_DIFF			-	-	
mm	Value for simulated error of measurement			DOUBLE	Immediately	
-						
-	-	0	-100	100	7/5	U

Description: With this parameter simulated measurement errors can be specified on the measuring points.

Provided that SD55618 $SCS_MEA_SIM_ENABLE=1 is used and that the measuring cycles are executed in a

simulated environment of HMI Advanced or ShopMill / ShopTurn, a measurement difference can be

entered in this parameter. The value of the measurement difference must be smaller than the measuring path in parameter _FA!

Otherwise cycle alarm 61301 "Probe does not switch" is output during active simulation.

55622	MEA_EMPIRIC_VALUE_NUM			-	-	
-	Number of empirical values			DWORD	Immediately	
-						
-	-	20	0	1000	7/5	U

Description: Number of empirical values

55623	MEA_EMPIRIC_VALUE			-	-	
mm	Empirical value memory			DOUBLE	Immediately	
-						
-	20	0	-100000	100000	7/7	U

Description: In its default setting the empirical value memory consists of 20 memory elements.

Using parameter $SCS_MEA_EMPIRIC_VALUE_NUM the number of memory elements

can be defined! Currently, however, these 20 memory elements cannot be changed!

In the empirical value memory, empirical values can be stored which are cleared with the currently calculated

difference between the setpoint and the actual value.

Using parameter _EVNUM the empirical value element to be cleared is addressed!

55624	MEA_AVERAGE_VALUE_NUM			-	-	
-	Number of mean values			DWORD	Immediately	
-						
-	-	20	0	1000	7/5	U

Description: Number of mean values

55625	MEA_AVERAGE_VALUE			-	-	
-	Mean value memory			DOUBLE	Immediately	
-						
-	20	0	-100000	100000	7/7	U

Description: In its default setting the mean value memory consists of 20 memory elements.

Using parameter $SCS_MEA_AVERAGE_VALUE_NUM the number of memory elements

can be defined! Currently, however, these 20 memory elements cannot be changed!

In the mean value memory, the mean values calculated in connection with functionality

"Automatic tool offset with mean value creation" are stored.

Using parameter _EVNUM the mean value element to be used is addressed!

55630	MEA_FEED_RAPID_IN_PERCENT			-	-	
%	Rapid traverse velocity in per cent, for intermediate positioning			DOUBLE	Immediately	
-						
-	-	50	0	100	7/7	U

Description: Traverse velocities for positioning in the measuring cycle between the measuring positions,

with rapid traverse velocity in per cent, with collision detection not active

Note:

If necessary, adapt the value of the rapid traverse velocity in per cent to the probe type used and to the

machine characteristics! This means that the maximum deflection of the actual probe type must be considered!!

Explanations:

In the measuring cycles any intermediate positions are calculated prior to the actual set of measurements. These positions can be approached

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1 or
- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0).

Depending on this setting different velocities are used for the approach:

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1):

  With SD55631 $SCS_MEA_FEED_PLAN_VALUE the traversing feed is performed in the plane and

  with SD55632 $SCS_MEA_FEED_FEEDAX_VALUE during traversing in the feed axis (applicate).

  If the probe switches when these intermediate positions are approached, the movement is stopped and the alarm "Probe collision" is output.

- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0):

  The intermediate positions are approached with the maximum axis velocity (rapid traverse) in per cent as specified in SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT.

  With SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=0 and SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=100 the maximum axis velocity is effective.

55631	MEA_FEED_PLANE_VALUE			-	-	
mm/min	Traverse velocity for intermediate positioning in the plane			DOUBLE	Immediately	
-						
-	-	1000	0	10000	7/7	U

Description:

Traverse velocities for intermediate positioning in the measuring cycle in the plane, with and without collision detection

Note:

If necessary, adapt the value of the velocity for the plane to the probe type used and to the

machine characteristics! This means that the maximum deflection of the actual probe type must be considered!!

Explanations:

In the measuring cycles any intermediate positions are calculated prior to the actual set of measurements. These positions can be approached

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1 or
- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0).

Depending on this setting different velocities are used for the approach:

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1):

  With SD55631 $SCS_MEA_FEED_PLAN_VALUE the traversing feed is performed in the plane.

  If the probe switches when these intermediate positions are approached, the movement is stopped and the alarm "Probe collision" is output.

- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0):

  The intermediate positions are approached with the maximum axis velocity (rapid traverse) in per cent as specified in SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT.

  With SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=0 and SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=100 the maximum axis velocity is effective.

55632	MEA_FEED_FEEDAX_VALUE			-	-	
mm/min	Positioning velocity in the infeed axis			DOUBLE	Immediately	
-						
-	-	1000	0	10000	7/7	U

Description: Traverse velocities for intermediate positioning in the measuring cycle in the infeed axis, with and without collision detection

Note:

If necessary, adapt the value of the velocity in the infeed axis to the probe type used and to the

machine characteristics! This means that the maximum deflection of the actual probe type must be considered!!

Explanations:

In the measuring cycles any intermediate positions are calculated prior to the actual set of measurements. These positions can be approached

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1 or
- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0).

Depending on this setting different velocities are used for the approach:

- with collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=1):

  With SD55632 $SCS_MEA_FEED_FEEDAX_VALUE the traversing feed is performed in the infeed axis (applicate).

  If the probe switches when these intermediate positions are approached, the movement is stopped and the alarm "Probe collision" is output.

- without collision detection (SD55600 $SCS_MEA_COLLISION_MONITORING=0):

  The intermediate positions are approached with the maximum axis velocity (rapid traverse) in per cent as specified in SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT.

  With SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=0 and SD55630 $SCS_MEA_FEED_RAPID_IN_PERCENT=100 the maximum axis velocity is effective.

55633	MEA_FEED_FAST_MEASURE			-	-	
mm/min	Rapid measuring feed			DOUBLE	Immediately	
-						
-	-	900	0	10000	7/7	U

Description: Rapid measuring feed

Note:

If necessary, adjust the value of the velocity to the probe type used and to the machine characteristics!

This means that the maximum deflection of the actual probe type must be considered!!

The use of "Rapid measuring feed" depends of SD55610 $SCS_MEA_FEED_TYP!

55761	J_MEA_SET_NUM_OF_ATTEMPTS			-	-	
-	Numb. of meas. attempts, if the probe does not switch, in "Measure in JOG"			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Numb. of meas. attempts, if the probe does not switch, in "Measure in JOG"

=0: 5 measuring attempts, then alarm "Probe does not switch" is output

=1: 1 measuring attempt, then alarm "Probe does not switch" is output

55762	J_MEA_SET_RETRAC_MODE			-	-	
-	Select. of velocity of retract. from the meas. point, in "Measure in JOG"			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Selection of the velocity of retraction from the measuring point, in "Measure in JOG"

=0: retraction is performed at the same velocity as that of inter-mediate positioning

=1: retraction is performed with rapid traverse

55763	J_MEA_SET_FEED_MODE			-	-	
-	Measuring with rapid or normal measuring feed, in "Measure in JOG"			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Measuring with rapid or normal measuring feed, in "Measure in JOG"

=0: measuring with measuring feed

=1: first probing is performed with "Rapid measuring feed" from SD55633 $SCS_MEA_FEED_FAST_MEASURE;

the second probing represents the measurement itself per-formed with measuring feed.

55770	J_MEA_SET_COUPL_SP_COORD			-	-	
-	Coupling spindle with coordinate rotation in the plane, in "Measure in JOG"			BYTE	Immediately	
-						
-	-	0	0	1	7/5	U

Description: Coupling of spindle orientation and coordinate rotation around the infeed axis, in the case of workpiece measurement with multiprobe in "Measure in JOG" mode

=0: When multiprobes are used, the spindle is oriented as a function of the active coordinate rotation around the infeed axis (applicate).

Thus, the axis-parallel orientation of the probe sphere contact points (calibrated trigger points) is maintained in relation to the geometry axis.

The direction of spindle rotation is defined by SD55604 $SCS_MEA_SPIND_MOVE_DIR.

=1: The current spindle orientation with NC-START of the measuring task for "Measure in JOG" is used as the starting position for the following procedure.

Note:

Coordinate rotation in the active plane means: - Rotation around the Z axis at G17,

- Rotation around the Y axis at G18
- Rotation around the X axis at G19.

Notice:

The coupling is annulled by the measuring cycle, if

- rotations around the 1st or 2nd measuring axis (abscissa or ordinate at G17) between calibration and actual measuring are not identical !!!
- the working spindle is not position-controlled (SPOS is not possible)
- a monoprobe is used.
- When the coupling is annulled by the measuring cycle, no alarm or message is displayed.

55771	J_MEA_SET_CAL_MODE			-	-	
-	Calibration hole with known/unknown center point, in "Measure in JOG"			BYTE	Immediately	
-						
-	-	0	0	1	7/5	U

Description: Calibration in the hole with known or unknown center point, in "Measure in JOG"

=0: calibration in a hole with unknown center point

=1: calibration in a hole with known center point

55772	J_MEA_SET_PROBE_MONO			-	-	
-	Selection of the probe type, in "Measure in JOG"			BYTE	Immediately	
-						
-	-	0	0	1	7/7	U

Description: Selection of the probe type, in "Measure in JOG"

=0 probe type is multiprobe

=1 probe type is monoprobe

55800	ISO_M_DRILLING_AXIS_IS_Z			-	-	
-	Drilling axis depends on the plane / always Z			BYTE	Immediately	
-						
-	-	0	0	1	7/6	U

Description: Selection of the drilling axis
0: drilling axis is vertical to the active plane
1: drilling axis is always "Z", independently of the active plane

55802	ISO_M_DRILLING_TYPE			-	-	
-	Tapping type			BYTE	Immediately	
-						
-	-	0	0	3	7/6	U

Description: Tapping type
0: tapping without compensating chuck
1: tapping with compensating chuck
2: deep hole tapping with chip breakage
3: deep hole tapping with stock removal

55804	ISO_M_RETRACTION_FACTOR			-	-	
%	Factor for retraction speed (0...200%)			DWORD	Immediately	
-						
-	-	100	0	200	7/6	U

Description: Factor for retraction speed (0...200%)

55806	ISO_M_RETRACTION_DIR			-	-	
-	Retraction direction at G76/87			BYTE	Immediately	
-						
-	-	0	0	4	7/6	U

Description: Retraction direction for precision drilling and reverse counter-sinking G76/G87
0: G17(-X) G18(-Z) G19(-Y)
1: G17(+X) G18(+Z) G19(+Y)
2: G17(-X) G18(-Z) G19(-Y)
3: G17(+Y) G18(+X) G19(+Z)
4: G17(-Y) G18(-X) G19(-Z)

55808	ISO_T_RETRACTION_FACTOR			-	-	
%	Factor for retraction speed			DWORD	Immediately	
-						
-	-	100	0	200	7/6	U

Description: Factor (1-200%) for retraction speed at tapping G84/G88

55810	ISO_T_DWELL_TIME_UNIT			-	-	
-	Dwell time evaluation			BYTE	Immediately	
-						
-	-	0	0	1	7/6	U

Description: Dwell time evaluation for deep hole drilling G83/G87
0: seconds
1: revolutions

1.8 Machine data compile cycles

1.8.1 General machine data compile cycles

Number	Identifier			Display filters	Reference	
Unit	Name			Data type	Active	
Attributes						
System	Dimension	Default value	Minimum value	Maximum value	Protection	Class

Description: Description

61516	CC_PROTECT_PAIRS			-	-	
-	Axis collision protection configuration			DWORD	Reset	
-						
-	-	0	0	0	7/2	M

Description: This MD defines the axis pairs that must be protected against mutual collision. The machine axis number of the first axis is entered in the decades of 1s and 10s. The number of the second machine axis must be entered in the decades of 100s and 1000s.

Example:

$MN_CC_PROTECT_PAIRS[0] = 1201 ; axis_1 = 1   axis_2 = 12

When zero is entered, collision protection is deactivated.

61517	CC_PROTECT_SAFE_DIR			-	-	
-	Axis collision protection. Definition of the retraction direction.			DWORD	Reset	
-						
-	-	0	0	0	7/2	M

Description: In this MD the direction of retraction for both axes of a collision-protected axis pair is entered. Entry in the decade of 1s and 10s defines the direction of retraction of the first axis. Entry in the decade of 100s and 1000s defines that of the second axis. A value > 0 means retraction in the plus direction. 0 means retraction in the minus direction.

The value can only be changed only if collision protection for the axis pair is inactive!

61518	CC_PROTECT_OFFSET			-	-	
mm, degrees	Axis collision protection. Position offset			DOUBLE	Reset	
-						
-	-	0.0	0.0	0.0	7/2	M

Description: Position offset for the collision detection of the two axes defined in MD_60972.

The following applies to calculation of distance d between axes AX1 and AX2:

d = abs(POS[AX1] + $MN_CC_PROTECT_OFFSET[n] - POS[AX2])

The axis collision protection function guarantees that the following condition is always fulfilled:

d > $MN_CC_PROTECT_WINDOW+$MN_CC_PROTECT_WINDOW_INCR[n]

This considers the current axis velocities and the acceleration/braking capacities of the axes in order to to be able to brake the axes in time if required.

The value can be changed only if collision protection for the axis pair is inactive!

61519	CC_PROTECT_WINDOW			-	-	
mm, degrees	Axis collision protection. Minimum distance			DOUBLE	Reset	
-						
-	-	10.0	0.0	10000.0	7/2	M

Description: Minimum distance that must be kept by the axes.

The value can be changed even if the protection is active. In this case, however, the axes must have a safe distance between them.

61532	CC_PROTECT_DIR_IS_REVERSE			-	-	
-	Axis collision protection. Detection of the reversed direction.			DWORD	Reset	
-						
-	-	0	-	-	7/2	M

Description: This machine data is used to detect the reversed direction of the axes of a collision-protected pair of axes.

61533	CC_PROTECT_WINDOW_EXTENSION			-	-	
mm, degrees	Axis collision protection. Increase in the minimum distance			DOUBLE	NEW CONF	
-						
-	-	10.0	0.0	10000.0	7/2	M

Description: Increasing the distance that must be kept from the axes.

The value can be changed even if the protection is active in the part program.

1.8.2 Channel-specific machine data compile cycles

62500	CLC_AXNO			-	-	
-	Axis assignment for clearance control			DWORD	PowerOn	
-						
-	-	0	-2	CC_MAXNUM_AXES_PER_CHAN	7/2	M

Description:

n=0: Deactivates the clearance control

n > 0:

Activates the 1D clearance control for the channel axis with the axis number indicated under n. This axis must not be a modulo rotary axis.

n < 0: Activates the 3D clearance control.

Activation of the 3D clearance control requires configuration of at least one of the two possible 5-axis transformations in the channel.

-1: with n = -1 the first 5-axis transformation (16 <=transformer type <=149) configured with $MC_TRAFO_TYPE_n in the 1st channel is selected for clearance control.

-2: with n = -2 the second 5-axis transformation configured in the 1st channel is selected.

The overlaid motion acts on the axes configured as linear axes in the first three elements of $MC_TRAFO_AXES_IN_n of the selected transformation.

Configuration of 3- and 4-axis transformations is permissible (2D clearance control).

Restriction:

- Only one of the linear axes involved in clearance control must be configured as master axis of a gantry grouping.
- No axis of the clearance control must be configured as slave axis of a gantry grouping.
- Erroneous configurations are rejected after power ON with CLC alarm 75000.

62502	CLC_ANALOG_INPUT			-	-	
-	Analog input for clearance control			DWORD	-	
-						
-	-	1	1	8	7/2	M

Description:

The machine data defines the number of the analog input that is used for the clearance sensor.

Differing from the functions realized in the interpolator (synchronized actions) the input of the clearance control cannot be influenced via PLC interface DB10 DBW148ff.

62504	CLC_SENSOR_TOUCHED_INPUT			-	-	
-	Input bit assignment for "Sensor collision" signal			DWORD	PowerOn	
-						
-	-	0	-40	40	7/2	M

Description: This machine data defines the digital input that is used for collision detection.

Requirements:

- The clearance sensor has a "sensor collision" signal.
- The numbering of the digital inputs corresponds to the numbering of the corresponding system variables: $A_IN[n], with n = number of the digital input.
- Example: 3rd input on the 2nd input byte:
  $MC_CLC_SENSOR_TOUCHED_INPUT = 11 ;   3 + 1 * 8

Negative values result in the corresponding input signal being used internally inverted (fail-safe).

See section 2.4, /TE1/ for sensor collision detection.

62505	CLC_SENSOR_LOWER_LIMIT			-	-	
mm, degrees	Lower motion limit of the clearance control			DOUBLE	Reset	
-						
-	2	-5.0,-10.0	-1.0e40	0.0	7/2	M

Description: This machine data consists of 2 field elements:

- CLC_SENSOR_LOWER_LIMIT[0]

With the first field element the lower limit for the deviation from the sensor-controlled machine position from the programmed position is entered.

As soon as the limit is reached, PLC signal DB21.DBX37.4 is set and CLC alarm 75020 is displayed:

- CLC_SENSOR_LOWER_LIMIT[1]

The second field element limits the value of the maximum lower motion limit that can be programmed.

62506	CLC_SENSOR_UPPER_LIMIT			-	-	
mm, degrees	Upper motion limit of the clearance control			DOUBLE	Reset	
-						
-	2	+10.0,+40.0	0.0	+1.0e40	7/2	M

Description: This machine data consists of 2 field elements:

- CLC_SENSOR_UPPER_LIMIT[0]

With the first field element the upper limit for the deviation from the sensor-controlled machine position from the programmed position is set.

As soon as the limit is reached, PLC signal DB21.DBB37.5 is set and CLC alarm 75021 is displayed.

- CLC_SENSOR_UPPER_LIMIT[1]

The second field element limits the value of the maximum upper motion limit that can be programmed.

62508	CLC_SPECIAL_FEATURE_MASK			-	-	
-	Special functions and CLC modes			DWORD	PowerOn	
-						
-	-	0x3	-	-	7/2	M

Description: Bit 0 and bit 1:

Alarm reaction on reaching the CLC motion limits: This machine data configures the alarm reaction on reaching the motion limits set with MD 62505 and MD 62506 or programmed with CLC_LIM .

Bit 0 = 0: Alarm 75020 does not stop program execution. The alarm can be acknowledged by pressing the Cancel key.

Bit 0 = 1: Alarm 75020 stops program execution at the lower limit. The alarm can only be acknowledged with reset.

Bit 1 = 0: Alarm 75021 does not stop program execution. The alarm can be acknowledged by pressing the Cancel key.

Bit 1 = 1: Alarm 75021 stops program execution at the upper limit. The alarm can only be acknowledged with reset.

Bit 4:

Operation as online tool length compensation in orientation direction

Bit 4 = 0: Clearance control works as usual.

Bit 4 = 1: Unlike the clearance control mode the analog input does not specify a velocity, but directly an offset position instead. In this case, the ordinate of the selected sensor characteristic $MC_CLC_SENSOR_VELO_TABLE_x is interpreted in mm or inch instead of in mm/min (inch/min).

This operating mode can be used for testing purposes and for implementing a 3D tool length compensation. The analog value is thereby not read in in position controller cycle, but in IPO cycle. In this operating mode, a normal influence or definition of the analog values by the PLC is possible via DB10 DBW148ff. The input used must have been activated through the following machine data: MD 10300 $MN_FASTIO_ANA_NUM_INPUTS

Bit 5:

Mode for rapid retraction in position controller cycle

Bit 5 = 0: Clearance control works as usual.

Bit 5 = 1: The analog input is inactive. If the digital input configured with MD 62504 is activated (inverted, if required), a retraction motion will start in the same position controller cycle that corresponds to an analog signal specification of +10V during operation as "Online tool length compensation" (see bit 4).

The digital input signal that starts the retraction movement cannot be influenced by the PLC. In addition to the reaction in the position controller, the input "sensor collision" and the subsequent stop of the path motion is handled in the interpolator. This signal branch can be influenced by the PLC through default signals DB10 DBB0ff.

Bit 8:

Mode for alarm output when the lower motion limit is reached.

Bit 8 = 0: Alarm 75020 is displayed.

Bit 8 = 1: Alarm 75020 will not be displayed, if the alarm reaction after reaching of the CLC movement limits (bit 0) was configured without program execution stop: bit 0 = 0

Bit 9:

Mode for alarm display when the upper motion limit is reached.

Bit 9 = 0: Alarm 75021 is displayed.

Bit 9 = 1: Alarm 75021 will not be displayed, if the alarm reaction on reaching the CLC motion limits (bit 0) was configured without program execution stop: bit 1 = 0

Bit 14:

Synchronization of the start position with single-axis clearance control.

Bit 14 = 0: If the clearance control has been configured for one axis only (MD62500), the current actual position of the next part program block on clearance control power OFF with CLC(0) is synchronized for this axis only.

Bit 14 = 1: If the clearance control has been configured for one axis only (MD62500), the current actual positions of the next part program block on clearance control power OFF with CLC(0) are synchronized for all axes.

This setting is required only for those applications for which a single-axis clearance control is used together with a 3/4/5-axis transformation (e.g. pipe cutting with rotating workpiece) and when an axis jump in the CLC axis or alarm: "Channel %1 Axis %2 System error 550010" occur at the first traversing block after CLC (0).

62510	CLC_SENSOR_VOLTAGE_TABLE_1			-	-	
V	Coordinate voltage sensor characteristic 1			DOUBLE	Reset	
-						
-	2	-10.0,10.0,0.0,0.0,0.0	-10.0	10.0	7/2	M

Description: This machine data defines the voltage values of sensor characteristic 1. The corresponding velocity value must be entered under the same index i of this machine data:

MD62511 $MC_CLC_SENSOR_VELO_TABLE_1[i]

For the simplest case it will suffice to define the characteristic via two interpolation points as a symmetrical straight through the zero point:

Example:

- $MC_CLC_SENSOR_VOLTAGE_TABLE_1[0] = -10.0 ; Volt
- $MC_CLC_SENSOR_VOLTAGE_TABLE_1[1] = 10.0; Volt
- $MC_CLC_SENSOR_VELO_TABLE_1[0] = 500.0; mm/min
- $MC_CLC_SENSOR_VELO_TABLE_1[1] = -500.0; mm/min

For all field elements of the machine data not used in the example value 0.0 must be set.

If the defined sensor characteristic creates an incorrect control direction, i.e. after power ON of the clearance control the sensor "flees" from the workpiece, the control direction can be corrected either by reversing the polarity of the sensor signal at the I/O module, or by changing the sign in front of the voltage values in the machine data.

Notes on how to define the sensor characteristic:

- A point with velocity value 0 must not stand at the end of the table.
- The characteristic must be monotonic, i.e. the velocity values above the voltage must either only rise or only fall.
- The characteristic must not have any jumps in the velocity sequence, i.e. it is not permissible to define different velocities for the same voltage value.
- The characteristic must have at least two interpolation points.
- Do not enter more than 5 interpolation points (3 for 840D prior to SW 5.3) with positive or with negative velocity.
- Characteristics that do not go directly throught the zero point may influence the clearance normalization set on the clearance sensor.

62511	CLC_SENSOR_VELO_TABLE_1			-	-	
mm/min	Coordinate velocity sensor characteristic 1			DOUBLE	Reset	
-						
-	2	2000.0/60.0,-2000.0/ 60.0,0.0...	-	-	7/2	M

Description: This machine data defines the velocity values of sensor characteristic 1. The corresponding voltage value must be entered under the same index i of the machine data:

MD62510 $MC_CLC_SENSOR_VOLTAGE_TABLE_1[i]

Additional information on how to define the characteristic is available in the description of machine data MD62510.

62512	CLC_SENSOR_VOLTAGE_TABLE_2			-	-	
V	Coordinate voltage sensor characteristic 2			DOUBLE	Reset	
-						
-	2	-10.0,10.0,0.0,0.0,0.0	-10.0	10.0	7/2	M

Description: This machine data defines the voltage values of sensor characteristic 2.

Additional information on how to define the characteristic is available in the description of machine data MD62510.

62513	CLC_SENSOR_VELO_TABLE_2			-	-	
mm/min	Coordinate velocity sensor characteristic 2			DOUBLE	Reset	
-						
-	2	2000.0/60.0,-2000.0/ 60.0,0.0...	-	-	7/2	M

Description: This machine data defines the voltage values of sensor characteristic 2.

Additional information on how to define the characteristic is available in the description of machine data MD62510.

62516	CLC_SENSOR_VELO_LIMIT			-	-	
%	Velocity of the clearance control motion			DOUBLE	Reset	
-						
-	-	100.0	-200.0	200.0	7/2	M

Description: 1D clearance control:

This machine data defines the maximum traversing velocity of the overlaid control motion as a percentage value of the max. residual axis velocity from the maximum value (MD32000 $MA_MAX_AX_VELO[AX#]) of the next clearance-controlled axis.

2D/3D clearance control

With 2D or 3D clearance control the maximum velocity of the slowest clearance-controlled axis multiplied with the root of 2 or with the root of 3 is used as reference value.

62517	CLC_SENSOR_ACCEL_LIMIT			-	-	
%	Acceleration of the clearance control movement			DOUBLE	Reset	
-						
-	-	100.0	0.0	200.0	7/2	M

Description: 1D clearance control:

This machine data defines the maximum acceleration of the overlaid control motion as a percentage value of the max. residual axis velocity from the maximum value (MD32300 $MA_MAX_AX_ACCEL[AX#]) of the next clearance-controlled axis.

2D/3D clearance control:

With 2D or 3D clearance control the maximum velocity of the slowest clearance-controlled axis multiplied with the root of 2 or with the root of 3 is used as reference value.

62520	CLC_SENSOR_STOP_POS_TOL			-	-	
mm, degrees	Pos. tolerance for status report "CLC standstill"			DOUBLE	Reset	
-						
-	-	0.05	0.0	1.0e40	7/2	M

Description: With the clearance control active and in order to achieve the exact stop condition (G601/G602), not only the axis involved in the programmed traversing motion, but also the clearance-controlled axes must have reached their exact stop conditions.

The exact stop condition of the clearance control is defined via a position window and a dwell time:

- MD62520 $MC_CLC_SENSOR_STOP_POS_TOL
- MD62521 $MC_CLC_SENSOR_STOP_DWELL_TIME

If the clearance control or the clearance-controlled axes are within the position tolerance during the parameterized dwell time, the exact stop condition of the clearance control is fulfilled.

Setting notes:

If the clearance control should not be able to keep the parameterized position window for the corresponding dwell time, the following alarm will be displayed in certain situations:

- Alarm "1011 Channel Channel number System error 140002"

In order to avoid the alarm or in case the alarm occurred, the following measures must be taken:

1. Switch on the clearance control with the typical machining clearance between the clearance sensor and a small metal sheet.

2. Tap on the metal sheet so that the laser head performs visible adjustment motions. After these adjustment movements are completed, do not touch the metal sheet again.

3. If the interface signal DB3x.DBX60.7 (position reached with fine exact stop) "flickers" after the tapping or after release of the process gas, the following machine data will have to be adjusted:

   - MD36010 $MA_STOP_LIMIT_FINE (increase)
   - MD62520 $MC_CLC_SENSOR_STOP_POS_TOL (increase)
   - MD62521 $MC_CLC_SENSOR_STOP_DWELL_TIME (shorten)

The changes to the machine data will become active only after NCK RESET. The clearance control therefore may have to be switched on again after NC start.

62521	CLC_SENSOR_STOP_DWELL_TIME			-	-	
s	Wait time for "CLC standstill"			DOUBLE	Reset	
-						
-	-	0.1	0.0	1.0e40	7/2	M

Description: This machine data defines the dwell time for reaching the exact stop conditions of the clearance control.

The corresponding position tolerance must be entered in machine data:

- MD62520 $MC_CLC_SENSOR_STOP_POS_TOL

Additional information on the exact stop condition of the clearance control is available in the description of machine data MD62520.

Related to:

The set dwell time must not be longer than the maximum delay for reaching the exact stop condition parameterized in the following machine data:

- MD36020 $MA_POSITIONING_TIME

.

62522	CLC_OFFSET_ASSIGN_ANAOUT			-	-	
-	Assignment of internal additional analog value to sensor signal			DWORD	PowerOn	
-						
-	-	0	-1020008 , -8	1020008 , 8	7/2	M

Description: This machine data defines the analog output, the output value of which is subtracted from the input voltage of the clearance sensor.

The numbering of the analog output corresponds to the numbering of the relevant system variables: $A_OUTA[n], with n = number of the analog output.

The analog output can be used through variable $A_OUTA[n] both block-synchronous from a part program or asynchronous via a synchronized action.

62523	CLC_LOCK_DIR_ASSIGN_DIGOUT			-	-	
-	Assignment digital output interlocking CLC			DWORD	PowerOn	
-						
-	2	0,0	-40	40	7/2	M

Description:

This machine data consists of 2 field elements:

- CLC_LOCK_DIR_ASSIGN_DIGOUT[0]

The first field element defines the digital output through which the negative motion direction of the clearance control can be locked.

- CLC_LOCK_DIR_ASSIGN_DIGOUT[1]

The second field element defines the digital output through which the positive motion direction of the clearance control can be locked.

Entering the negative output number will invert the evaluation of the switching signal.

Example:

Digital output 1 ($A_OUT[1]) shall lock the negative motion direction; digital output 2 ($A_OUT[2]) shall lock the positive motion direction:

- MD 62523 $MC_CLC_LOCK_DIR_ASSIGN_DIGOUT[0] = 1
- MD 62523 $MC_CLC_LOCK_DIR_ASSIGN_DIGOUT[1] = 2

With the corresponding system variables interlocking of the relevant motion direction can be switched on or off either block-synchronous in the part program or asynchronous via synchronized actions.

- Interlock of the negative motion direction ON/OFF: $A_OUT[1] = 1 / 0
- Interlock of the positive motion direction ON/OFF: $A_OUT[2] = 1 / 0

With switching signal inversion (MD 62523 $MA_CLC_LOCK_DIR_ASSIGN_DIGOUT[0] = -1):

Interlock of the negative motion direction ON/OFF: $A_OUT[1] = 0 / 1

62524	CLC_ACTIVE_AFTER_RESET			-	-	
-	Clearance control active after RESET			BOOLEAN	PowerOn	
-						
-	-	FALSE	-	-	7/2	M

Description:

1D clearance control:

This machine data parameterizes the RESET behavior (program end RESET or NC RESET) of the 1D clearance control.

- CLC_ACTIVE_AFTER_RESET = 0: after RESET the clearance control is switched off analog to the part program command CLC(0).
- CLC_ACTIVE_AFTER_RESET = 1: after RESET the cleance control maintains its current activation status.

3D clearance control:

This machine data does not effective with a 3D clearance control. The clearance control will in this case always be switched off after RESET.

62525	CLC_SENSOR_FILTER_TIME			-	-	
s	Time constant of PT1 sensor filtering			DOUBLE	Immediately	
-						
-	-	0.0	0.0	10.0	7/2	M

Description: This machine data parameterizes the time constant for the PT1 filter of the clearance control (corresponds to an RC element).

With the PT1 filter, the higher-frequency noise components in the input signal of the clearance control can be diminished.

The filter's effect can be observed through the function-specific display data (see section 2.7, /TE1/).

A value of zero switches the filter off completely.

Note:

Any additional time constant in the control loop reduces the max. achievable control loop dynamics.

62528	CLC_PROG_ORI_AX_MASK			-	-	
-	Axis screen for CLC with free direction specification			DWORD	PowerOn	
-						
-	-	0x0	-	-	7/2	M

Description: Each bit of the axis screen refers to the channel axis[n+1] depending on its bit index n. Only exactly 3 bits may be set according to the three direction axes of the compensation vector. The bits are evaluated in ascending order.

The first channel axis parameterized like that corresponds to the X coordinate of the compensation vector. The second channel axis to the Y coordinate, and so on.

62529	CLC_PROG_ORI_MAX_ANGLE			-	-	
degrees	Limit angle for CLC with free direction specification			DOUBLE	Reset	
-						
-	-	45.0	0.0	180.0	7/2	M

Description: Permissible limit angle between tool orientation and CLC direction defined freely through additonal axes.

62530	CLC_PROG_ORI_ANGLE_AC_PARAM			-	-	
-	Index of the display variables f. the current differential angle			DWORD	Reset	
-						
-	-	-1	-1	20000	7/2	M

Description: Index n of system variable $AC_PARAM[n] in which the current differential angle between tool orientation and CLC direction is output.

62560	FASTON_NUM_DIG_OUTPUT			-	-	
-	Configuration of the switching output			BYTE	PowerOn	
-						
-	-	0	0	4	7/2	M

Description: This machine data assigns the number of the digital onboard output (1...4) to the NCU, on which the fast switching signal is output.

Output of the switching signal is deactivated with 0.

62561	FASTON_OUT_DELAY_MICRO_SEC			-	-	
-	still missing			DWORD	NEW CONF	
-						
-	2	0,0	-5000	5000	7/2	M

Description: This MD enables separate specification of time delay values for the switch-on and switch-off edge of the fast switching signal.

$MC_FASTON_OUT_DELAY_MICRO_SEC[0] Time delay of the switch-on edge

$MC_FASTON_OUT_DELAY_MICRO_SEC[1] Time delay of the switch-off edge

Negative values create a derivative action time for signal output. Positive values cause the output to be delayed. Derivative action time or delay are used to compensate external switching delays. The values must be determined empirically and should not exceed a few 100 microseconds. Values that are larger than approx. a half position control cycle clock will possibly not have a correct effect.

62571	RESU_RING_BUFFER_SIZE			-	-	
-	RESU ring buffer size (block buffer)			DWORD	PowerOn	
-						
-	-	1000	10	1000000	7/2	M

Description: The block buffer includes the geometrical information for the part program. The value entered in the machine data corresponds to the number of loggable part program blocks (with 32 byte / part program block). The block buffer size corresponds to the number of retrace-capable blocks.

62572	RESU_SHARE_OF_CC_HEAP_MEM			-	-	
%	RESU share of the parameterized heap memory			DOUBLE	PowerOn	
-						
-	-	100.0	1.0	100.0	7/2	M

Description: The total heap memory size available for all compile cycles is parameterized by channel-specific machine data MD 28105 $MC_MM_NUM_CC_HEAP_MEM

The RESU machine data can limit the maximum heap memory share that RESU is to use.

62573	RESU_INFO_SA_VAR_INDEX			-	-	
-	RESU indices of the synchronized action variables used			DWORD	PowerOn	
-						
-	2	-1	-1	10000	7/2	M

Description: Reserved. This machine data must not be used.

62574	RESU_SPECIAL_FEATURE_MASK			-	-	
-	RESU parameterizable behavior			DWORD	PowerOn	
-						
-	-	0x0	0x0	0x0f	7/2	M

Description: With bit settings parameterizable behavior of the RESU function:

Bit 0:reserved. Do not use!

Bit 1:

Bit 1 = 0:(default) RESU main program CC_RESU.MPF is created in the dynamic memory area

of the NC (DRAM) (recommended setting)

Bit 1 = 1:RESU main program CC_RESU.MPF is created in the buffered part program memory

of the NC(SRAM).

Bit 2:

Bit 2 = 0:(default)

The following RESU-specific subroutines are created as user cycles:

- CC_RESU_INI.SPF
- CC_RESU_END.SPF
- CC_RESU_BS_ASUP.SPF
- CC_RESU_ASUP.SPF

Bit 2 = 1:(recommended setting)

The RESU-specific subroutines (see above) are created as OEM cycles.

Bit 3:

Bit 3 = 0: (default)

No effect (see under bit 3 = 1).

Bit 3 = 1: (recommended setting, if bit 2 = 1)

If the RESU-specific subroutines (see above) are created as OEM cycles

and if during NC start RESU-specific subroutines are neverthe-less available as user

cycles, these will be cancelled without prior checkback.

62575	RESU_SPECIAL_FEATURE_MASK_2			-	-	
-	RESU additional parameterizable behavior			DWORD	Reset	
-						
-	-	0x0	0x0	0x01	7/2	M

Description: With bit settings parameterizable behavior of the RESU function:

Bit 0:

Bit 0 = 0: (default)

For continued machining at the contour, a block search with con-tour calculation beginning at

the part program start is used (recommended setting).

Bit 0 = 1:In order to accelerate that machining is continued, 2 different block search types are used:

- From part program start to the last main block: block search without calculation
- From the last main block to the current part program block: block search with contour

calculation

62580	RESU_WORKING_PLANE			-	-	
-	RESU determination of the working plane			DWORD	NEW CONF	
-						
-	-	1	1	3	7/2	M

Description: These machine data determine the working plane for the 2-dim. function RESU. The following settings are possible:

1 : for working plane G17 (first and second geometry axis)

2 : for working plane G18 (first and third geometry axis)

3 : for working plane G19 (second and third geometry axis)

62600	TRAFO6_KINCLASS			-	-	
-	Kinematics class			DWORD	NEW CONF	
-						
-	-	1	1	2	7/2	M

Description: The following kinematics classes can be indicated:

- Standard transformation: 1
- Special transformation: 2

62601	TRAFO6_AXES_TYPE			-	-	
-	Axis type for transformation [axis no.]: 0...5			DWORD	NEW CONF	
-						
-	6	1, 1, 1, 3, 3, 3	1	4	7/2	M

Description: This machine data identifies the axis type used in the transformation.

The following axis types can be indicated:

- Linear axis: 1
- Delta/acme spindle drive: 2
- Rotary axis: 3 (4)

62602	TRAFO6_SPECIAL_KIN			-	-	
-	Special kinematics type			DWORD	NEW CONF	
-						
-	-	1	-	-	7/2	M

Description: This machine data identifies the type of special kinematics.

The following special kinematics are available:

- No special kinematics:1
- 5-axis articulated arm with coupling of axis 2 to axis 3: 2
- 2-axis SCARA with forced coupling to tool: 3
- 3-axis SCARA with degrees of freedom X, Y, A: 4
- 2-articulated arm with coupling of axis 1 to axis 2: 5
- 2-axis articulated arm without coupling of axis 1 to axis 2: 8
- 4-axis SCARA with coupling of axis 1 to axis 2: 7

62603	TRAFO6_MAIN_AXES			-	-	
-	Basic axis identification			DWORD	NEW CONF	
-						
-	-	1	1	7	7/2	M

Description: This machine data identifies the type of basic axis assignment. Normally, the first 3 axes are the basic axes.

The following basic axis assignments are included:

- SS (gantry): 1
- CC (SCARA): 2
- NR (articulated arm): 3
- SC (SCARA): 4
- RR (articulated arm): 5
- CS (SCARA): 6
- NN (articulated arm): 7

62604	TRAFO6_WRIST_AXES			-	-	
-	Identification of the hand axes			DWORD	NEW CONF	
-						
-	-	1	1	6	7/2	M

Description: This machine data identifies the robot hand type. Normally, axes 4 to 6 are the robot hand.

The following hand types are included:

- No hand: 1
- Central hand: 2
- Beveled hand: 3
- Hand with elbow: 5
- Beveled hand with elbow: 6

62605	TRAFO6_NUM_AXES			-	-	
-	Number of transformed axes			DWORD	NEW CONF	
-						
-	-	3	2	6	7/2	M

Description: This machine data identifies the number of axes involved in the transformation.

Package 2.3 (810D) or 4.3 (840D) support kinematics with a max. of 5 axes.

62606	TRAFO6_A4PAR			-	-	
-	Axis 4 parallel / antiparallel to the last basic axis			DWORD	NEW CONF	
-						
-	-	0	0	1	7/2	M

Description: This machine data identifies whether the 4th axis is parallel / antiparallel to the last rotary basic axis.

This machine data only applies for kinematics with more than 3 axes.

- Axis 4 is parallel / antiparallel: 1
- Axis 4 is not parallel: 0

62607	TRAFO6_MAIN_LENGTH_AB			-	-	
mm	Basic axis length A and B, n = 0...1			DOUBLE	NEW CONF	
-						
-	2	0.0, 500.0	-	-	7/2	M

Description: This machine data identifies the basic axis lengths A and B. These lengths are particularly defined for each basic axis type.

- n = 0: basic axis length A
- n = 1: basic axis length B

62608	TRAFO6_TX3P3_POS			-	-	
mm	Attachment of the hand (position share), n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies the position share of frame TX3P3 connecting the basic axes with the hand.

- Index 0: X component
- Index 1: Y component
- Index 2: Z component

62609	TRAFO6_TX3P3_RPY			-	-	
degrees	Attachment of the hand (rotation share), n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies the orientation share of frame TX3P3 connecting the basic axes with the hand.

- Index 0: rotation with RPY angle A
- Index 1: rotation with RPY angle B
- Index 2: rotation with RPY angle C

62610	TRAFO6_TFLWP_POS			-	-	
mm	Frame between hand pt. and flange coordinate system, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies the position share of frame TFLWP that connects the hand point with the flange.

- Index 0: X component
- Index 1: Y component
- Index 2: Z component

62611	TRAFO6_TFLWP_RPY			-	-	
degrees	Frame between hand point and flange coordinate system, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies the orientation share of frame TFLWP that connects the hand point with the flange.

- Index 0: rotation with RPY angle A
- Index 1: rotation with RPY angle B
- Index 2: rotation with RPY angle C

62612	TRAFO6_TIRORO_POS			-	-	
mm	Frame between foot pt. and int. coordinate system, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies the position share of frame TIRORO that connects the basic coordinate system with the internal transformation coordinate system.

- Index 0: X component
- Index 1: Y component
- Index 2: Z component

62613	TRAFO6_TIRORO_RPY			-	-	
degrees	Frame between foot pt. and int. coordinate system, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies the orientation share of frame TIRORO that connects the basic coordinate system with the internal transformation coordinate system.

- Index 0: rotation with RPY angle A
- Index 1: rotation with RPY angle B
- Index 2: rotation with RPY angle C

62614	TRAFO6_DHPAR4_5A			-	-	
mm	Parameter A for configuration of the hand, n = 0...1			DOUBLE	NEW CONF	
-						
-	2	0.0, 0.0	-	-	7/2	M

Description: This machine data identifies length a.

- n = 0: transition axis 4 to 5
- n = 1: transition axis 5 to 6

62615	TRAFO6_DHPAR4_5D			-	-	
mm	Parameter D for configuration of the hand, n = 0...1			DOUBLE	NEW CONF	
-						
-	2	0.0, 0.0	-	-	7/2	M

Description: This machine data identifies length d.

- n = 0: transition axis 4 to 5
- n = 1: transition axis 5 to 6

62616	TRAFO6_DHPAR4_5ALPHA			-	-	
degrees	Parameter ALPHA for configuration of the hand, n = 0...1			DOUBLE	NEW CONF	
-						
-	2	-90.0, 90.0	-	-	7/2	M

Description: This machine data identifies angle alpha

- n = 0: transition axis 4 to 5
- n = 1: transition axis 5 to 6

62617	TRAFO6_MAMES			-	-	
-	Offset of math. to mech. zero point [axis no.]: 0...5			DOUBLE	NEW CONF	
-						
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data can specify an adjustment of the zero point for a rotary axis to the mathematical zero point specified by the transformation.

Based on the mechanical zero point the offset is hereby related to the mathematically positive direction of axis rotation.

62618	TRAFO6_AXES_DIR			-	-	
-	Adjustm. of the phys. and math. dir. of rot. [axis no.]: 0...5			DWORD	NEW CONF	
-						
-	6	1, 1, 1, 1, 1, 1	-1	1	7/2	M

Description: This machine data can adjust the mathematical and physical direction of rotation

of the axes.

- +1: same direction of rotation
- -1: different direction of rotation

62619	TRAFO6_DIS_WRP			-	-	
mm	Medium distance between hand point and singularity			DOUBLE	NEW CONF	
-						
-	-	10.0	0.00001	999999.9999	7/2	M

Description: Through this machine data a limit value for the distance between the hand point and the singularity can be entered.

Inactive!

62620	TRAFO6_AXIS_SEQ			-	-	
-	Axis reorganization			DWORD	NEW CONF	
-						
-	6	1, 2, 3, 4, 5, 6	1	6	7/2	M

Description: This machine data can reverse the order of the axes in order to internally transfer a kinematic system into a standard kinematic system.

62621	TRAFO6_SPIN_ON			-	-	
-	Triangular or acme-screw spindles available			DWORD	NEW CONF	
-						
-	-	0	0	1	7/2	M

Description: This machine data identifies whether triangular spindles or acme connections are available.

- 0: not available
- 1: available

This function is currently not supported.

MD62621 must be set to 0. Machine data MD62622 through MD62628 are thus inactive!

62622	TRAFO6_SPIND_AXIS			-	-	
-	Axis on which the triangular spindle has an effect, n = 0...2			DWORD	NEW CONF	
-						
-	3	0, 0, 0	-	-	7/2	M

Description: This machine data identifies for which axis a triangular spindle is active. A maximum of 3 triangular spindles may be available.

- n = 0: 1st triangular axis
- n = 1: 2nd triangular axis
- n = 2: 3rd triangular axis

62623	TRAFO6_SPINDLE_RAD_G			-	-	
mm	Length G for triangular spindle, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies length G for the n-th triangular spindle.

62624	TRAFO6_SPINDLE_RAD_H			-	-	
mm	Length H for triangular spindle, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies length H for the n-th triangular spindle.

62625	TRAFO6_SPINDLE_SIGN			-	-	
-	Sign for triangular spindle, n = 0...2			DWORD	NEW CONF	
-						
-	3	1, 1 ,1	-1	1	7/2	M

Description: This machine data identifies the sign for the adjustment of the direction of rotation for the n-th triangular spindle.

62626	TRAFO6_SPINDLE_BETA			-	-	
degrees	Angular offset for triangular spindles, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data identifies offset angle b for adjustment of the zero point

for the n-th triangular spindle.

62627	TRAFO6_TRP_SPIND_AXIS			-	-	
-	Axes driven by acme spindle, n = 0...1			DWORD	NEW CONF	
-						
-	2	0, 0	-	-	7/2	M

Description: This machine data identifies which axes are driven by an acme connection.

- n = 0: axis driven by an acme
- n = 1: coupling axis

62628	TRAFO6_TRP_SPIND_LEN			-	-	
mm	Acme length, n = 0...3			DOUBLE	NEW CONF	
-						
-	4	0.0, 0.0, 0.0, 0.0	-	-	7/2	M

Description: This machine data specifies the lengths of the acme connection.

62629	TRAFO6_VELCP			-	-	
mm/min	Cartesian velocity [no.]: 0...2			DOUBLE	Immediately	
-						
-	3	600000.0, 600000.0, 600000.0	-	-	7/2	M

Description: This machine data can specify a velocity for the Cartesian directions of traversing blocks with G0.

- n = 0: velocity in X direction
- n = 1: velocity in Y direction
- n = 2: velocity in Z direction

62630	TRAFO6_ACCCP			-	-	
m/s²	Cartesian accelerations [no.]: 0...2			DOUBLE	Immediately	
-						
-	3	0.5, 0.5, 0.5	0.001	100000	7/2	M

Description: This machine data can specify an acceleration for the Cartesian directions of traversing blocks with G0.

- n = 0: velocity in X direction
- n = 1: velocity in Y direction
- n = 2: velocity in Z direction

62631	TRAFO6_VELORI			-	-	
rev/min	Orientation angle velocities [no.]: 0...2			DOUBLE	Immediately	
-						
-	3	1.6666, 1.6666, 1.6666	-	-	7/2	M

Description: This machine data can specify a velocity for the orientation angles of traversing blocks with G0.

- n = 0: velocity angle A
- n = 1: velocity angle B
- n = 2: velocity angle C

62632	TRAFO6_ACCORI			-	-	
rev/s²	Orientation angle accelerations [no.]: 0...2			DOUBLE	Immediately	
-						
-	3	0.00277, 0.00277, 0.00277	0.001	100000	7/2	M

Description: This machine data can specify an acceleration for the orientation angles of traversing blocks with G0.

- n = 0: velocity angle A
- n = 1: velocity angle B
- n = 2: velocity angle C

62633	TRAFO6_REDVELJOG			-	-	
-	Reduction factor velocity in JOG [no.]: 0...2			DOUBLE	Immediately	
-						
-	6	10.0, 10.0, 10.0, 10.0, 10.0, 10.0	-	-	7/2	M

Description: This machine data is inactive.

62634	TRAFO6_DYN_LIM_REDUCE			-	-	
-	Reduction factor for velocity controller			DOUBLE	NEW CONF	
-						
-	-	1.0	0.001	1.0	7/2	M

Description: This MD can be used to specify a reserve for the maximum velocity, so that an excessive increase in the velocity by the velocity controller will not cause the maximum velocity to be exceeded.

The value must be regarded as a factor that has an effect on the maximum velocity.

62635	TRAFO6_VEL_FILTER_TIME			-	-	
s	Time constant for velocity controller			DOUBLE	NEW CONF	
-						
-	-	0.024	0.0	100.0	7/2	M

Description: This MD can be used to set the time constant for the velocity controller in the interpolator. This can avoid controller vibration.

62636	TRAFO6_CC_TOA_START_NUM			-	-	
-	Starting number for tool orientations			DWORD	PowerOn	
-						
-	-	0	0	8	7/2	M

Description: This machine data identifies number n of the 1st parameter $TC_DPCn starting at which the

OEM tool parameters for compile cycle tool orientation are read in.

If the machine data is set to 0, the OEM tool parameters are not read in.

62637	TRAFO6_EXT_AXIS_VECTOR_1			-	-	
-	Direction vector of the first special axis, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 1.0	-1.0	1.0	7/2	M

Description: This machine data identifies the direction vector of the first special axis with reference to the basic coordinate system.

- Index 0: x component
- Index 1: y component
- Index 2: z component

62638	TRAFO6_EXT_AXIS_VECTOR_2			-	-	
-	Direction vector of the second special axis, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 1.0, 0.0	-1.0	1.0	7/2	M

Description: This machine data identifies the direction vector of the second special axis with reference to the basic coordinate system.

- Index 0: x component
- Index 1: y component
- Index 2: z component

62639	TRAFO6_EXT_AXIS_VECTOR_3			-	-	
-	Direction vector of the third special axis, n = 0...2			DOUBLE	NEW CONF	
-						
-	3	0.0, 0.0, 1.0	-1.0	1.0	7/2	M

Description: This machine data identifies the direction vector of the third special axis with reference to the basic coordinate system.

- Index 0: x component
- Index 1: y component
- Index 2: z component

63514	CC_PROTECT_ACCEL			-	-	
m/s², rev/s²	PROT braking acceleration in the case of collision			DOUBLE	Reset	
-						
-	-	1000.0	1.0	10000.0	7/2	M

Description: If the axis collision protection function PROT has detected a collision, the involved axes are braked using the acceleration set in this machine data.

Recommended setting: a few per cent higher than 32300__$MA_MAX_AX_ACCEL, provided that the dimensioning of the drive and the mechanical system allow it.

Notice: the braking acceleration set here always has a BRISK effect independently of other parameterizations (e.g. parameter set, active dyn. G code)

1.8.3 Axis-specific machine data compile cycles

63540	CC_MASTER_AXIS			-	-	
-	Indicates the corresponding CC_Master axis for a CC_Slave axis			DWORD	Reset	
-						
-	-	0	0	CC_MAXNUM_AXES_IN_SYSTEM	7/2	M

Description: By assigning a valid CC_Master axis in this machine data, the relevant axis is defined as the CC-Slave axis of an MCS coupling. The assignment is made by entering the machine axis number of the CC_Master axis.

The machine axis number and the axis name must be taken from the channel-specific machine data:

- 20070 $MC_AXCONF_MACHAX_USED
- 20080 $MC_AXCONF_CHANAX_NAME_TAB

Notice:

CC_Master and CC_Slave must have the same axis type (linear or rotary axis).

CC_Master and CC_Slave must not be a spindle.

CC_Master and CC_Slave must not be replacement axes.

If the axes are dynamically different, it is recommended to make the axis with the lower dynamics the CC_Master axis.

The machine data may be changed only when the coupling has been switched off.

63541	CC_POSITION_TOL			-	-	
mm, degrees	Monitoring window (only relevant to a CC_Slave axis)			DOUBLE	Reset	
-						
-	-	0.0	-	-	7/2	M

Description: Monitoring window of the MCS coupling. Only the entry in the machine data of the CC_Slave axis is evaluated. The difference of the actual values between the CC_Master and CC_Slave must always range within this window. Otherwise an alarm will be output.

The following condition is monitored:

abs(ActualPos[CC_Master] - (ActualPos[CC_Slave] + CC_Offset)) <= MD63541

with:

CC_Offset= position difference between CC_Master and CC_Slave when switching on the coupling.

Monitoring is switched off by entering value 0.0

63542	CC_PROTECT_MASTER			-	-	
-	Indicates the corresponding PMaster axis for a PSlave axis			DWORD	Reset	
-						
-	-	0	0	CC_MAXNUM_AXES_IN_SYSTEM	7/2	M

Description: By assigning a valid Protect-Master axis in this machine data the relevant axis is defined as the Protect-Slave axis. Assignment is made by entering the machine axis number of the Protect-Master axis.

The machine axis and the axis name must be taken from the channel-specific machine data:

- MD20070 $MC_AXCONF_MACHAX_USED[n-1]
- MD20080 $MC_AXCONF_CHANAX_NAME_TAB

Notice:

Protect-Master and Protect-Slave axis must have the same axis type (linear or rotary axis).

63543	CC_PROTECT_OPTIONS			-	-	
-	Configuration of the collision protection function			DWORD	Reset	
-						
-	-	0	0	0xFF	7/2	M

Description: The collision protection function can be adapted to the special situation by setting the following:

Bit 0 - bit 3 for Protect-Master and Protect-Slave

Bit 0 = 1:Retraction in PLUS

Bit 1 = 1:Braking to avoid collision is made by increasing the max. braking acceleration by factor 1.2

Bit 2 = 1:Monitoring can be activated even without a referenced axis

Bit 3 = 1Reverse the direction of retraction, if the axis is the master axis

Bit 4 - bit 7 only relevant to Protect-Slave

Bit 4 = 1:Monitoring always active (otherwise ON/OFF via PLC)

Bit 5 Reserve

Bit6 Reserve

Bit 7=1:Display active protection in DB3x, DBX66.0

63544	CC_COLLISION_WIN			-	-	
mm, degrees	Collision protection window			DOUBLE	Reset	
-						
-	-	-1.0	-	-	7/2	M

Description: Minimum distance between the Protect-Slave axis and the Protect-Master axis. Only the value entered in the Slave axis is used. With a value smaller than 0, the monitoring function cannot be activated.

63545	CC_OFFSET_MASTER			-	-	
mm, degrees	Work offset for collision protection			DOUBLE	PowerOn	
-						
-	-	0.0	-	-	7/2	M

Description: Work offset for collision detection between Protect-Slave and Protect-Master axis.

The value entered for the Protect-Slave axis is used only.

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Suggestions and/or Corrections

Siemens AG I DT MC MS1 P. O. Box 3180 D-91050 Erlangen Federal Republic of Germany Fax +49 (0) 9131 98 - 2176 [Documentation]	Suggestions Corrections
	for Publication/Manual SINUMERIK 840D sl, Detailed Maschine Data Description (AMDsl) Manufacturer/Service documentation
From Name: Company/Dept. Address :________________ Telephone : _____ / ________________ Telefax : _____ / ________________ email : ________________	Order No.: - 03/2010
	Should you come across any printing errors when reading this publication, please notify us on this sheet. Suggestions for improvements are also welcome.

A.2 Overview

SINUMERIK 840D sl Documentation Overview

General Documentation

SINUMERIK 840D sl
Sales Brochure

SINUMERIK 840D sl, 840Di sl, 802D sl
Catalog NC 61 *)

SINAMICS S120
Catalog PM 21 SIMOTION, SINAMICS S120 and Motors for Production Machines *)

User Documentation

SINUMERIK 840D sl
Operating Manual
- Universal *)
- Turning *)
- Milling *)
- HMI-Advanced *)

SINUMERIK 840D sl
Programming Manual
- Fundamentals *)
- Production Planning *)
- Measuring Cycles
- Lists, System Variables

SINUMERIK 840D sl, 840D, 840Di sl
Programming Manual
- ISO Turning/Milling

SINUMERIK 840D sl
Diagnostics Manual *)

Manufacturer/Service Documentation

SINUMERIK 840D sl
Manual
- NCU *)
- Operator Components and Networking *)
- Guidelines for Machine Configuration

SINUMERIK 840D sl
Commissioning Manual
- CNC: NCK, PLC, Drive *)
- Base Software and Operating Software *)
- Base Software and HMI-Advanced *)

SINUMERIK 840D sl
List Manual *)
- Part 1
- Part 2

Manufacturer/Service Documentation

SINUMERIK 840D sl
Function Manual
- Basic Functions *)
- Extended Functions
- Special Functions
- Synchronized Actions
- Tool Management

SINUMERIK 840D sl, 840Di sl, 802D sl, 828D
Function Manual
- ISO Dialects

SINAMICS S120
Function Manual Drive Functions

SINUMERIK 840D sl
Function Manual Safety Integrated

SINUMERIK
EMC Guidelines

Electronic Documentation

SINUMERIK, SINAMICS, Motors
DOConCD *)
DOConWEB

*) Recommended minimum scope documentation