DYNAVERT® T

Instructions for Parameterizing

4BS0550-004-en

Type range T05

FLENDER
LOHER

1 Table of contents

Applicable to DYNAVERT® T of series 05, as from software version 11C0153-AP39

Subject to technical modification.

DYNAVERT® is a registered trade mark of Loher GmbH.

Keep this document for further usage.

2 Operating functions of the inverter

2.1 General

The operation of the inverter is possible via various operating sources (local, remote, BUS etc.). The inverter accepts the same operating commands from all operating sources and is working with the same function state diagram. The function state diagram used corresponds basically with the PNO-profile “Variable-speed drives PROFIDRIVE“.

2.2 Status diagram

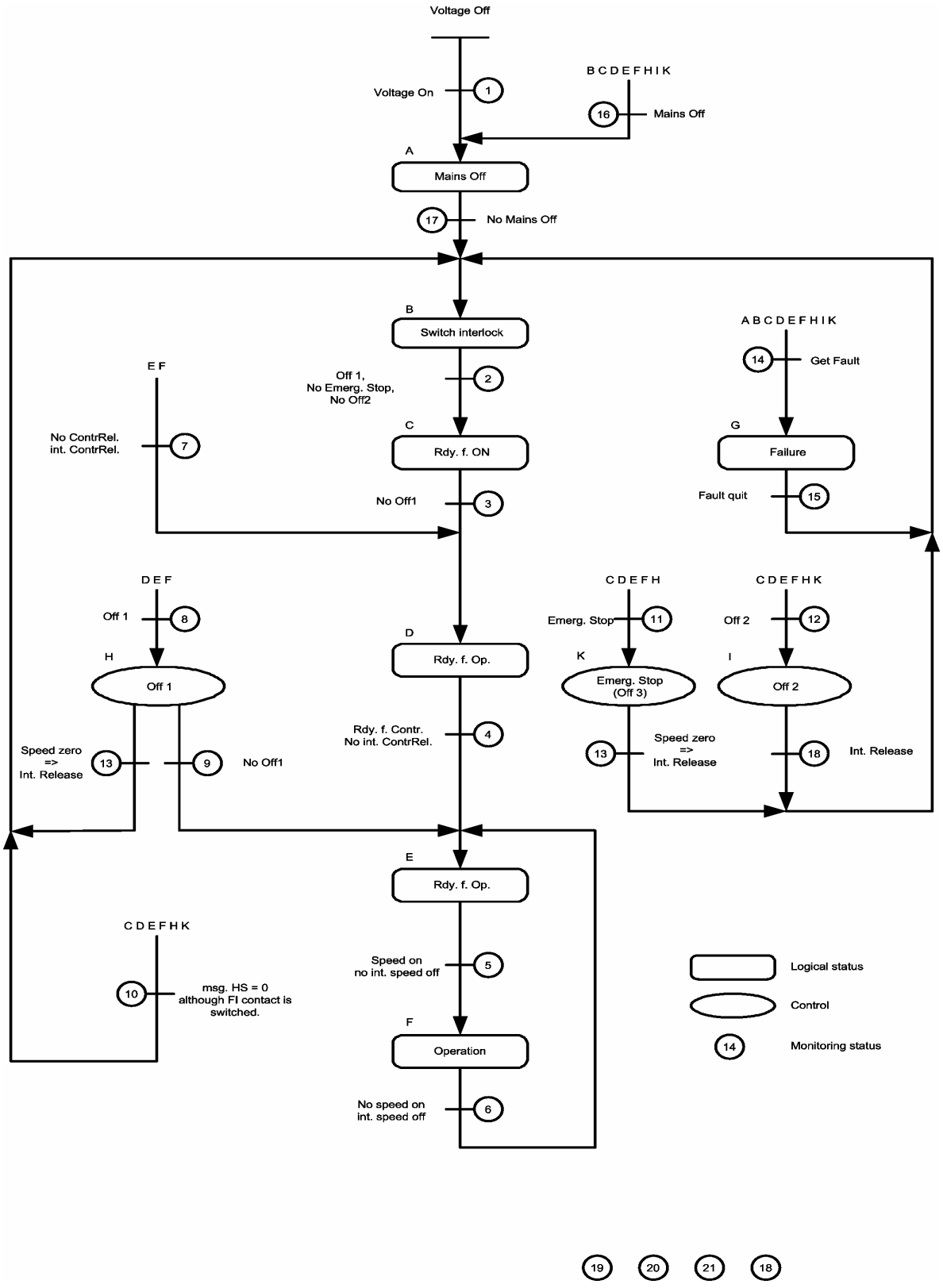


Figure 1 Function state diagram

Logical status:
The inverter signals in the actual value status *I-INVERTER DATA* always one of the logical statuses. A logical status can be taken up in stationary condition.

Control programs:
Can be selected parallelly to the logical statuses. These are processed and are carrying on from one logical status to another one. During processing the previous logical status is still displayed. Partially, the respective messages are shown on the display.

Status transitions:
Define the events occurring, and/or the prerequisites to be given in order to enable a change of status.

2.3 Relevant parameters

P-INV.BEHAVIOUR:Switch interlock

determines the behavior in the switch interlock status.

Switch interlock = OFF	**Switch interlock = ON**	**Switch interlock = always** **or** **operating source = BUS**
The switch interlock status is maintained only after an OFF2 or an emergency stop. The status can be exited by Reset or OFF1.	The switch interlock status is maintained only after an OFF2 or an emergency stop. The status can be exited by OFF1 only.	The switch interlock status is maintained after an OFF2, an emergency stop or an acknowledged failure. The status can be exited by OFF1 only.

Table 1 Exiting the switch interlock

P-INV.BEHAVIOUR:MCfunc.

Here is defined as from which status on a contactor is engaged by the inverter and whether the contactor is located at the mains-side or the motor-side. The status from which on the contactor shall be engaged is reached only when the feedback from the contactor is received.

MCfunc	Fault	OFF 1	Controller release no internal controller inhibition	Speed ON no internal speed OFF
LinC no fault	no	-	-	-
LinC rdy.f.op	no	no	-	-
LinC rel.f.op	no	no	yes	-
LineC operat.	no	no	yes	yes
MotC no fault	no		-	-
MotC rdy.f.op	no	no	-	-
MotC rel.f.op	no	no	yes	
MotC operat.	no	no	yes	yes

Table 2 Required operating commands for switching-on a main contactor

P-OPERATION:Feedb.MC

This setting defines from where the feedback of a contactor is coming.
Preferable terminal –X2:8 shall be used as this one will cause simultaneously an internal lock-out.

In case of line contactor the feedback is not required (*P-OPERATION: Feedb.MC = inactive),* in case of a motor contactor the feedback via an auxiliary contact of the contactor is imperative (fire hazard for the contactor when switching low frequencies.)

2.4 Description of the logical statuses:

A Mains OFF

- Phase failure monitoring has tripped or the voltage of the interm. circuit is below minimum and *P-INV.BEHAVIOUR:Lowvolt. = Mains off* or *= FaultReset*
- Either the preloading process or the feedback of the main contactor is waited for (*P-INV.BEHAVIOUR:MCfunc.=* LinC *no fault, P-OPERATION:Feedb.MC* is not programmed to inactive).

B Switch interlock:

P-INTERFACE:Op.-source = BUS or *P-INV.BEHAVIOUR:Switch interlock = yes or always:*

System is waiting for an OFF1. The status can be exited only if there is no OFF2 or emergency stop active.

P-INTERFACE: Op.-source <> BUS and
P-INV.BEHAVIOUR: Switch interlock = OFF.

System is waiting until an active OFF2 or emergency stop is reset by a reset command or an OFF1 command.

C Ready for switching on:
The inverter is waiting until the OFF1-command is deactivated

D Ready for operation:
The inverter is waiting for controller release and deactivation of internal controller inhibition.

E Operation released:
The inverter is waiting for Speed on in order to react upon the setpoint value.

F Operating status:
All releases given; the inverter reacts upon a setpoint value

G Fault:

A fault has occurred.

2.5 Description of control programs:

H OFF1:
Shutdown of drive at braking ramp (comparable to Speed off) and adoption of the Switch interlock status.

I OFF2:
Immediate lock-out and adoption of the Switch interlock status.

K Emergency stop (OFF3):
Shut down of drive at the emergency stop ramp and adoption of the Switch interlock status.

2.6 Description of the status transitions:

1 Voltage OFF (A) => Mains off (B) (Voltage on)

Voltage of control electronics is switched on; software is initialized

2 Switch interlock (B) => Ready for switching on (C) (OFF1)

see Table 1

3 Ready for switching on (C) => Ready for operation (D) (no OFF 1):

OFF1 is deactivated.

With *P-INV.BEHAVIOUR:MCfunc.= LinC rdy.f.op:*

Contactor is engaged, contactor feedback shall come and no phase failure or undervoltage shall exist after elapse of the precharge time.

With *P-INV.BEHAVIOUR:MCfunc.= MotC rdy.f.op:*

Contactor is engaged and contactor feedback shall come.

4 Ready for operation (D) => Operation released (E)
Controller release is given.
No internal controller inhibition provided.

With *P-INV.BEHAVIOUR:MCfunc.= LinC rel.f.op:*

Contactor is engaged, contactor feedback shall come and no phase failure or undervoltage shall exist after elapse of the precharge time. If so, in case of dynamic controller release this is reset after 5s.

With *P-INV.BEHAVIOUR:MCfunc.= MotC rel.f.op:*

Contactor is engaged and contactor feedback shall come. If not, in case of dynamic controller release this is reset after 5s.

5 Operation released (E) => Operating status (F)
Speed ON is given
No int. Speed off

With *P-INV.BEHAVIOUR:MCfunc.= LineC operat. :*

Contactor is engaged, contactor feedback shall come and no phase failure or undervoltage shall exist after elapse of the precharge time. If so, in case of dynamic Speed ON this is reset after 5s.

With *P-INV.BEHAVIOUR:MCfunc.= MotC operat.:*

Contactor is engaged, contactor feedback shall come. If not, in case of dynamic Speed ON this is reset after 5s.

6 Operating status (F) => Operation released (E):
Speed OFF in Operating status is given; guided braking of drive to zero; Speed zero is reached, internal inverter lock-out

7 Operating status (F) => Ready for switching on (C) => Ready for operation (D)
Controller release is removed during operation, internal inverter lock-out; drive is coasting. Waiting time until the inverter is again ready for operation (except Synchronizing = ON).

Operation released (E) => Ready for operation (D)
Controller release is removed during ”operation released“, internal inverter lock-out is given.

8 Ready for operation (D), Operation released (E), Operating status (F) => OFF1 (H):
OFF1 is given
Guided braking of drive to zero

9 OFF1 (H) => Operation released (E):
During OFF1 (Speed zero not yet reached) OFF1 is removed.

10 Ready for switching on (C), Ready for operation (D), Operation released (E), Operating status (F), OFF1 (H) OFF2 (I) =>Switch interlock (B):

The main contactor feedback withdraws already after main contactor engagement and feedback received (provided *P-INV.BEHAVIOUR:MCfunc. is not inactive)*. The inverter goes immediately to controller lock-out and adopts the Switch interlock status.

11 Ready for switching on (C), Ready for operation (D), Operation released (E), Operating status (F), OFF1 (H) => Emergency stop (K):

Emergency stop has been activated. The inverter runs along the emergency stop ramp to Speed zero.

12 Ready for switching on (C), Ready for operation (D), Operation released (E), Operating status (F), OFF1 (H), Emergency stop (K) => OFF2 (I):

OFF2 has been activated. The inverter goes immediately to lock-out. Drive is coasting.

13 OFF1 (H), Emergency stop (K) => Switch interlock (B):
After control program OFF1 or Emergency stop were performed (i.e. Speed zero is reached) the internal lock-out has been activated.

14 Mains OFF (A), Switch interlock (B), Ready for switching on (C), Ready for operation (D), Operation released (E), Operating status (F), OFF1 (H), Emergency stop (K), OFF2 (I) => Fault (G)

The inverter identifies a fault (internal inverter fault or external parameterizable fault function) and disconnects.

15 Fault (G) => Switch interlock (B)

There is no longer any cause for a fault. By a fault acknowledgement all fault messages can be eliminated.

16 Switch interlock (B), Ready for switching on (C), Ready for operation (D), Operation released (E), Operating status (F), OFF1 (H), Emergency stop (K), OFF2 (I) => Mains OFF (A)

The conditions for Mains OFF are fulfilled.

- Phase failure monitoring has tripped or the voltage of the interm. circuit is below minimum value and *P-INV.BEHAVIOUR:Lowvolt. = Mains off* or *= FaultReset*

- Either the preloading process or the feedback of the main contactor is waited for (*P-INV.BEHAVIOUR:MCfunc.*= LinC *no fault, P-OPERATION:Feedb.MC* is not programmed to inactive)

17 Mains OFF (A) => Switch interlock (B)

Inverter is preloaded and main contactor feedback is received (appropriate parameterize provided).

18 OFF2 (I) => Switch interlock (B)

After control program OFF2 has been performed the internal lock-out has been activated.

2.7 Operating commands - Operating sources

The inverter allows selection from various operating sources. At the time being Local, Remote and BUS can be selected. The functions of operating sources Local and Remote are free programmable, for operating source BUS the respective control word is used. The following table shows the relevant parameters and/or information for the various operating functions and operating sources (see also figure 2).

Operating source	**Local**	**Remote**	**BUS** Control word is defined with P-PZD OUT-Data STW1
Controller release	P-ContrlRelease:Local	P-ContrlRelease:Remote	STW1 Bit 3
Speed on	P-Speed on:Local	P-Speed on:Remote	STW1 Bit 6
OFF1 (NC)	P-OFF1 (NC):Local	P-OFF1 (NC):Remote	STW1 Bit 0
int. controller lock-out	P-int.ctrl.inhib.:Local	P-int.ctrl.inhib.:Remote	-
int. Speed off	P-int.speed off:Local	P-int.speed off:Remote	-
Reversing	P-Reversing:Local	P-Reversing:Remote	P-Profibus:Revers Standard: STW Bit 11
Reset-source	**Local**	**Remote**	**BUS**
Reset	P-Reset:Local	P-Reset:Remote	STW1 Bit 7

Table 3 Allocation of the operating commands to the operating sources

If the reset-source is set to Global, reset can be performed from any operating source.

In addition to the above described operating functions which are independent from the operating source or reset-source, permanently active operating functions are also available.

Operating function	relevant parameters
Controller release	P-ContrlRelease:Global 1 P-ContrlRelease:Global 2
Speed on	P-Speed on:Global 1 P-Speed on:Global 1
OFF1 (NC)	P-OFF1 (NC):Global 1 P-OFF1 (NC):Global 2
int. controller lock-out	P-int.ctrl.inhib.:Global 1 P-int.ctrl.inhib.:Global 2
int. Speed off	P-int.speed off:Global 1 P-int.speed off:Global 2
Emergency stop (NC)	P-Emerg. stop:Global 1 P-Emerg. stop:Global 2 STW1 Bit 2 (provided connection to Bus is available)
OFF2 (NC)	P-OFF2 (NC):Global 1 P-OFF2 (NC):Global 2 STW1 Bit 1 (provided connection to Bus is available)
Feedback Main contactor	Feedb.MC
Motorpoti	P-Motorpoti:up P-Motorpoti:down

Table 4 Operating commands that are always effective

2.8 Parameterizing of operating functions

As mentioned before, the operating functions for operating sources Local and Remote can be free programmed (relevant parameters see *Table 3* and *Table 4*). In addition, a parameter with higher priority *P-OPERATION:Opr. is available*, by means of which certain predefined operating functions are programmed automatically. To this effect many parameters are set to defined values. The following table shows the parameterizing dependent from parameter Operation.

If one of these parameters is modified subsequently, the setting value of parameter P-OPERATION:Opr. is extended by the addition ”spec.“.

	std siss	**std sisd**	**std dids**	**std didd**	**Namur 1**	**Namur 2**	**Namur 3**	**Namur 4**	**Namur 5**	**Namur 6**
P-ContrlRelease:Local P-ContrlRelease:Remote P-ContrlRelease:Global 1 P-ContrlRelease:Global 2	always always X2:8 always		always always Selfholdg. 4 always		Selfholdg. 5 X2:10 X2:15 X2:11	Selfholdg. 5 Selfholdg. 4 X2:15 always	always always X2:15 always		always always always always	
P-Speed on:Local P-Speed on:Remote P-Speed on:Global 1 P-Speed on:Global 2	Selfholdg. 5 X2:10 always always	Selfholdg. 5 Selfholdg. 3 always always	Selfholdg. 5 X2:10 always always	Selfholdg. 5 Selfholdg. 3 always always	always always always always		Selfholdg. 5 X2:10 always X2:11	Selfholdg. 5 Selfholdg. 4 always always	Selfholdg. 5 X2:10 X2:15 X2:11	Selfholdg. 5 Selfholdg. 4 X2:15 always
P-OFF1 (NC): Local P-OFF1 (NC): Remote P-OFF1 (NC): Global 1 P-OFF1 (NC): Global 2 P-OFF1 (NC): Displayanzeige	inactive inactive inactive inactive yes									
P-Reset: Local P-Reset: Remote P-Reset: Global 1 P-Reset: Global 2	ResetIntern X2:14 inactive inactive									
P-Emerg. stop: Global 1 P-Emerg. stop: Global 2	X2:15 inactive				inactive inactive					
P-OFF2 (NC): Global 1 P-OFF2 (NC): Global 2 P-OFF2 (NC): T1 P-OFF2 (NC): T2	inactive inactive !! OFF2 !! Operation									
P-int.ctrl.inhib.: Local P-int.ctrl.inhib.: Remote P-int.ctrl.inhib.: Global 1 P-int.ctrl.inhib.: Global 2	inactive inactive inactive inactive									
P-int.speed off: Local P-int.speed off: Remote P-int.speed off: Global 1 P-int.speed off: Global 2	inactive inactive inactive inactive									
P-Reversing: Local P-Reversing: Remote	inactive X2:16									
P-Motorpoti: up P-Motorpoti: down	inactive inactive				X2:12 X2:13					
Rückm.HS	inactive				X2:8					
P-Self-Holding 3: On P-Self-Holding 3: OFF0 P-Self-Holding 3: OFF1	- - -	X2:11 X2:10 ResetSpeed	- - -	X2:11 X2:10 ResetSpeed	- - -					

	std siss	std sisd	std dids	std didd	Namur 1	Namur 2	Namur 3	Namur 4	Namur 5	Namur 6
P- Self-Holding 4: ON P- Self-Holding 4: OFF0 P- Self-Holding 4: OFF1	- - -		X2:9 X2:8 ResRelease		- - -	X2:10 X2:11 ResRelease	- - -	X2:10 X2:11 ResetSpeed	- -	X2:10 X2:11 ResetSpeed
P- Self-Holding 5: ON P- Self-Holding 5: OFF0 P- Self-Holding 5: OFF1	ON internal OFF intern. ResetSpeed				ON internal OFF intern. ResetSpeed		ON internal OFF intern. ResetSpeed			
P-Message 8: Inp. P Message 8: T1 P-Message 8: T2	inaktiv - -				MessgGen.MESS 12 Interlocking active					
P-Warning 7:Inp. P-Warning 7:T P-Warning 7:System	Kaltl.X2:28 Motorwicklg.temp. 0				inactive - -					
P-Warning 8:Inp. P-Warning 8:T P-Warning 8:System	X2:29 extern 0				inactive external 0					
P-failure 11:Inp. P-failure 11:T P-failure 11:System	Kaltl.X2:27 Motorwicklg.temp. 0				inactive Fan external 0					
P-failure 12:Inp. P-failure 12:T P-failure 12:System	X2:13 external 0				inactive external 0					
P-MessgGen.MESS12:Inp. P-MessgGen.ZV: 0->1 P-MessgGen.ZV: 1->0 P-MessgGen.MESS12:Invers.	- - - -				X2:15 0 0 ON					
P-ParamSwitch 6:Inp P-ParamSwitch 6:Par P-ParamSwitch 6:AW	inactive - -				inactive SetSource MPoti					
P-ParamSwitch 7:Inp P-ParamSwitch 7:Par P-ParamSwitch 7:AW	inactive - -				inactive SetSource Sollw1					
P-ParamSwitch 8:Inp P-ParamSwitch 8:Par P-ParamSwitch 8:AV	inactive - -				inactive ContrMode Speed					

	std siss	**std sisd**	**std dids**	**std didd**	**Namur 1**	**Namur 2**	**Namur 3**	**Namur 4**	**Namur 5**	**Namur 6**
P-ParamSwitch 9:Inp P-ParamSwitch 9:Par P-ParamSwitch 9:AV	inactive - -				inactive SetSource BUS 1					
P-ParamSwitch 10:Inp P-ParamSwitch 10:Par P-ParamSwitch 10:AV	inactive - -				inactive Operating source BUS					
P-ParamSwitch 11:Inp P-ParamSwitch 11:Par P-ParamSwitch 11:AV	X2:12 SetSource AE1				X2:9 SetSource AE1					
P-ParamSwitch 12:Inp P-ParamSwitch 12:Par P-ParamSwitch 12:AV	X2:12 Operating source Local				X2:9 Operating source Remote					

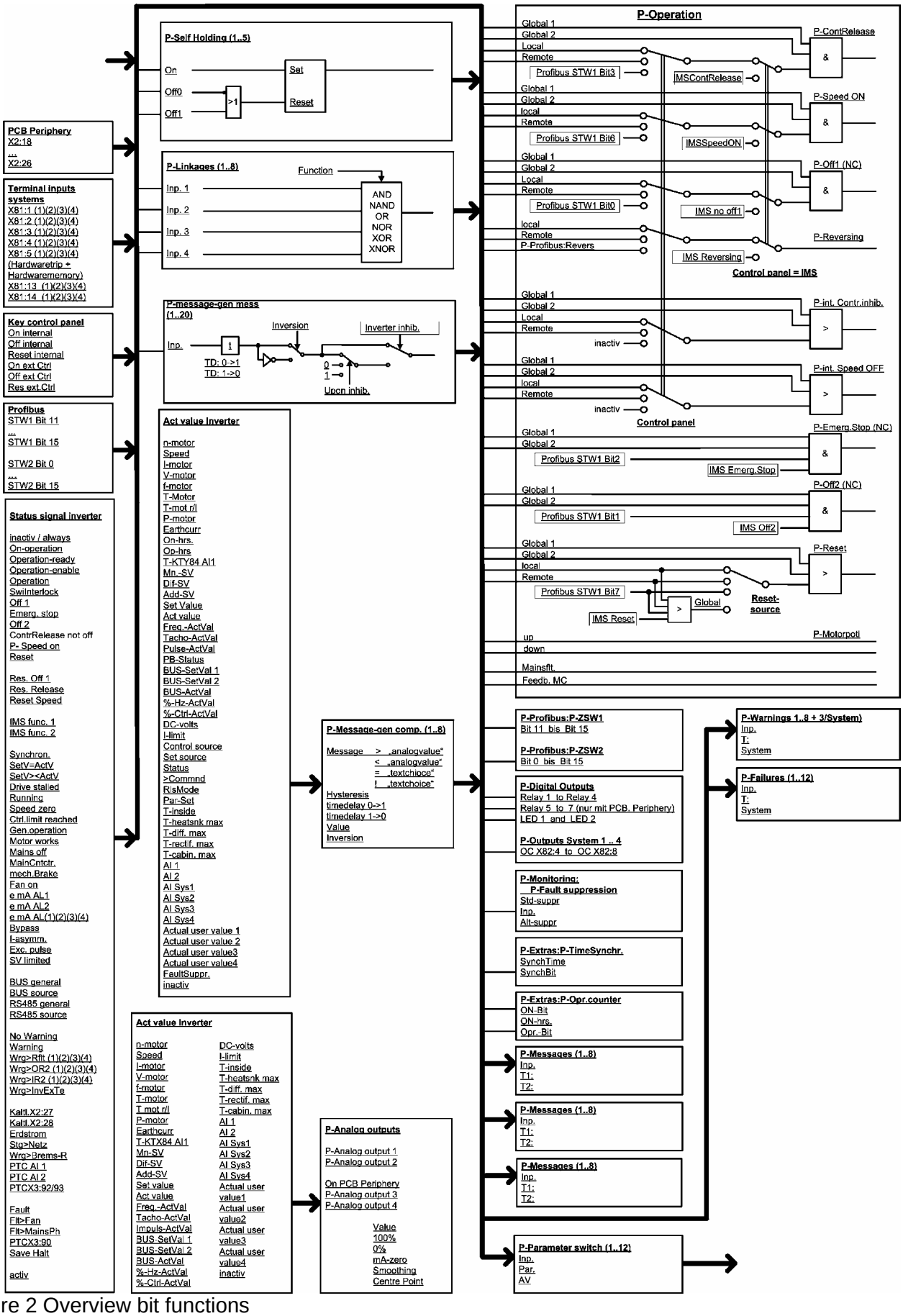


Figure 2 Overview bit functions

3 Control mode and setpoint default / setpoint normalization

3.1 Control modes:

The inverter distinguishes between the control modes Speed, Process-n, Torque, Current, Process-I and Lift gear. The preselection of the respective control mode is effected in P-DRIVE DATA/Contr.Mode or in P-PARAMETER SWITCH/P-ParamSwitch.

The parameters needed for the particular control mode are found in the respective parameter menus P-SPEED DEFAULT (for Speed), P-PROCESS CONTROL (for Process-n and Process-I), P-M-CONTROL (for the torque), P-CURRENT CONTROL (for current), P-HOIST./ROT.GEAR and P-SPEED DEFAULT (for lift gear).

For Speed the setpoint value is interpreted as a speed-proportional quantity which finally causes an output rotary-field frequency that is proportional to the setpoint value. A setpoint value integrator is limiting the rate of response of the rotary-field output frequency to the parameterized values (*t-accel.*, *t-decel.*, etc.).

For Process-n the setpoint/actual default and standardization is independent from the rotary-field output frequency. Basically, the setpoint integrator is not active. It is used only for starting and braking with Speed OFF. In its place a PID-process controller with the parameters *P ctrl.*, *Tn ctrl.*, *D ctrl.* is effective. For this control mode you have to have installed an actual value detector rated for the process quantity to be controlled (pressure, flow, etc.). The controller compares the setpoint value with the actual value of the process and generates a rotary-field frequency, dependent from the deviation and the set control parameters, as manipulated variable.

Process-I behaves in like manner as Process-n. Only the manipulated variable is different: instead of the rotary-field frequency the current is the relevant quantity.

If in case of process control an *fmin* has been parameterized and rotary field is not set to both *fmin* will be observed. For starting from standstill the run-up to *fmin* is made with the setpoint integrator. After reaching *fmin* the process controller is activated internally. With activated process controller the manipulated variable of frequency (controller output) is limited to *fmin*. A limitation of the manipulated variable to *fmax* is always provided.

If in case of process control the system shall be run to zero with command Speed OFF, this is again effected internally with the setpoint integrator.

With torque control the se tpoint default is made in Nm. For the actual value always the internally computed motor torque is used. On principle, the setpoint integrator is not active. It is used only for starting and braking with Speed OFF. In its place a PI-Torque control with the parameters P T-ctr.SVC and Tr T-ctr.SVC is active.

If you have parameterized an *fmin* at torque control and if the rotary field is not set to Both, *fmin* will be considered. For starting from standstill the run-up to *fmin* is made with the setpoint integrator. After reaching *fmin* the process controller is internally activated. With activated torque controller the output frequency is limited to *fmin*. A limitation to *fmax* is always provided.

In case of Lift gear the inverter behaves according to the speed default. Additionally, a triggering signal for the mechanical brake is generated and prior to the start of the setpoint integrator the load is taken over by the brake. Furthermore, the drive is held electrically until the mechanical brake is tripping.

3.2 Setpoint default and setpoint normalization:

Depending on the setting of parameter Control mode and of parameters n SetpSource, P SetpSource and/or T SetpSource, you can default the setpoint value on the selected place. If all

ON-commands are set, the inverter will adopt the setpoint value and will follow to it subject to parameterizing (e.g. run-up, braking time, controller adjustment, limitation by fmin/fmax, etc.).

Internally, the inverter is working in all control modes always with standardized quantities for the setpoint value, and also the actual value.

For control modes Speed default and Process control you have to select in parameter *Unit* that unit which is appropriate for display in your application. The reasonable presentation of the numerical value can be selected with parameter *AftDecPoint* among 5/0, 3/1, 2/2 and 1/3 digits before/ after the decimal point. The setpoint normalization (unit and presentation of numerical value on the display) can be parameterized independently from each other for speed default and process control respectively.

In case of torque control the setpoint default is always made in Nm and the presentation of the numerical value is automatically adapted independently from the inverter output.

Speed default

The presentation of the setpoint value in control mode Speed default is defined by the parameters *Unit* and *AftDecPoint* in menu P-SPEED DEFAULT. In addition to the display of the setpoint value also all the other relevant parameters – e.g. fixed setpoint values, normalization of an analog or a BUS setpoint - are converted to this kind of presentation.

By setting the parameter *fnom-M* you are defining the allocation of setpoint representation to the rotary-field frequency. Here you have to set that value, which corresponds with the parameterized rated motor frequency (see motor data). By parameter *nAnaSV%* you define, in case of analog setpoint default, which setpoint value shall correspond with the analog value 10V/20mA. Correspondingly you define with parameter *Bus SV%*the allocation of a Bus setpoint of 4000H.

Example:
In a plant 1000 pieces/min correspond with a motor frequency of 50 Hz (4-pole motor). You want to set a production speed of 0-2000 pieces/min with an analog setpoint value 0-10V.

Solution	
fmax = 100,0 Hz	to enable running at the respective speed
n SetpSource = AI1	Selection of setpoint source; connection of the analog setpoint at input AI1
Unit = St/min	Setting of *Unit* to St/min
AftDecPoint = 0	Setting of the numerical value without decimal place with 5 digits before decimal point
fnom-M = 1000 St/min	Allocation of motor frequency and size of setpoint according to unit and decimal places
nAnaSV% = 2000 St/min	Allocation of analog setpoint 10V and size of setpoint according to unit and decimal places

Process control

The presentation of the setpoint in control mode Process-n, Process-I or Process-V is defined by the parameters Unit and AftDecPoint in menu P-PROCESS CONTROL. In addition to the display of the setpoint value also all the other relevant parameters – e.g. fixed setpoint values, normalization of an analog or a BUS setpoint - are converted to this kind of presentation.

By setting the parameter P-PROCESS CONTROL: MaxSet you are defining the allocation of the presentation of the setpoint and the internal normalization of the process control. At the same time, this value represents the maximum setpoint value that can be preset.

By parameter *PAnaSV%* you are defining in case of an analog setpoint default, which setpoint value shall correspond with the analog value 10V/20mA. Correspondingly you are defining the allocation of a Bus setpoint of 4000H with parameter*Bus SV%*.

In case of process control an actual value sensor shall be installed, rated for the process to be controlled. The actual-value signal of this sensor can be connected via the analog input or the PROFIBUS. Selection is to be made by parameter *AV source*. The normalization of the respective actual value can be adjusted via parameters *AnaAct%* or *BusAct%*.

Example Process-n:
You want to control a flow rate. For that, you have got a flow-rate measurement with an analog signal of 4…20mA for 0…1000m³/h. You want to preset the control range of 0…800m³/h with an analog setpoint value of 0…10V.

Solution	
P SetpSource = AI1	Selection of setpoint source; connection of the analog setpoint at input AI1
Unit = m³/h	Setting of indicating unit to m³/h
AftDecPoint = 0	Setting of numeric value without decimal place with 5 digits before decimal point (as well possible: 1 decimal place with 3 digits before decimal point ###,#)
MaxSet = 800 m³/h	Setting of controller normalization and of the maximum possible setpoint to 800 m³/h
PAnaSV% = 800 m³/h	Allocation of analog setpoint 10 and setpoint size after unit and decimal place
AV source = AI2	Selection of actual value source; connection of the analog actual value at input AI2
AnaAct% = 1000m³/h	Allocation of analog actual value 20mA and setpoint size after unit and decimal place
]	
P ctrl. = ###.##	Setting of P-Amplification of the PID-process controller as required; (1,00 means a modification of the manipulated variable of frequency by 1 = f-motor at a control deviation of 1 = MaxSet)
Tn ctrl. = ###,# s	Setting of the readjustment time Tn of the PID-process controller as required
D ctrl. = ###.# s	Setting of rate time D of the PID-process controller as required
SetVSmoothg. = #.## s	Setting of setpoint smoothening for smoothening of setpoint jumps, if required
ActSmoothg = #.## s	Setting of actual value smoothening for smoothening of the actual value signal, if required

Example Process-I:
You want to run the inverter as an exciting device for a synchronous generator. For that, the output voltage of the synchronous generator has to be controlled for which a voltage transformer with 10kV/100V is available. The indication of the actual value should be in %. You wish to preset the control range of 85…115%(8,5…11,5kV) with an analog setpoint of 4…20mA. The exciting current of the synchronous machine is the manipulated value.

Solution	
P SetpSource = AE1	Selection of setpoint source; connection of the analog setpoint at input AI1
Menu P-ANALOG INPUTS/ mA-zero =4mA	Here, the setpoint signal is set to 4…20mA. The setpoint encoder is to be connected to terminals –X2:50-51.
Unit = %	Setting of indicating unit to m³/h
AftDecPoint = 1	Setting of numeric value with one decimal place: ###,#
MaxSet = 115 %	Setting of controller normalization and of the maximum possible setpoint to 115%
PAnaSV% = 115%	Allocation of analog setpoint 20mA and the setpoint size acc. to unit and decimals
Act-Source = AI2	Selection of actual value source;; connection of the analog actual value at input AI2
DIL-Switch S2:1-4: 0010	Here, the analog input 2 is set to 0…132V input voltage
AnaAct% = 132%	Allocation of analog actual value and the setpoint size
P Control = ###.##	Setting of P-Amplification of the PID-process controller as required; (1,00 means a modification of the manipulated value for current by 1 = I-motor at a control deviation of 1 = MaxSet)
Tn ctrl. = ###,# s	Setting of the readjustment time Tn of the PID-process controller as required
D Control = ###.# s	Setting of rate time D of the PID-process controller as required
SetVSmoothg. = #.## s	Setting of setpoint smoothening for smoothening of setpoint jumps, if required
ActSmoothg = #.## s	Setting of actual value smoothening for smoothening of the actual value signal, if required

Torque control

The setpoint value at Contr.Mode = torque (torque control) is presented in Nm or kNm, in dependence from the inverter output. In case of a positive setpoint value of the torque the inverter is performing a clockwise acting torque and with a negative setpoint value of the torque the generated torque will act anticlockwise. That means, in case of a clockwise rotary field a positive setpoint is generating a motive (driving) torque and a negative setpoint a regenerative (braking) torque. With anti-clockwise rotary field the situation is vice versa.

By setting parameter P-M-CONTROL: MaxSet you are defining the maximum setpoint that can be preset.

By parameter *MAnaSV%* you are defining – in case of analog setpoint default - which setpoint value shall correspond to the analog value 10V/20mA. Accordingly, you are defining die allocation of a Bus-setpoint of 4000H by parameter *Bus SV%*.

Example:
You want to carry out a torque control. You want to perform the setpoint default via an analog setpoint value at AI1 with 10V = 300Nm.

Solution	
M SetpSource = AI1	Selection of setpoint source; connection of the analog setpoint at input AI1
MaxSet = 300 Nm	Setting of the maximum possible setpoint to minimum 300 Nm
PAnaSV% = 300 Nm	Allocation of analog setpoint 10V to 10V/20mA = 300 Nm, corresponding to the setpoint size
P T-ctr.SVC = ###.##	Setting of P-Amplification of torque-control PCB as required
Tr T-ctr.FOC = #### ms	Setting of readjustment time Tr of torque-control PCB as required
SetVSmoothg. = #.## s	Setting of setpoint smoothening for the dampening of setpoint jumps, if required

Current control

For control mode = current two setpoint values are required. Parameter I SetpSource defines from where the main setpoint for the current and the parameter f-source is determined and from where the sub-setpoint (actual value sub-setpoint) for the rotary-field frequency is coming. The setpoint normalization for the current is always given in [A] and for the frequency always in [Hz]. By MaxSet the max. admissible current setpoint is defined. By parameter Load is to be set whether a 2-phase or 3-phase load is connected. The parameters IAnaSV% or Bus SV% define the conversion of a 10V/20mA analog signal or 0x4000 bus signal into an Ampere current setpoint. f Analog or f Bus define the conversion into a frequency setpoint in case of current control. Only positive current setpoint values will be accepted. If with analog setpoint source only a negative signal is available, this is to be inverted with the AI functionality. Fixed setpoints I SV1, I SV2, I SV3 for the current or the frequency f SV1 can also be preset. The rate of response of the rotary-field frequency is defined by parameter t Frequ. in [s]. This time indicates the rate of response of the frequency from 0 up to the parameterized fmax.

In case of current control the behavior of the inverter differs in some details from the other control modes. If a minimum frequency fmin is parameterized, the output frequency jumps upon inverter starting up to fmin and is integrating from there to the current setpoint. If the inverter is switched off with Speed OFF, the output frequency is integrating up to fmin and there the inverter disconnects. If the setpoint at Rotation=both and with an fmin changed from positive to negative (or vice versa), the output frequency is integrating up to fmin and then jumps to the opposite rotary direction, integrating from there to a new setpoint value. Is the rotary field changing from =CW to =CCW (or vice versa) the output frequency jumps directly to fmin in the new rotary direction.

Specifics upon setting Load = 2DC

By this parameterizing the output frequency is always maintained at zero, independent from the remaining parameterizing. Here, the load has always to be connected to phases U and W.

Specifics upon setting Load = 2AC

Here, the load has also to be connected to phases U and W. The frequency setpoint for the AC is accepted as a positive as well as a negative value. The output frequency however is always minimum 10Hz, independently from the parameterizing of fmin or from the current setpoint default. This rise is automatically carried out inverter-internally.

Example:
You want to run a heating resistor (2-phase) with current control and a current up to 50,0A. The current setpoint is coming via an analog value with 20mA == 50,0A to AI1 and the rotary-field frequency shall always be constantly 100Hz.

Solution	
fmin = 100 Hz	Setting of fmin to get the output frequency jumping directly to this value
fmax = 100 Hz	Setting of fmax, so that 100 Hz are admissible
I SetpSource = AI1	Selection of the setpoint source for the current setpoint; connection of the analog setpoint at input AI1
MaxSet = 50,0 A	Fixing of the maximum possible setpoint to 50,0A
Laod = 2AC	Load-setting to 2-phase
IAnaSV% = 50,0 A	Allocation of the analog setpoint 10V/20mA to the setpoint size according to 10V/20mA = 50,0 A
f-source = SetVal1	Selection of the setpoint source for the frequency setpoint; default by fixed setpoint 1
f SV1 = 100,0 Hz	Selection of the fixed setpoint to the required value

Voltage control

Control mode = voltage is to be regarded in the same way as control mode = current. There is only the difference that here the inverter serves as the voltage source. For that, a voltage setpoint is preset to which the internal actual voltage value is adjusted. Parameterizing and normalization of the voltage and frequency setpoint is comparable to that of the current control.

Lift gear

General properties
The lift gear function is activated by *P-SPEED DEFAULT:Contr.Mode=Liftgear*. Additionally, with parameter *P-MOTOR DATA:Motor type* there can be selected whether the actual-value feedback shall be applied (Motor type = async_FOC) or not (Motor type = async_SVC).

The following properties apply with actual-value feedback as well as without:

- Via operating input *Speed ON* the run-up along the set run-up ramp can be activated, as well as the braking process down to standstill along the set braking ramp.

Properties in case of operation with the actual-value feedback

- Operation in motor speed = zero as well as with output frequency = zero is possible with disengaged brake. This means that electric halt to standstill, reversing of rotary direction without activation of the mechanical brake as well as the takeover of the load by the mechanical brake at setpoint zero is possible. A pulse tacho-generator with a graduation of minimum 1000 should be used.

Upon starting an *automatic determination of the holding torque* (position control) is carried out after disengagement of the mechanical brake, and the corresponding holding torque is generated. About that, the inverter is not dependent on a defined apply time of the mechanical brake. After that, the run-up encoder is started to achieve a defined run-up starting from speed zero.

Braking is effected electrically down to speed zero. After that the mechanical brake is activated (minimum wear at the brake) and the drive is electrically held for a parameterizable period of time. Thus, the inverter is not dependent on any defined release time of the brake.

Properties in case of operation without actual-value feedback

- Owing to the Space-Vector control and the machine guidance applied, the load at the motor (and thus also the correct saturation) can be established with sufficient accuracy to about 0.5 Hz, even without actual-value feedback, resulting in a minimum setpoint :
  Minimum setpoint = nom. slip-frequency of the motor + 0,5 Hz, however min. 2 Hz

  This value is automatically calculated by the inverter on basis of the parameterized motor data and is used as the starting frequency. This means, that with a lower setpoint the inverter will not start.

- Since in operation without actual-value feedback no *automatically establishing of the holding torque* can be performed, the inverter has to start with a defined starting torque. In case of DYNAVERT® T starting torques for setpoint values can be preset separately in clockwise or anti-clockwise direction. Moreover, the starting torque can be preset in the motive (positive value) or the regenerative (negative value). Additionally, the starting torques can be modified by digital parameter switches.
  In order to avoid starting against a closed brake and thus avoiding an unnecessary high starting jerk, the apply time of the mechanical brake can be parameterized in the inverter. The inverter is starting the run-up encoder only after the brake has been triggered for a sufficiently long time.
  By following parameters (Menu P-HOIST./ROT.GEAR) the starting process can be optimized:

Engag t br.	Apply time of the mechanical brake
R Start.torq.	Starting torque clockwise
L Start.torq.	Starting torque anti-clockwise

- Also without setpoint feedback braking is effected electrically down to speed zero. A possible short-term operation with frequencies below 0,5 Hz (necessary in case of regenerative load) is run in open-loop control with the torque established before. After that the mechanical brake is activated (minimum wear at the brake) and the drive is electrically held for a parameterizable period of time. Thus, the inverter is not dependent on a defined release time of the brake.

Example for the parameterizing of a lift gear

The data of the lift gear are assumed as follows:

- apply time of the mechanical brake 50 ms
- release time of the mechanical brake 90 ms
- 4-pole motor
- HTL-Tacho with 1024 pulses
- clockwise rotating field is upward

For operating the lift gear with tacho-feedback the following parameterization is practical (parameterizing of the correct motor data and mesurg.Auto-R1 is taken for granted)

P-DRIVE DATA	Contr.Mode	= Liftgear
P-SPEED DEFAULT	P sp.ctr.	= 30
P-SPEED DEFAULT	Tr sp.ctr.	= 200 ms
P-MOTOR DATA	Motor type	= async_FOC
P-MOTOR DATA	Sensor	= HTL
P-MOTOR DATA	Pulses/360	1024
P-HOIST./ROT.GEAR	Engag t br.	= 0,1 s
P-HOIST./ROT.GEAR	t-rel mec.br.	= 0,3 s
P-HOIST./ROT.GEAR	P PosContr.	20

Explanation:
The values for apply time and release time of the mechanical brake should be set – at the minimum – to the theoretical values, so that at the one hand the automatically establishment of the starting torque is working correctly, and at the other hand the inverter is maintaining the torque sufficiently long so that the brake applies reliably.

Upon operation of the lift gear without tacho-feedback the following parameterization is practical (parameterizing of the correct motor data and mesurg.Auto-R1 is taken for granted)

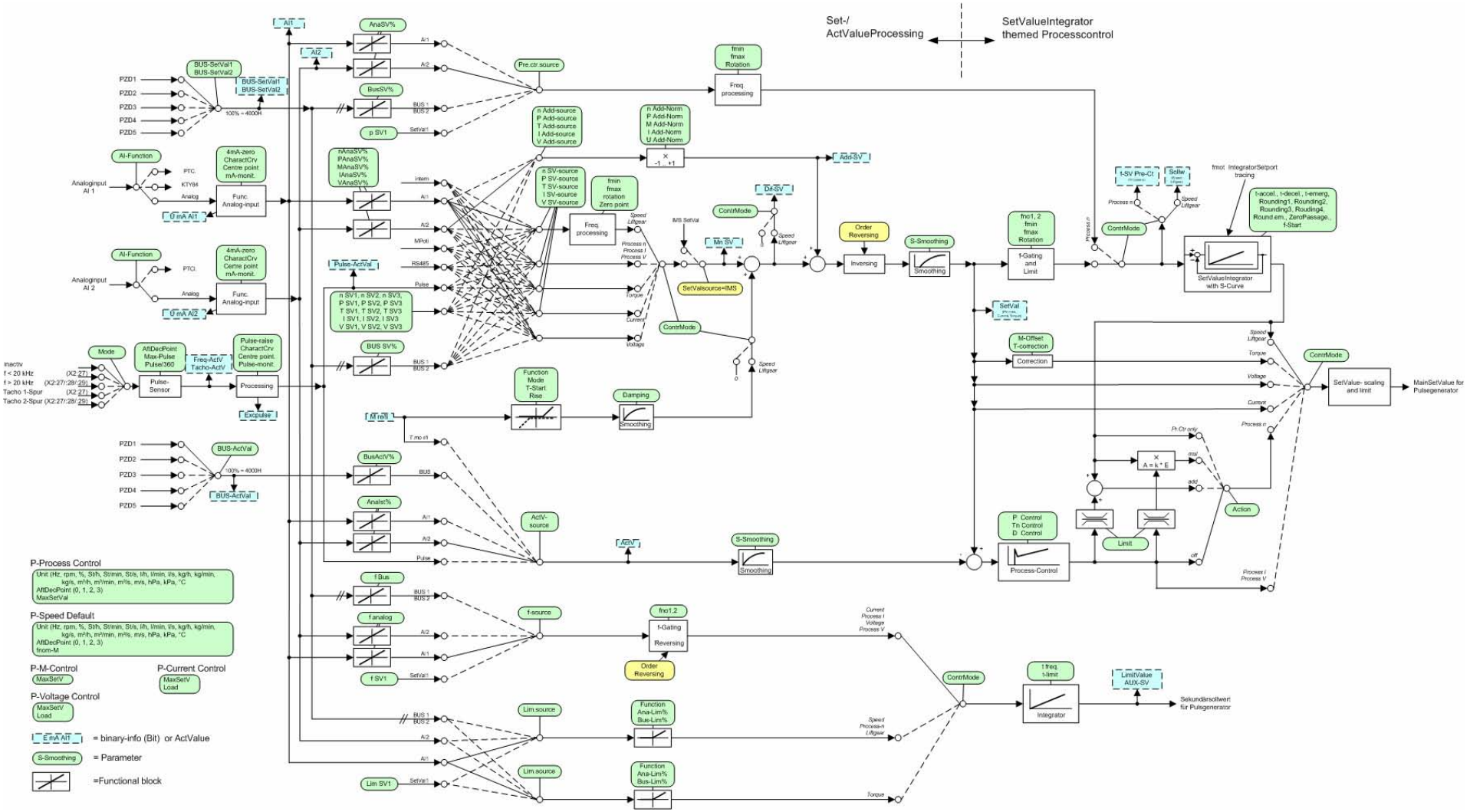
P-DRIVE DATA	Contr.Mode	= Liftgear
P-MOTRORDATEN	Motortyp	= async_SVC
P-HOIST./ROT.GEAR	Engag t br.	= 0,05 s
P-HOIST./ROT.GEAR	t-rel mec.br.	= 0,3 s
P-HOIST./ROT.GEAR	R Start.torq.	65 %
P-HOIST./ROT.GEAR	L Start.torq.	- 30 %

Explanation:
The apply time of the mechanical brake should be set to the actual value as precise as possible. The starting torques should be set in such a way that with maximum load an extreme reverse rotation is prevented. The best would be to begin with a starting torque of about 70 % and to reduce or increase the value under full load until the desired starting behavior is achieved.

If in case of very sensible applications, upon operation with small load, the starting jerk is not tolerable there will be two possibilities of remedy:

1. Installation of a pulse encoder on the motor
2. Conversion of the starting torques (parameter *R Start.torq.*, L *Start.torq.*) by parameter switches. For that, an information about the load has to be available. Depending on the load signal the, for example, *R Start.torq.* can be switched over between 25 % and 65 %.

3.3 Setpoint path



4 PROFIBUS

The interfacing of the PROFIBUS is performed by an optional PCB which is located below the blue plastic cover of the Control electronic-PCB.

This PROFIBUS interfacing of the DYNAVERT T as from software version ../AP39 can serve 3 logical connecting modes in parallel.

1) A cyclic connection to a Class 1-Master for the exchange of the process data (control word, setpoint value, status word and actual value) with the PROFIBUS service DATA_EXCHANGE.
   This connection is set-up by the Master by corresponding parameterizing and configurating telegrams. Thus, the Slave will be adjusted for cyclic connection to this Master and will reject the set-up of a cyclic connection to another Master as long as this connection is active.
   That Master which establishes this cyclic connection with the Slave becomes for this Slave a Class 1-Master.
   This kind of connection is described subsequent to this parameterizing instruction.
   This kind of connection has been already possible with older software versions.

2) An acyclic connection to the Class 1-Master for an acyclic access to an object - writing or reading - by the PROFIBUS services MSAC1-WRITE and MSAC1-READ.
   With the connection-setup of a Master for the cyclic data exchange (this Master is becoming a class 1-Master for this Slave) also the acyclic Class 1-Master connection is established.

3) An acyclic connection to further Class 2-Masters for access to an object (writing or reading) by PROFIBUS services MSAC2- WRITE and MSAC2- READ. For this data exchange at first the connection of the Class 2-Master to the PROFIBUS-service INITIATE has to be set up.
   Actually, the PROFIBUS interfacing of the inverter accepts simultaneously up to four Class 2-Master logon actions. A reasonable data exchange however can be carried out with one Class 2-Master only as simultaneous accesses to objects by several Class 2-Masters will be rejected by the inverter with a fault message.

The acyclic accesses 2.) and 3.) are explained in description 4BS0596.

4.1 Data of interfacing

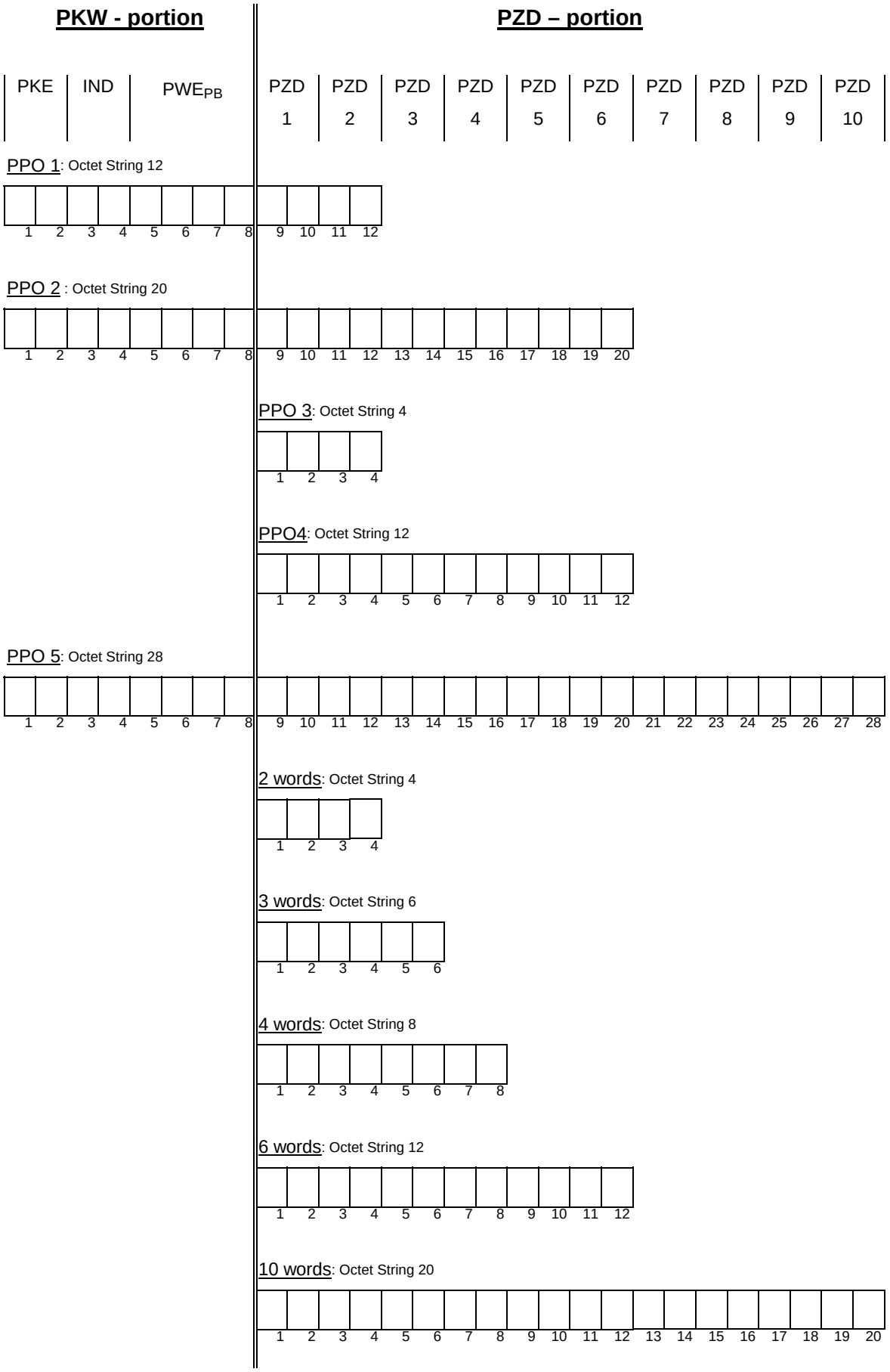
Baud rates	9.6 kBaud, 19.2 kBaud, 93.75 kBaud, 187.5 kBaud, 500 kBaud, 1.5 MBaud, 3 MBaud, 6 MBaud, 12 MBaud
Address of participant	Adjustable by parameter *BUS address*; if set to zero the rotary switches on the PCBs are defining the participants' address.
Terminator	Is provided on the PCB and can be connected. Attention! Normally, the BUS-terminators are provided also in the connector - they are to be switched only once.
Protocol	PROFIBUS-DP V0, cyclic data transfer with Class 1-Master Acyclic data transfer with Class 1 or Class 2-Master
Data types	PPO1, PPO2, PPO3, PPO4, PPO5, 2 words, 3 words, 4 words, 6 words, 10 words (but no processing of the PKW-portion)
Bus connection	9-pin D-sub female
GSD-file	LOHT0842.GSD

4.2 Replacement for T-03

If in an installation with PROFIBUS interfacing a T-03 is replaced by a T-05, the inverter can be adjusted with parameter *Variant* in such a way that it can be run in a PROFIBUS project with the GSD-file LOHT3105.GSD.

4.3 Data types

The data type for the cyclic communication can be selected with parameters *PZD-OUT* and *PZD-IN*. If you wish to apply one of the PPO-types, it can be selected only simultaneously for PZD-OUT and PZD-IN. Different data types are admitted only with the settings "2 words" to "10 words".


PKW - portion
PZD – portion
PKE
IND
PWE$_{PB}$
PZD 1
PZD 2
PZD 3
PZD 4
PZD 5
PZD 6
PZD 7
PZD 8
PZD 9
PZD 10
PPO 1: Octet String 12
1 2 3 4 5 6 7 8 9 10 11 12
PPO 2 : Octet String 20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
PPO 3: Octet String 4
1 2 3 4
PPO4: Octet String 12
1 2 3 4 5 6 7 8 9 10 11 12
PPO 5: Octet String 28
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
2 words: Octet String 4
1 2 3 4
3 words: Octet String 6
1 2 3 4 5 6
4 words: Octet String 8
1 2 3 4 5 6 7 8
6 words: Octet String 12
1 2 3 4 5 6 7 8 9 10 11 12
10 words: Octet String 20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

4.4 Actual values as PZD-IN-Data

In the annex Chapter 7.1, “Actual values for status, analog output, comparison message and PROFIBUS“, page 44 you will find a list of the actual inverter values incl. Format, which you may set as process input data.

Basically, via PROFIBUS that numerical value is transmitted which you will see on the display. Here, the comma is omitted. For example, in the indication I-motor = 139,7 A the motor current is transmitted via PROFIBUS as numerical value 1397.

4.5 Status word ZSW1

Bit	Value	Meaning as per profile	Meaning at the inverter
0	1	Ready for switching on	Electronics provided with voltage and initialized, no fault
	0	Not ready for switching on	Mains OFF
1	1	Ready for operation	No fault and no OFF1 given
	0	Not ready for operation	
2	1	Operation released	No fault, no OFF1 and ctrl.release$_{FI}$ given
	0	Operation inhibited	
3	1	Fault	Inverter indicates fault
	0	Fault free	Inverter has no fault
4	1	No OFF2	No OFF2
	0	OFF2	OFF2 is carried out
5	1	No OFF 3	No emergency stop
	0	OFF 3	Emergency stop is carried out
6	1	Switch interlock	Reengagement only by OFF1 and following no OFF1
	0	No switch interlock	
7	1	Warning	At least one warning at the inverter
	0	No warning	No warning at the inverter
8	1	Deviation setpoint value to actual value within range of tolerance	The deviation between setpoint and actual value is lower than the difference parameterized at the inverter
	0	Deviation setpoint value to actual value	The deviation between setpoint and actual value is higher than the difference parameterized at the inverter
9	1	Leadership Bus	The BUS is operating source or/and setpoint source
	0	Leadership in the field	The BUS is not operating source or/and setpoint source
10	1	Operating status	No Fault, no OFF1 ,controller release$_{FI}$ and speed ON$_{FI}$ provided
	0	No operating status	
11..15	Inverter specific		

Bit value = 0						No operating status	L	Deviation setpoint value to actual value	No warning	No switch interlock	OFF 3	OFF2	Fault-free	Operation inhibited	Not ready for operation	Not ready for switching on	
Bit value = 1						Operating status	Leadership BUS	Deviation setpoint value to actual value within tolerance range	Warning	Switch interlock	No OFF 3	No OFF2	Fault	Operation released	Ready for operation	Ready for switching on	
STW	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
Mains OFF	x	x	x	x	x	0	1	0	0	0	1	1	0	0	0	0	**X230 H**
Switch interlock	x	x	x	x	x	0	1	0	0	1	1	1	0	0	0	0	**X270 H**
Switch interlock of OFF2	x	x	x	x	x	0	1	0	0	1	1	0	0	0	0	0	**X260 H**
Switch interlock of OFF 3	x	x	x	x	x	0	1	0	0	1	0	1	0	0	0	0	**X250 H**
Switch interlock of OFF2 and OFF 3	x	x	x	x	x	0	1	0	0	1	0	0	0	0	0	0	**X240 H**
Fault (not ready for switching on)	x	x	x	x	x	0	1	0	0	0	x	x	1	0	0	0	**X238 H**
Ready for switching on	x	x	x	x	x	0	1	0	0	0	x	x	0	0	0	1	**X231 H**
Ready for operation	x	x	x	x	x	0	1	0	0	0	x	x	0	0	1	1	**X233 H**
Operation released	x	x	x	x	x	0	1	0	0	0	x	x	0	1	1	1	**X237 H**
Operating status (run-up/return)	x	x	x	x	x	1	1	0	0	0	x	x	0	1	1	1	**X637 H**
Operating status (SWE)	x	x	x	x	x	1	1	1	0	0	x	x	0	1	1	1	**X737 H**
Additional warnung signal	x	x	x	x	x	x	x	x	1	x	x	x	x	x	x	x	
Leadership given	x	x	x	x	x	x	1	x	x	x	x	x	x	x	x	x	
additional indication of OFF3	x	x	x	x	x	x	x	x	x	x	0	x	x	x	x	x	
additional indication of OFF2	x	x	x	x	x	x	x	x	x	x	x	0	x	x	x	x	

4.6 Control Word STW1

Bit	Value	Meaning as per profile	Meaning at the inverter
0	1	ON	No OFF1
	0	OFF1	Braking along ramp
1	1	Operating status	No OFF2
	0	OFF2	OFF2 activated
2	1	Operating status	No emergency stop
	0	AUS 3	Emergency stop activated
3	1	Operation released	Contr.release$_{FI}$
	0	Operation inhibited	Contr.release$_{FI}$ deactivated
4	not implemented		
5	not implemented		
6	1	Setpoint released	Speed ON$_{FI}$ activated
	0	Setpoint lock-out	Speed ON$_{FI}$ deactivated
7	1	Acknowledge (pos. flank)	Acknowledge (pos. flank)
	0	Prepare acknowledgment	
8	not implemented		
9	not implemented		
10	1	Leadership from AG	Control word and setpoint valid
	0	No leadership	Control word and setpoint frozen
11..15	Inverter specific		

5 Further inverter functions:

5.1 Current limitation

The inverter performs automatically a current limitation. The setpoint for this current limitation I-Limitation is influenced by the parameterizing and the operating status of the inverter. The parameters I contin., I short, t short in menu P-INVERTER DATA and I-breakov in P-MOTOR DATA are also decisive.

Basically, the maximum value for I-Limitation is also the maximum short-time current of the inverter (type-dependent). This value can be reduced by various functions.

Time-related model

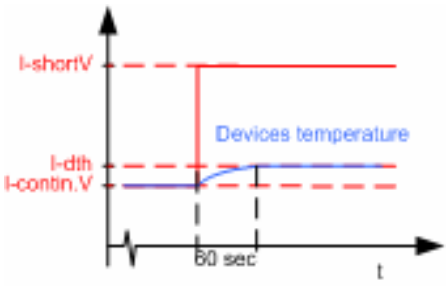
The time-related model is defined by parameter I short, I contin. and t short. A load higher than I contin. is possible for the time t short. After that, the current limit is limited to t short. After elapse of 9-fold the time of t short with a load of <= t short an overload up to I short is again admitted.

Thermal model

For the thermal model will be considered what the inverter actually is able to perform thermally. This means, as the thermal limit a somewhat higher current than I contin. is resulting, since the thermal limit is that value the inverter achieves when being preloaded with I contin., and than it will be able to run the t short for 1 min every 10 min. The t short however is released only when the current limiter is not engaged. Above all, the thermal model shall protect all power components (line reactors etc.) except those power semiconductors on the heat sink which are not fitted with a temperature detection.

Basing on the inverter data the constant thermal current is calculated as

Idth = I- I continV + 20% * (I shortV – I continV).
The time constant of the inverter results in such a form that the thermal constant limit is reached after 60 sec. of I shortV, if loaded before with I continV.

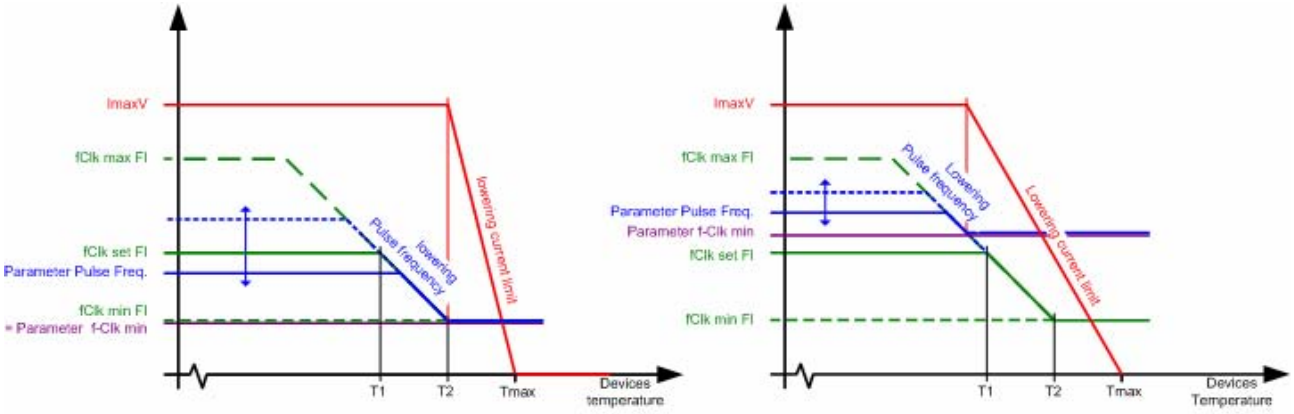


Dependence from heat sink temperature

Depending on the heat sink temperature (for protection of power semiconductors) a reduction of the pulse frequency and of the current limit shall effect. The inverters are working, depending on the type, with a maximum, a rated, and a minimum pulse frequency. Tmax is the maximum admissible heat sink temperature.

The lowering characteristic of the pulse frequency is defined by the nominal and the minimum inverter pulse frequency. Dependent from this characteristic and from the parameterized pulse fre-

quency Pulse freq. that temperature point is resulting from which the lowering of the pulse frequency will start. Dependent from the minimum admissible pulse frequency f-pulse min that temperature point is resulting from which lowering of the pulse frequency is no longer admissible. From this point on the lowering of the current limit is started.



Lowering current limit starts, when Lowering Pulse frequency from param. value of Pulse frequency until f-Clk min has been done.

Dependence from heat sink temperature symmetry

Depending on the heat sink temperature asymmetry a reduction of the current limit occurs in that form that in case of surpassing the admissible asymmetry of 8K (air-cooled) or 10K (water-cooled) the current limit of ImaxV is reduced by 50% within the next rise of 10K.
In case of surpassing the admissible asymmetry by more than 10K a shut-down on fault is following. With parallel inverters, the power section with the highest asymmetry is the decisive factor.

Saturation-dependent current limit

The saturation-dependent reduction of the current limit shall prevent the chopping of the motor in field-weakening operation. The relevant parameter is I-breakov. Set the current limit I-Limitation as per the following formula:

I-Limitation <= I-breakov. * (f-motor * V-motor actually) / (V-motor * f-actually)

5.2 Operating-hour meter

Basically, 2 operating-hour meters are available for each inverter:
- Duty-hour meter
- Operating-hour meter

As the default value the duty-hour meter is used for the operating hours of the cabinet fan, and the operating-hour meter for the operating hours of the inverter. Both values are available as actual values for the duty hrs. and the operating hrs.

By both operating-hour meters however other operating hours can also be measured, e.g. an ON-signal that is connected to a digital input. For that, go into menu P-EXTRAS/ P-opr.counter and select the respective ON-bit or Opr.-bit.

Additionally, the duty-hour meter can be set to a preset value. Enter the value to be set in hours in the parameter P-EXTRAS/ P-opr.counter /ON-hrs.

5.3 P-f-rise of torque (decanter-control)

With the inverter the output frequency can be influenced dependently from the torque. This mode of influencing is often needed with production machines like decanters: if too much material is accumulating in the decanter drum, this can be cleared out by a short-term and time-limited rise of speed. All necessary parameters are available in menu P-f-rise Torque.

Upon parameterizing proceed as follows:

- Preselect the P-f-rise by setting parameter P-f-rise/function from “off” to “add on” Depending on the type of worm gear it might be necessary to select a “sub.”.
- Select Torque cw or ccw for parameter P-f-rise/Mode:
  With speed = cw and regenerative operation of the inverter: Torque ccw
  With speed = ccw and regenerative operation of the inverter: Torque cw
  With speed = cw and motive operation of the inverter: Torque cw
  With speed = ccw and motive operation of the inverter: Torque ccw
- Establish the torque at which the decanter is “overfilled“ and should be cleared out by a speed rise. Parameterize this threshold in P-f-rise/T-start.
- Select in parameter P-f-rise/Rise the required rise in Hz/kNm proportionally to the torque. This value should be established on commissioning, starting from zero and increasing slowly.
- The parameter P-f-rise/Damping is set to 20s as a default value. The damping is necessary here anyway as the frequency rise actually is a positive feedback. It would make sense however, to vary the dampening together with the amplification upon commissioning.

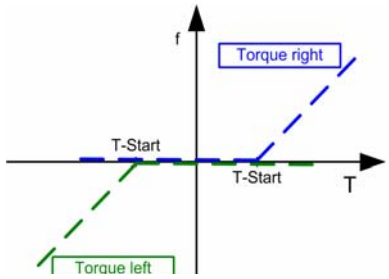


Figure 3: Characteristic of torque cw and ccw

5.4 Fault suppression

By function Fault suppression can be determined that some faults will no longer cause a shut-down and a common fault message, but are only displayed as a warning and the bit warning is set. Naturally, an entry in the event memory will be made. Here can be selected among four suppression levels. The relevant parameters can be found in the menu *P-MONITORING/ P-fault suppression*. The Parameter *Inp.* defines whether the current level of fault suppression is determined by parameter *Std.Suppr.* or *Alt.Suppr.* If the bit that has been selected in parameter *Inp.* =0/inactive, the parameter *Std.Suppr.* is effective, if bit =1/active, parameter *Alt- Suppr.* is effective.

The setting options are

Std.Suppr =	*inactive*	*low*		
Alt.Suppr =	*inactive*	*low*	*medium*	*high*

Basically, the various setting options have the following effects

Setting	Effect
inactive	As hitherto - all shut-downs on faults are active
low	Fault signals indicating a fault in the temperature monitoring function are suppressed. 1. If inverter reactors are fitted with prewarn and shut-down contact (e.g. in cabinet-mount devices), an overtemperature-fault will be suppressed, if the prewarn contact has not tripped at the same time. 2. If the evaluation of temperature sensing shows a temperature value beyond the limits of plausibility (fault in the temperature sensor – short circuit, disconnection) this fault is suppressed.
medium	Faults not expected to cause an immediate destruction of the inverter will be suppressed (e.g. all temperature faults, parameterized fault functions,…).
high	Also those faults are suppressed that are switched off only by software, which however might cause an immediate destruction of the device.

In table “list of all messages, warnings, failures, inverter failures“ in column Fault suppression there is indicated for any fault or inverter failure from which level on this fault will be suppressed and is becoming a warning signal only. Faults without an indication cannot be suppressed.

Additionally to the suppression of the respective faults the following measures are taken.

Setting	Additional measure
inactive	non
low	non
medium	1. The current limit is set to the value of I short. Any temperature or time dependent lowering of the current limit is no longer carried out. 2. A reduction of duty time of the brake transistor to protect the brake resistor is no longer carried out.
high	same as medium

In actual value *FaultSuppr.* is indicated which level of the fault suppression function is actually effective. This actual value is entered also as additional value of an entry in the event memory.

5.5 Limiting function

With the limiting function, via a second setpoint value, the physical output quantities frequency, torque or current can be limited to an adjustable value. The limitation takes effect amountwise. The setpoint value for the limitation shall be positive. The limiting function is set differently by means of the parameters in the sub-menus *P-limit for n* or *P-limit for T* for the inverter-internal control modes n or T. Here, the control modes speed, lift gear and Process-n are considered inverter-internal as n and the control modes Process-M and torque as inverter-internal M. Inverter-internal control mode means the control mode of the motor management. In control mode Current or Process-I a limiting function cannot be used.

The parameter *Function* defines the physical quantity that is to be limited. The source for the limitation is selected by *LimSource*. *AnaLim%* and *Bus-Beg%* determine the normalization at the limitation source analog or Bus. A fixed limiting value *LimSW1* (similar to the fixed setpoint value) is available. By parameter *t-Lim* the averaging time of a special integrator for the limiting function is defined. This integrator prevents an abrupt change of the limiting value, and the time the integrator needs for changing the quantity from zero up to the admissible maximum value is parameterized.

If the control mode is switched-over (e.g. by parameter switch) and another inverter-internal control mode is resulting there from, the limiting function will also change. At the moment of switch-over the integrator of the limiting function is either set to the new limiting setpoint (new physical value) when the new limiting value is higher than the actual value of this physical quantity, or to the actual value of this physical quantity when the limiting value is lower and is integrating from there up to the new limiting value. Thus, an abrupt change of the physical quantity is prevented, which might cause control problems, even a shut-down on fault.

Specifics of the limiting function:

In case of a limitation of Frequency the limitation is higher than the raise of fmin. In case of a limitation of Torque the limiting value is kept internally at minimum 1/8 of the nominal motor torque and in case of Current at minimum 1,5 x I-idle, even if the preset setpoint value for this limitation would be lower.

For the limitation of torque at SVC the special parameters *P T-lim-ctr* and *Tr T-lim-ctr* are available for torque limitation control.

By actual value *LimValue* the actually preset limiting value of the quantity-to-be-limited is displayed with the correct unit.

Application, for example: Test stand with torque control and adjustable speed limitation.

5.6 Mains buffering

During a mains failure the dynamic mains buffering keeps the voltage of the intermediate circuit on a certain level, the motor continues running slightly regenerative.

The required driving energy is taken from the rotating mass.

The motor speed is decreasing according to the ratio of rotating mass/load torque.

After restoration of the mains supply it will take some seconds until the motor has re-established the full torque and is again accelerating the system.

If the inverter is parameterized to Mains buffering and is just buffering it seems at the first glance as if the mains have not failed at all. The inverter continues running as if the mains would be available.

Mains buffering is reasonable only in case of high rotating masses.

In order to be able to use this function, it is necessary to reconnect to external control voltage (terminals 101 and 102) and to feed in with a secured external voltage.

Exception: inverters up to 30 kW with 400V or 37 kW with 500V: if on this types the SMPS is fed via “internal” (standard) and the nominal line voltage is higher than 340 V, the SMPS will be backed up during the mains failure.

Proceed as follows for parameterizing:

- set P-INV. BEHVIOUR / buffering to ON or to t-restart.

With ON the inverter is buffering for an unlimited time or until the control voltage is no longer available; in case of t-restart the inverter is buffering for the set t-restart-time (P- INV. BEHVIOUR).

5.7 Meaning of actual value Comm. fault

The actual value Comm. fault indicates whether a message and which one is displayed at the moment. These can be 2-line messages of the inverter, warnings or faults. The value is composed of two components. First, of the MESS-number that represents the message, warning or fault and, secondly, of a system-value that indicates the system (relevant in case of inverters with several systems) for which this message, warning or failure is indicated.

In case of inverters with no system or one system only the system value is always 0.

With inverters of 2 or more systems, the system value in case of messages concerning the whole inverter is also 0. For messages that can be allocated doubtlessly to a defined inverter system is resulting

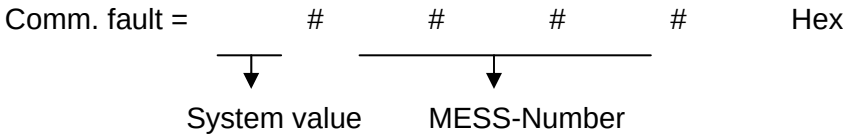
System value = consecutive system no. x 4096

Here, the consecutive system can take on the values 1 to 4.

Thus, the value of the Comm. fault is

Comm. fault = system value + MESS-number

Thus, in the hexa-decimal system the following context is resulting for the actual value of the Comm. fault.



The nibble of highest value of the 4-digit hexadecimal value provides a system value and the other three nibbles are giving the MESS-Number

Example:

Inverter: 2T2A-83692-911 with 2 systems and the fault “short circuit Phase U (MESS-NumBer = 3105 = 0C21 Hex), in system 2 shows

Comm. fault = 2 C 2 1 Hex or 11297 (= 2*4096 + 3105)

The individual faults are listed in the survey of message texts 4BS0576. Here, the MESS-Numbers of the individual messages are stated.

Upon all messages with the following message texts in the 1st line the inverter has cut-out in fault condition and set common fault:	**Upon all messages with the following message texts in the 1st line the inverter has activated a warning.**
!! Inverter fault““ !! Fault !! !! Fault System 1!! !! Fault System 2!! !! Fault System 3!! !! Fault System 4!!	!! Prewarning !! !!Suppressed fault!! !! FltSuppr. Sys. 1!! !! FltSuppr. Sys. 2!! !! FltSuppr. Sys. 3!! !! FltSuppr. Sys. 4!!

All other messages are only notes and information. No fault or warning message will be generated.

5.8 Meaning of the actual value MESS_Namur

The actual value MESS_Namur is set up acc. to the Namur-guidelines or the Profi-Drive protocol.

Similar to Comm. fault it indicates the actual value fault message. Contrary to the Comm. fault, which however is doubtlessly reading out a fault with the respective number, the actual value MESS_Namur reads out only a fault message group. For each fault message group a very specific bit is set. For selection see the following table.

Anyway, only one bit is set. If several fault message groups are active at the same time, the fault message group with the highest priority is read out.

Bit	**Bit Significance (Bit = true)**	**Significance (Bit = false)**
0	Fault Control Electronic/Software	No Fault Control Electronic/Software
1	Fault Supply Net	No Fault Supply Net
2	DC Link Overvoltage	No DC Link Overvoltage
3	Fault Power Section	No Fault Power Section
4	Overtemperature Converter	No Overtemperature Converter
5	Earth Fault	No Earth Fault
6	Overload Motor	No Overload Motor
7	Error Communication Bus	No Error Communication Bus
8	External Safety Trip	No External Safety Trip
9	Fault Speed Sensor	No Fault Speed Sensor
10	Fault Internal Communication	No Fault Internal Communication
11	Fault Infeed System (DC Link)	No Fault Infeed System (DC Link)
12	reserved	reserved
13	reserved	reserved
14	reserved	reserved
15	Miscellaneous Faults	No Miscellaneous Faults

6 Special commissioning tools and information

6.1 Check of the internal processor DSP

Particularly upon commissioning it could be very helpful to know which release is applying at the internal pulse-pattern processor DSP. With it, the parameterizing can be rechecked.

You will find the release of the DSP under ACTUAL VALUES/I-INVERTER DATA/RlsMode. The individual values have the following meaning:

RlsMode	Remark
none	Inverter is locked out; pulse inhibition; no release.
n-contrl	Motor guidance carried out as speed control.
T-contrl	Motor guidance carried out as torque control.
I-contrl	Control of output current; current control.
V-contrl	output voltage is controlled; voltage control
Mot.trappg	In case of lift gear; the load is taken over by the brake.
Mot.excite	The motor is excited.
Mot.holdg	In case of lift gear; the load is electrically held until handed over to the brake.
Tacho offs.	The Tacho offset will be established.
I -> Zero	In case of lift gear; controlled disconnection of the current prior to the lock-out.
R1-Meterg	The R1-measuring is carried out.
Synchron.	Synchronization is carried out.
DC-Brakes	DC-braking is carried out.
T impress	Process continuation with the last established load information.
Test s.halt	Testing of safe halt is carried out.

6.2 Check of terminal inputs:

In menu I-ACTUAL VALUES /I-INVERTER DATA/I-Terminal inputs you can have a close look at the status (0 or 1) of the individual digital inputs. In this menu the following parameters are available:

- X2:9-16:
  Display of the terminal inputs X2:9 to X2:16 of the Control electronics-PCB. Each indicated place represents a terminal, i.e. 8 places are indicated. If value 0 is indicated the respective terminal is not engaged. If a terminal is engaged, the indication at the respective places is: for terminal X2:9 = 9, for terminal X2:10 = A, for terminal X2:11 = 1 etc..

  Example: If terminals X2:9, X2:10, X2:14 and X2:16 are engaged, the value is indicated as = 9A000406.

- X2:8, 27-29:
  Indication of terminal inputs X2:8 and X2:27 to X2:29 of the Control electronics-PCB. Each indicated place represents a terminal, i.e. 4 places are indicated. If value 0 is indicated, the respective terminal is not engaged. If a terminal is engaged, the indication at the respective places is: for X2:8 = 8, for X2:27 = 7, for X2:28 = 8 and for terminal X2:29 = 9.

  Example: If terminals X2:8, X2:28 and X2:29 are engaged, the indicated value is = 8089.

- X2:19-26:
  Indication of terminal inputs X2:19 to X2:26 of the Control electronics-PCB. Each indicated place represents a terminal, i.e. 8 places are indicated. If value 0 is indicated, the respective terminal is not engaged. If a terminal is engaged, the indication at the respective places is: for X2:19 = 9, for X2:20 = A, for X2:21 = 1 etc.

  Example: If terminals X2:19, X2:20, X2:24 and X2:26 are engaged, the indicated value is = 9A000406.

- 1-X81:.. (Cabinet device, System 1)
  2-X81:..(Cabinet device, System 2, if available)
  3-X81:.. (Cabinet device, System 3, if available)
  4-X81:.. (Cabinet device, System 4, if available)
  Indication of terminal inputs X81:1 to X81:5, X81:13 and X81:14 of the Signals-PCB of a cabinet-mount device with one inverter. Each indicated place represents a terminal, i.e. 8 places are indicated, with place 6 always being 0. If value 0 is indicated, the respective terminal is not engaged. If a terminal is engaged, the indication at the respective places is: for X81:1 = 1, for X81:2 = 2 etc., for X81:13 = 3 and for X81:14 = 4.

  Example: If terminals X18:1, X81:2, X81:5 and X81:13 are engaged, the indicated value is = 12005030.

6.3 Inverter replacement – Parameter-transfer with IMS

If during service the Control-electronics PCB or the whole device has to be replaced, we recommend to memorize the parameterization of the inverter by means of the IMS-software.

If a new inverter is installed it is to be considered however that not all parameters are transferred by IMS, as they are depending on some individual inverter data (e.g. Inv.No. or Outp-filter) or they will be releasing an action in the inverter (e.g. Test halt/PTC). They should not be overwritten by the transfer of a Parameter set from one device to the other one.

That means however that in the service case (e.g. replacement of the Control-electronics PCB, replacement of the inverter) these parameters will not be transferred during transfer of the parameter set and that these are to be checked and probably to be manually adjusted.

The following parameters are affected:

Parameter	Menu	only for menu=Loher (=Prim.Par)
A	P-DRIVE DATA	
Para-source	P-INTERFACE	
Address	P-RS485	
Auto-Tuning	P-MOTORDATA	
Sensor adjustm.	P-MOTOR DATA	

FMAXMAX	P-INVERTER DATA	yes
I-MAXU	P-INVERTER DATA	yes
t-preload min	P-INVERTER DATA	yes
Outp-filter	P-INVERTER DATA	yes
Safe halt	P-INVERTER DATA	yes
Inv.no.	P-INVERTER DATA	yes
Inp.	P-MONITORING: P-fault suppression	
Alt.Suppr.	P-MONITORING: P-fault suppression	
Parameter set	P-EXTRAS	
Menu	P-EXTRAS	
Date	P-EXTRAS	
Time	P-EXTRAS	
Test halt/PTC	P-EXTRAS	
Unit	P-EXTRAS	yes
>FactPar store	P-EXTRAS	yes
ON-hrs.	P-EXTRAS: P-opr.counter	
Opr.-hrs.	P-EXTRAS:P- P-opr.counter	yes
Opr.	P-OPERATION	
Adr. DSP1	P-SERVICE MODULE	
Adr. DSP2	P-SERVICE MODULE	

All parameters, which have **Menu=Loher (=Prim.Par) = yes**, are visible in the original parameter status only. At normal parameterizing with IMS these parameters are masked out.

7 Annexes

7.1 Actual values for status, analog output, comparison message and PROFIBUS

Explanations of titles on the table:
x in Smoothing The respective signal is smoothened with the indicated ms-value.
x in Status The actual value can be parameterized in a line of the inverter display.
x in AA The actual value can be parameterized as an analog output signal
x in COMP The actual value can be parameterized as an actual-signal for a comparison message
x in PZD-IN The actual value can be parameterized and transferred via PROFIBUS in the PZD-IN area.
Short designation Short designation of format of the actual value (normally used with Profibus, e.g. I2 = Integer with 2*8 Byte)
Format Format of the actual value, e.g. Integer 16: from -32768 to +32767 or unsigned 16: from 0 to 65535
Display-unit The unit displaying the actual value on the inverter display.
Physical quantity: physical quantity of the actual value.
Quantities/conversion index: Values are possibly needed for transfer with Profibus for presentation in another number format.
Standard value, analog outputs and comparison messages: further information

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designa-tion	Format	Display-unit	Physical quan-tity	Quantities in-dex	Conversion-Index	Standard value Analog outputs and compari-son messages
n-Motor	Motor speed Accuracy: ±1% with SVC with correctly set slip compensa-tion ±0,1% at FOC of the nominal motor speed	320	x	x	x	x	I2	Integer 16	rpm	speed	11	67	n-Motor [*3]
Speed	Motor speed, converted not to min^{-1}, but in the physical quantity parameterized under “unit”. Accuracy like n-Motor	320	x	x	x	x	I2	Integer 16	)[1]	)[1]	)[1]	-3 … 0)[1]	f-max [*1]

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designation	Format	Display-unit	Physical quantity	Quantities index	Conversion-Index	Standard value Analog outputs and comparison messages
I-Motor	Motor current Accuracy: ±2% of the inverter short-time current	1280	x	x	x	x	I2	Integer 16	A	current	22	-2 … 0)[2]	I-Motor [*3]
V-motor	Motor voltage Accuracy: ±2% of nominal inverter voltage	320	x	x	x	x	I2	Integer 16	V	el. voltage	21	0	V-Motor [*3]
f-motor	Motor frequency Accuracy: 0.2‰ of nominal motor frequency	320	x	x	x	x	I2	Integer 16	Hz	frequency	28	-1	f-Motor [*3]
T-motor	Calculated motor torque + = motor, - = regenerative Accuracy: ±5% of nominal value (= torque at permanent inverter output) from >5Hz in the constant-field range with correct motor-data setting.	1280	x	x	x	x	I2	Integer 16	Nm/ kNm)[2]	torque	16	-2 … 1)[2]	P-Motor*9550/ n-Motor [*3]
T-mot r/l	Calculated motor torque + = clockwise (CW) - = anti-clockwise (CCW) Accuracy: like T-motor	1280	x	x	x	x	I2	Integer 16	Nm/ kNm)[2]	torque	16	-2 … 1)[2]	P-Motor*9550/ n-Motor [*3]

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designation	Format	Display-unit	Physical quantity	Quantities index	Conversion-Index	Standard value Analog outputs and comparison messages
P-motor	Calculated motor output Accuracy: ±3% of permanent inverter output from >5Hz in the constant-field range with correct motor-data setting.	1280	x	x	x	x	I2	Integer 16	KW	effective power	9	-2 … 0)[2]	P-Motor [*3]
Earth current	Differential current to earth (only with option differential current measuring)	40	x	x	x	x	I2	Integer 16	A	el. current	22	-2	1 A
ON-hrs.	Operation time meter 1; default parameterizing: fan on		x	-	x	-	I4	Integer 32	h	s	4	74	0 h
Opr.-hrs.	Operation time meter 2; default parameterizing: operation		x	-	x	-	I4	Integer 32	h	s	4	74	0 h
T-KTY84 AI1	Temperature of the sensor connected to analog input 1 Accuracy: 10°C plus sensor inaccuracy		x	x	x	x	I2	Integer 16	°C	°C	17	100	150 °C
Mn-SV	Main setpoint (preset by setpoint source, without intervention of Dif-SV or Add-SV)		x	x	x	x	I2	Integer 16	)[1]	)[1]	)[1]	-3 … 0)[1]	f-max [*1]
Dif-SV	Main setpoint + torque-dependent setpoint raise (menu P-f-TORQUE RISE) Default parameter: Mn-SV =Dif-SV		x	x	x	x	I2	Integer 16	)[1]	)[1]	)[1]	-3 … 0)[1]	f-max [*1]

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designation	Format	Display-unit	Physical quantity	Quantities index	Conversion-Index	Standard value Analog outputs and comparison messages
Add-SV	2., additive setpoint, parameterized at n,P,T or I Add-Source		x	x	x	x	I2	Integer 16	)[1]	)[1]	)[1]	-3 … 0)[1]	f-max [*1]
SetVal	Sum of Mn-SV and Add-SV		X	x	x	x	I2	Integer 16	)[1]	)[1]	)[1]	-3 … 0)[1]	fmax [*1]
Aux-SV	Frequency setpoint in case of current control		x	-	-	x	I2	Integer 16	)[1]	)[1]	)[1]	-3 … 0)[1]	-
f-SV PreCt	Precontrol setpoint (menu P-PROCESS CONTROL/ P-n-precontrol/)		x			x	I2	Integer 16	Hz	frequency	28	-1	-
LimValue	Actual limiting value of the preset and parameterized limitation		x	-	-	x	I2	Interger 16	)[1]	)[1]	)[1]	-2 … 0	-
ActV.	Actual value of the process control		X	x	x	x	I2	Integer 16	)[1]	)[1]	)[1]	-3 … 0)[1]	fmax [*1]
Freq.act.	Actual value of frequency in Hz (kHz) of pulse input		x	x	x	x	I2	Integer 16	Hz /kHz)[1]	frequency	28	-3 … 0)[1]	Max.plse. [*1]
Tacho act	Actual value of speed in RPM of pulse input		x	x	x	x	I2	Integer 16	rpm	speed	11	-3 … 0)[1]	Max.plse. [*1]
Pulse act	Actual value of frequency in % of pulse input		x	x	x	x	I2	Integer 16	%	relation	24	-1	100 %
BUS address	Bus address of inverter at the bus-system		-	-	-	-	I2	Integer 16	-	without	0	0	
PB-Status	Status Profibus		x	-	x	-	O2	Unsigned 16	-	without	0	0	(none)
BUS STW 1	Control word 1 Profibus		x	-	-	-	O2	Unsigned 16	-	without	0	0	
BUS STW 2	Control word 2 Profibus		x	-	-	-	O2	Unsigned 16	-	without	0	0	

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designation	Format	Display-unit	Physical quantity	Quantities index	Conversion-Index	Standard value Analog outputs and comparison messages
BUS-SetVal1	Setpoint 1 from BUS		x	x	x	-	N2	standardized value 16 bit	-	without	0	0	4000H
BUS-SetVal2	Setpoint 2 from BUS		x	x	x	-	N2	standardized value 16 bit	-	without	0	0	4000H
BUS-ActVal	Actual value of process from BUS		x	x	x	-	N2	standardized value 16 bit	-	without	0	0	4000H
BUS ZSW 1	Status word 1 to the BUS		x	-	-	x	O2	Unsigned 16	-	without	0	0	
BUS ZSW2	Status word 2 to the BUS		x	-	-	x	O2	Unsigned 16	-	without	0	0	
%-Hz-Act.val	actual value of frequency (100% corresp. to 4000H)		x	x	x	x	N2	standardized value 16 bit	-	without	0	0	4000H
%-CtrlActVal	Actual value of process (100% corresp. to 4000H)		x	x	x	x	N2	standardized value 16 bit	-	without	0	0	4000H
Comm. fault	Common fault shows fault/warning/message of highest priority		-	-	-	x	O2	Unsigned 16	-	without	0	0	-
SlipCorr	Corrective value of motor slip at FOC		x	-	-	-	I2	Integer 16	-	without	0	3	-
I-idle act	Corrected lo-load motor current at FOC		x	-	-	-	I2	Integer 16	A	el. current	22	-2 … 0)^2	-
DC-volts	Voltage intermed. circuit Accuracy: ±2%		x	x	x	x	I2	Integer 16	V	el. voltage	21	0	V mains nom. * √2
I-limit	Actual current limit		x	-	x	x	I2	Integer 16	A	el. current	22	-2 … 0)^2	I-short
PulseFreq	Actual pulse frequency		X	-	-	-	I2	Integer 16	kHz	frequency	28	-1	-
Para-source	Actual parameter source		-	-	-	-	O2	Unsigned 16	-	without	0	0	

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designation	Format	Display-unit	Physical quantity	Quantities index	Conversion-Index	Standard value Analog outputs and comparison messages
Op.-source	Actual operating source (parameter switches, if any, are considered).		x	-	x	x	O2	Unsigned 16	-	without	0	0	(local)
Set source	Actual setpoint source (parameter switches, if any, are considered).		x	-	x	x	O2	Unsigned 16	-	without	0	0	(AI 1)
Status	Actual inverter status		x	-	x	x	O2	Unsigned 16	-	without	0	0	(Mains ON)
>Commnd	Next command necessary to start the inverter.		x	-	x	x	O2	Unsigned 16	-	without	0	0	(Mains ON)
RlsMode	Release mode for inverter-internal processor DSP for generation of pulse pattern.		x	-	x	x	O2	Unsigned 16	-	without	0	0	-
Par-Set	Actual parameter set		x	-	x	x	I2	Integer 16	-	without	0	0	1
T-inside	Internal temperature		x	x	x	x	I2	Integer 16	°C	° C	17	100	50 °C
T-heatsnk max	Heatsink tempature (in case of several measuring points = maximum).		x	x	x	x	I2	Integer 16	°C	° C	17	100	70 °C
T-diff. max.	Temperature difference of in-parallel connected IGBT (in case of several measuring points = maximum)		x	x	x	x	I2	Integer 16	°C	°C	17	100	5 K
T-rectif. max	Rectifier temperature (in case of several measuring points = maximum).		x	x	x	x	I2	Integer 16	°C	°C	17	100	100 °C
T-cabin. max	Cabinet temperature (in case of several cabinets = maximum).		x	x	x	x	I2	Integer 16	°C	°C	17	100	70 °C

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designation	Format	Display-unit	Physical quantity	Quantities index	Conversion-Index	Standard value Analog outputs and comparison messages
AI1	Analog input 1 (at control electronics).		x	X	x	x	I2	Integer 16	%	relation	24	-1	100 %
AI2	Analog input 2 (at control electronics).		x	X	x	x	I2	Integer 16	%	relation	24	-1	100 %
AI Sys1	Analog input at Signals-PCB System 1		x	x	x	x	I2	Integer 16	%	relation	24	-1	100 %
AI Sys2	Analog input an Pl. Signal System 2		x	x	x	x	I2	Integer 16	%	relation	24	-1	100 %
AI Sys3	Analog input an Pl. Signal System 3		x	x	x	x	I2	Integer 16	%	relation	24	-1	100 %
AI Sys4	Analog input an Pl. Signal System 4		x	x	x	x	I2	Integer 16	%	relation	24	-1	100 %
X2:9-16	Status of digital inputs (see chapter Commissioning tools)		x	-	-	-	O4	Unsigned 32	-	without	0	0	-
X2:8, :27-29	Status of digital inputs (see chapter Commissioning tools)		x	-	-	-	O2	Unsigned 16	-	without	0	0	-
X2:19-26	Status of digital inputs (see chapter Commissioning tools)		x	-	-	-	O4	Unsigned 32	-	without	0	0	-
X81:..	Status of digital inputs (see chapter Commissioning tools)		x	-	-	-	O4	Unsigned 32	-	without	0	0	-
1-X81:..	Status of digital inputs (see chapter Commissioning tools)		x	-	-	-	O4	Unsigned 32	-	without	0	0	-

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designation	Format	Display-unit	Physical quantity	Quantities index	Conversion-Index	Standard value Analog outputs and comparison messages
2-X81:..	Status of digital inputs (see chapter Commissioning tools)		x	-	-	-	O4	Unsigned 32	-	without	0	0	-
3-X81:..	Status of digital inputs (see chapter Commissioning tools)		x	-	-	-	O4	Unsigned 32	-	without	0	0	-
4-X81:..	Status of digital inputs (see chapter Commissioning tools)		x	-	-	-	O4	Unsigned 32	-	without	0	0	-
Date	Date of the real time clock		x	-	-	-				without			-
Time	Time of the real time clock		x	-	-	-				without			-
T1	Actual value of text T1		x	-	-	-	O2	Unsigned 16	-	without	0	0	-
T2	Actual value of text T2		x	-	-	-	O2	Unsigned 16	-	without	0	0	-
T3	Actual value of text T3		x	-	-	-	O2	Unsigned 16	-	without	0	0	-
T4	Actual value of text T4		x	-	-	-	O2	Unsigned 16	-	without	0	0	-
User act.1	Internal act. value 1 for service purposes		x	x	X	x	I2	Integer 16	-	without	0	0	16384
User act.2	Internal act. value 2 for service purposes		x	x	X	x	I2	Integer 16	-	without	0	0	16384
User act.3	Internal act. value 3 for service purposes		x	x	X	x	I2	Integer 16	-	without	0	0	16384
User act.4	Internal act. value 4 for service purposes		x	x	X	x	I2	Integer 16	-	without	0	0	16384

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designa-tion	Format	Display-unit	Physical quan-tity	Quantities in-dex	Conversion-Index	Standard value Analog outputs and compari-son messages
Comm. fault	Principle set at S1:2 for common fault relay (no-load or load current)		-	-	-	-	O2	Unsigned 16	-	without	0	0	
FaultSuppr.	Actual value of function Fault suppression		x	-	x	x	O2	Unsigned 16	-	without	0	0	
Type	Type designation of inverter		-	-	-	-			-	without	0	0	
No.of systems	No. of inverter systems		-	-	-	-	O2	Unsigned 16	-	without	0	0	
Inv.no.	Serial no. of inverter		-	-	-	-	I4	Integer 32	-	without	0	0	
Version	Software version		-	-	-	-			-	without	0	0	

)[1:] The values are depending on inverter parameterizing
)[2:] The values are depending on inverter type (see the following table)
)[3:] Value will be rounded to the next norm scale
Following end scale values are used:
1, 2, 4, 5, 8, 10, 15, 20, 25, 40, 50, 80, 100, 150, 200, 250, 400, 500, 800, 1000, 1500, 2000, 2500, 4000, 5000, 8000, 10000, 25000, 20000, 25000, 40000, 50000, 80000, 100000, 250000

7.2 Inverter-type dependent data normalization

If the conversion index is -1, the actual value will have one decimal place, and so on.

Inverter type	T-motor T-mot r/l Display unit	I-motor I-limit Conversion index	P-motor Conversion index	T-motor T-mot r/l Conversion index BUS
T05-2,2/400	Nm	-2	-2	-1
T05-3/400	Nm	-2	-2	-1
T05-4/400	Nm	-1	-2	-1
T05-5,5/400	Nm	-1	-2	-1
T05-7,5/400	Nm	-1	-2	-1
T05-11/400	Nm	-1	-1	-1
T05-15/400	Nm	-1	-1	-1
T05-22/400	Nm	-1	-1	-1
T05-30/400	Nm	-1	-1	-1
T05-37/400	Nm	-1	-1	-1
T05-45/400	Nm	-1	-1	-1
T05-55/400	Nm	-1	-1	-1
T05-75/400	Nm	-1	-1	-1
T05-90/400	Nm	-1	-1	0
T05-110/400	Nm	0	-1	0
T05-160/400	Nm	0	0	0
T05-200/400	Nm	0	0	0
T05-250/400	Nm	0	0	0
T05-315/400	Nm	0	0	0
T05-400/400	Nm	0	0	0
T05-500/400	Nm	0	0	0
T05-560/400	Nm	0	0	0
T05-630/400	Nm	0	0	0
T05-710/400	Nm	0	0	0
T05-2,2/500	Nm	-2	-2	-1
T05-3/500	Nm	-2	-2	-1
T05-4/500	Nm	-2	-2	-1
T05-5,5/500	Nm	-1	-2	-1
T05-7,5/500	Nm	-1	-2	-1
T05-11/500	Nm	-1	-2	-1
T05-15/500	Nm	-1	-1	-1
T05-22/500	Nm	-1	-1	-1
T05-30/500	Nm	-1	-1	-1
T05-37/500	Nm	-1	-1	-1
T05-45/500	Nm	-1	-1	-1
T05-55/500	Nm	-1	-1	-1
T05-75/500	Nm	-1	-1	-1
T05-90/500	Nm	-1	-1	0
T05-110/500	Nm	-1	-1	0
T05-132/500	Nm	0	-1	0
T05-200/500	Nm	0	0	0
T05-250/500	Nm	0	0	0
T05-315/500	Nm	0	0	0
T05-400/500	Nm	0	0	0
T05-500/500	Nm	0	0	0
T05-560/500	Nm	0	0	0
T05-630/500	Nm	0	0	0
T05-710/500	Nm	0	0	0
T05-30/690	Nm	-1	-1	-1

Inverter type	T-motor T-mot r/l Display unit	I-motor I-limit Conversion index	P-motor Conversion index	T-motor T-mot r/l Conversion index BUS
T05-37/690	Nm	-1	-1	-1
T05-45/690	Nm	-1	-1	-1
T05-55/690	Nm	-1	-1	-1
T05-75/690	Nm	-1	-1	-1
T05-90/690	Nm	-1	-1	0
T05-110/690	Nm	-1	-1	0
T05-132/690	Nm	-1	-1	0
T05-160/690	Nm	-1	0	0
T05-200/690	Nm	0	0	0
T05-250/690	Nm	0	0	0
T05-315/690	Nm	0	0	0
T05-400/690	Nm	0	0	0
T05-500/690	Nm	0	0	0
T05-560/690	Nm	0	0	0
T05-630/690	Nm	0	0	0
T05-710/690	Nm	0	0	0
T05-800/690	Nm	0	0	0
T05-909/690	kNm	0	0	1
T05-910/690	kNm	0	0	1
T05-911/690	kNm	0	0	1
T05-912/690	kNm	0	0	1
T05-913/690	kNm	0	0	1
T05-915/690	kNm	0	0	1
T05-916/690	kNm	0	0	1
T05-918/690	kNm	0	0	1
T05-919/690	kNm	0	0	1
T05-922/690	kNm	0	0	1
T05-925/690	kNm	0	0	1
VSD-90-1000/02	Nm	-1	-1	-1
VSD-630-1000/01	Nm	0	0	0

7.3 Free-selectable units for the setpoint value

In operating modes Speed default and/or Process control the unit for the setpoint value can be free selected. Following units are available.

Display unit	Physical quantity	Quantities index	Basic unit	Conversion index **with decimal place =**			
				0	1	2	3
Hz	Frequency	28	Hz	0	-1	-2	-3

rpm	Speed	11	1/sec	67	115	116	71
%	Relation	24	%	0	-1	-2	-3
St/h	Piece-flow	183	St/s	72	117	118	73
St/min	Piece-flow	183	St/s	67	115	116	71
St/s	Piece-flow	183	St/s	0	-1	-2	-3
l/h	Liter-flow rate	184	l/s	72	117	118	73
l/min	Liter-flow rate	184	l/s	67	115	116	71
l/s	Liter-flow rate	184	l/s	0	-1	-2	-3
hl/h	Hectoliter-flow rate	186	hl/s	72	117	118	73
hl/min	Hectoliter-flow rate	186	hl/s	67	115	116	71
hl/s	Hectoliter-flow rate	186	hl/s	0	-1	-2	-3
kg/h	Mass-flow rate	15	kg/s	72	117	118	73
kg/min	Mass-flow rate	15	kg/s	67	115	116	71
kg/s	Mass-flow rate	15	kg/s	0	-1	-2	-3
m³/h	Volume-flow rate	14	m³/s	72	117	118	73
m³/min	Volume-flow rate	14	m³/s	67	115	116	71
m³/s	Volume-flow rate	14	m³/s	0	-1	-2	-3
m/s	Speed	13	m/s	0	-1	-2	-3
hPa	Pressure	6	Pa	2	1	0	-1
kPa	Pressure	6	Pa	3	2	1	0
bar	Pressure	6	Pa	5	4	3	2
°C	Temperature	17	K	100	119	120	121

7.4 Normalization of a limiting function – Indication of Act.value LimValue

If a limiting function is active the Act.value LimValue can, dependent from the control mode and the limiting function set, take on the following units and normalizations.

Display unit	Physical quantity	Quantities index	Basic unit	Conversion index
Hz	Frequency	28	Hz	1
A	El. current	22	A	type-dependent curr. normalization
Nm/kNm	Torque	16	Nm	type-dependent torque normalization

7.5 Indication format, conversion index and quantity index

Indication format

The indication format defines the presentation of a value in the display

Number	Format	Presentation	Number	Format	Presentation	Number	Format	Presentation
0	-		15	k70	± #######	30	uk50	#####
1	k20	± ##	16	k80	± ########	31	uk51	#####.#
2	k30	± ###	17	h20	##	32	uk41	####.#
3	k40	± ####	18	h40	####	33	uk32	###.##
4	k12	± #.##	19	h80	########	34	uk23	##.###
5	k21	± ##.#	20	d20	##.##.##	35	uk60	######
6	k31	± ###.#	21	t20	##:##:##	36	uk70	#######
7	k22	± ##.##	22	uk12	#.##	37	uk80	########
8	k13	± #.###	23	uk21	##.#	38	text	…….
9	k50	± #####	24	uk31	###.#	39	Selection PNR	…….
10	k51	± #####.#	25	uk22	##.##	40	Selection Bits	…….
11	k41	± ####.#	26	uk13	#.###	41	ktext	…….
12	k32	± ###.#	27	uk20	##	42		
13	k23	± ##.###	28	uk30	###	43		
14	k60	± ######	29	uk40	####	44		

Quantity index

In the following table you will find the quantity indices determined for Profibus that can be used for inverter DYNAVERT T-05.

HEX	Decimal	Unit	Phys. quantity	HEX	Decimal	Unit	Phys. quantity
0 0	0	none	-	1 0	16	Nm	Torque
0 1	1	m	Length	1 1	17	K	Temperature
0 2	2	m^2	Area	1 2	18	K	Temp.-Difference
0 3	3	m^3	Volume	1 3	19	J	Entropy
0 4	4	s	Time	1 4	20	J/kg	Enthalpy
0 5	5	N	Power	1 5	21	V	El. voltage
0 6	6	Pa	Pressure	1 6	22	A	Electr. current
0 7	7	kg	Mass	1 7	23	Ohm	El. resistance
0 8	8	J	Energy, work	1 8	24	%	Relation
0 9	9	W	Effective power	1 9	25	%	rel. humidity
0 A	10	VA	Apparent power	1 A	26	g/kg	abs. humidity
0 B	11	s^{-1}	Speed (rot.)	1 B	27	%	Percent
0 C	12	rad	Angle	1 C	28	Hz	Frequency
0 D	13	m/s	Speed	1 D	29	Nm/A	rel. torque
0 E	14	m^3/s	Volume flow rate	1 E	30	h	Output (US)
0 F	15	kg/s	Mass flow rate	1 F	31	m/s^2	Acceleration

HEX	Decimal	Unit	Phys. quantity
2 0	32	m/s^3	Jerk
2 1	33	kHz	Frequency
6 4	100	in	Length (US)
6 D	109	lbs	Mass (US)
B 4	180	ft/min	Speed (US)
B 5	181	ft/s^2	Acceleration (US)
B 6	182	ft/s^3	Jerk (US)
B 7	183	St/s	Piece-flow
B 8	184	l/s	Liter-flow
B 9	185	Hz/Nm	Frequ./Torque
B A	186	hl/s	Hectoliter-flow

Conversion index

In the following table you will find the conversion indices, determined for Profibus, that can be used for inverter DYNAVERT T-05.

# # . .	Conv. Index	Factor	Offset	# # . .	Conv. Index	Factor	Offset
F A	-6	0,000001	0	4 2	66	0,001/60	0
F B	-5	0,00001	0	4 3	67	1/60	0
F C	-4	0,0001	0	4 4	68	1000*60	0
F D	-3	0,001	0	4 5	69		0
F E	-2	0,01	0	4 6	70	60	0
F F	-1	0,1	0	4 7	71	0,001/3600	0
0 0	0	1	0	4 8	72	1/3600	0
0 1	1	10	0	4 9	73	1000/3600	0
0 2	2	100	0	4 A	74	3600	0
0 3	3	1000	0	4 B	75	3600*1000	0
0 4	4	10000	0	4 C	76	3600*1000000	0
0 5	5	100000	0	4 D	77	86400	0
0 6	6	1000000	0	4 E	78	PI/10800	0
				4 F	79	PI/648000	0
				5 0	80	PI/180	0
				5 1	81	PI/200	0

# # . .	Conv. Index	Factor	Offset
6 4	100	1	-273,15
6 5	101	5/9	-459,67
7 3	115	0,1/60	0
7 4	116	0,01/60	0
7 5	117	0,1/3600	0
7 6	118	0,01/3600	0
7 7	119	0,1	-273,15
7 8	120	0,01	-273,15
7 9	121	0,001	-273,15

Quantity index and conversion index are defining in which way values that are to be transmitted via bus (for example) shall be interpreted.
The quantity index indicates the physical quantity with its basic unit. The conversion index defines a multiplication factor and an offset by means of which the transmitted numerical value has to be evaluated in order to get its correct physical quantity.

General: physical value = (numerical value * factor + offset) [Unit]

e.g. Dynavert T05-11/400 Motor current = 17,8A

Numerical value via bus = 178
Quantity index = 22 -> el. current in A
Conversion index = -1 -> Factor = 0,1 and offset = 0

Consequently (178 * 0,1 + 0) A = 17,8A

7.6 Parameter selection for parameter switches

Following parameters can be switched over to an alternative value by means of a parameter switch.

Parameter	Parameter	Parameter	Parameter
Control mode	n SV1	TAnaSV%	Mode
Fmin	n SV2	T SV1	I contin.
Rotation	n SV3	T SV2	I short
Operating source	P sp.ctr.	T SV3	t short
Reset-source	Tr sp.ctr.	P T-ctr.SVC	Clk.freq.
RctRS485	P SetpSource	Tr T-ctr.SVC	Brake
Rct. BUS	P ctrl.	I SetpSource	Synchron.
n SetpSource	Tn ctrl.	IAnaSV%	t-Restart
t-accel.	D ctrl.	I SV1	Parameter set
t-decel.	AV source	I SV2	T1
Rounding1	PAnaSV%	I SV3	T2
Rounding2	P SV1	f-source	T3
Rounding3	P SV2	f SV1	T4
Rounding4	P SV3	R Start.torq.	P T-ctr.FOC
nAnaSV%	T SetpSource	L Start.torq.	Tr T-ctr.FOC

7.7 Accuracy of analog signals

Here below, the analog inputs and outputs of the Control electronics-PCB or Peripheral-PCB are described:

Analog inputs

Two analog inputs, each with a 10Bit-A/D-converter are available. The inaccuracy of an analog input of 0…±10V or 0…±20mA signal up to the AD-converted value is max. 0,5% from the input range. This accuracy refers also to the use of the analog input as a, for example, setpoint or actual value.

The inaccuracy of the analog input on the Signals-PCB (only cabinet-mount devices) is max. 1,5%.

Analog outputs

Two analog outputs are available. The output signal is unipolar 0-10V or 0-20mA. Via parameterizing a signal can be selected for reading-out from a pool of signals. The adaptation to any indication-scaling with an initial value unequal zero and terminal value is possible. An mA raise (typ. 4mA) is free parameterizable. For the output of plus-minus signals there is the possibility of a centre-point raise.

The analog outputs are adapting themselves automatically to the connected instrument, i.e. depending on the burden a 20mA output signal is generated at R-burden < 300 Ohm and an 10V output signal at R-burden > 1000 Ohm. In this resistance range the inaccuracy of an analog output is at max. 1%. In case of burdens between 300 and 1000 Ohm the accuracy of the signals is deteriorating.

To get the accuracy of an analog output signal the accuracy of the selected signal has to be added to the accuracy of the analog output.

7.8 Annex Parameter Schedule

I-DRIVE DATA

n-motor	Motor speed in rotations per minute. For a correct display the exact input of the motor parameter (rated speed, rated frequency) is prerequisite. The load dependent slip is regarded.
Speed	This value is the motor speed converted into the setpoint normalization with speed control.
I-motor	Effective value of the motor current. Accuracy: ±2% of the inverter short-time current.
V-motor	Effective value of the motor input voltage in V.
f-motor	Frequency of the inverter output voltage resp. motor input voltage in Hz.
T-motor	The torque delivered at the motor shaft is calculated out of the electrical power, considering the speed and the motor losses. With positive sign the motor is driven, with a negative one it is braked. Accuracy: ±5% of the nominal value (= torque at FI-continuous output) as from >5Hz in the constant field range with correct setting of the motor data.
T-mot r/l	The torque delivered at the motor shaft is calculated on the basis of the electrical power in consideration of the speed and the motor losses. With positive sign der motor turns CW, with a negative one CCW. Accuracy: ±5% of the nominal value (= torque in case of FI-continuous output) starting from >5Hz in the constant field range with correctly set motor data.
P-motor	The mechanical power, supplied at the motor shaft is computed out of the electrical power, considering the motor losses. Accuracy: ±3% of FI-continuous output as from >5Hz in the constant field range with correct setting of the motor data.
EarthCurr.	The value of the loss current to earth, which is measured by means of a summation current transformer over the mains phases. The metering device is available, dependent from the design of the device. For 500V-devices it is available as a standard feature and for 690V-devices dependent from the design of the device. The earth current can be monitored by a parameterizable threshold (see "I-earth max.") and time (see "Delay I-earth"). If the earth current rises sharply, the drive will be disconnected.
ON-hrs.	Display of the ON-hours meter. The ON-hours meter counts always when the message parameterized in "P-EXTRAS:P-Opr.counter:ON-bit" is active. The counter can be readjusted to any starting value by the user.

Opr.-hrs.	Display of the operating-hours meter. The operating hours meter counts always when the message parameterized in "P-EXTRAS:P-Opr.counter:Opr.-Bit" is active. The counter cannot be readjusted by the user.
T-KTY84 AI1	If the O/I function of the analog input 1 is set to KTY84 (temperature evaluation of a corresponding temperature sensor), the temperature is indicated by this actual value.

I-setp./act.val.

Mn-SV	Actual set-value: the actual set-value is given by the choosen set value source.
Dif-SV	Preset main setpoint value plus torque-dependent value of frequency
Add-SV	You can select the additive setpoint value separately for each mode of control (Add-source) and preset an amplification factor (Add-Norm) in the range of -100% to +100%. The so-calculated additive setpoint value is added to the main setpoint value with the correct sign.
SetVal	Preset main setpoint value.
Aux-SV	Indication of the preset auxiliary setpoint (e.g. frequency in case of current control).
f-SV PreCt	If with "control mode = process-n" a precontrol of the frequency is activated, the actual value of frequency precontrol is indicated by this actual value.
LimValue	This actual value indicates the actual value of the limiting function.
ActV.	The actual value of process control is indicated in the normalization of the controlled value of process.
Freq.act.	Actual value of the pulse input as a frequency. Active only with mode f < 20kHz resp f > 20 kHz
Tacho act	Actual value of the pulse input as a speed. Active only with mode Tacho 1 track resp Tacho 2 track.
Pulse act	Actual value of the pulse input after preparation, independent from the selected mode in [%]

I-Profibus

BUS address	The actual value BUS address indicates under which participant's address the FI is responsive at PROFIBUS. Indicates either the parameter BUS address or the switch-position on the auxiliary board if the parameter is set to zero.
PB-Status	Indication of the BUS-status. It is, e.g., indicated whether there is no auxiliary board or if the connection to the BUS-master is online or offline.
BUS STW 1	Display of BUS-control word 1 in Hex, which FI receives via PROFIBUS. Bit0 to Bit10 are implemented according to PROFIBUS-Profile or not used. Bit11 to Bit15 can be used free parameterizable in FI. If BUS is selected either as operation source and/or set value source and the BUS-connection is not o.k., the value is blinking.
BUS STW 2	Display of BUS-control word 2 in Hex, which FI receives via PROFIBUS. Bit0 to Bit10 are implemented according to PROFIBUS-Profile or not used. Bit11 to Bit15 can be used free parameterizable in FI. If BUS is selected either as operation source and/or set value source and the BUS-connection is not o.k., the value is blinking.
BUS-SetVal1	Display of BUS-set value 1 in Hex, which FI receives via PROFIBUS. This value for example, when selected as set value source is accepted by FI as set value in the PROFIBUS-Profil-normalization 0x4000 == 100%. If BUS is selected either as operating source and/or set value source and the BUS-connection is not o.k., the value is blinking.
BUS-SetVal2	Display of BUS-set value 2 in Hex, which FI receives via PROFIBUS. This value for example, when selected as set value source is accepted by FI as set value in the PROFIBUS-Profil-normalization 0x4000 == 100%. If BUS is selected either as operating source and/or set value source and the BUS-connection is not o.k., the value is blinking.
BUS-ActVal	Display of BUS-actual value in Hex, which FI receives via PROFIBUS. This value for example, when selected as actual value source is accepted by FI as set value in the PROFIBUS-Profil-normalization 0x4000 == 100%. If BUS is selected either as operating source and/or set value source and the BUS-connection is not o.k., the value is blinking.
BUS ZSW 1	Display of the 1st status word in Hex. Bit 0 to Bit 10 are parameterizable as per PROFIBUS-Profile - Bit11 to Bit15 are free parameterizable.
BUS ZSW 2	Display of the 2nd status word in Hex. All Bits are free parameterizable.
%-Hz-Act.val	16384 (0x4000) correspond to a motor frequency within der normalization range of the set value of BUS frequency.
%-CtrlActVal	16384 (0x4000) correspond to an actual value, acc to the act.-value source to the size of the normalized process controlled value.
Comm. fault	Maximum value actual fault message.
MELD_NAMUR	Drive status/fault word depending on VIK-NAMUR-definition.

P-Motor data/Motor type=async_FOC)

SlipCorr	Indication for the correction of the slip with field-oriented control. In case of a too high deviation from value = 1 the parameterised nominal motor speed should be corrected.
I-idle act	Indication of the corrected no-load current of the motor. Parameter for motor no-load current "I-idle" should be set to this value.

I-MEMORY

01:

Single event

System	System, on which the event has occured.
Date	Date of occurrence of the event.
Time	Actual time of the event.
SetV	Set value prior to the event.
|SetV	Set value when the even occured.
n-motor	Motor speed before the event occured.
|n-motor	Motor speed on occurrence of the the event.
I-motor	Effective value of motor current prior to the event.
|I-motor	Effective value of motor current when event occurs.
V-motor	Effective value of frequency of the inverter output voltage prior to the event.
|V-motor	Effective value of frequency of the inverter output voltage when event occurs.
f-motor	Frequency of inverter output voltage prior to the event.
|f-motor	Frequency of inverter output voltage when event occurs.
T-motor	Torque output at motor shaft prior to the event.
|T-motor	Torque output at motor shaft when event occurs.
EarthCurr	Earth current prior to the event.
|EarthCurr	Earth current after the event.
DC-volts	Voltage of intermediate circuit prior to the event.
|DC-volts	Voltage of intermediate circuit when event occurs.
I-limit	Status "current limit reached" prior to the event.
|I-limit	Status "current limit reached" when event occurs.
PulseFreq	Pulse frequency of the output-side IGBT inverter prior to the event.
|PulseFreq	Pulse frequency of the output-side IGBT inverter on occurence of the event.
LimValue	Limiting value of the limiting function before the event occures.
|LimValue	Limiting value of the limiting function on occurrence of the event.
ActV.	Actual value of process-actual-value preparation before the event occures.
|ActV.	Actual value of process-actual-value preparation on occurrence of the event.
Op.-source	Set operating source prior to the event.
|Op.-source	Set operating source on occurence of the event.
SetSource	Set operating source prior to the event.
|SetSource	Set operating source on occurence of the event.
Stat.	Inverter status prior to the event.
|Stat.	Inverter status on occurence of the event.
RlsMode	This actual value indicates the internal operating mode of the motor management before the event occures.
|RlsMode	This actual value indicates the internal operating mode of the motor management on occurrence of the event.
FaultSuppr	This actual value shows the actual setting of function "fault suppression" prior to the event.
|FaultSuppr	This actual value shows the actual setting of function "fault suppression" upon occurrence of the event.

UserActV1	User actual value 1 prior to the event.
|UserActV1	User actual value 1 on occurence of the event.
UserActV2	User actual value 2 prior to the event.
|UserActV2	User actual value 2 on occurence of the event.
UserActV3	User actual value 3 prior to the event.
|UserActV3	User actual value 3 on occurence of the event.
UserActV4	User actual value 4 prior to the event.
|UserActV4	User actual value 4 on occurence of the event.
Control DSP	"DSP control code" prior to the event.
|Control DSP	"DSP control code" when event occurs.
Status DSP	"DSP status" prior to the event.
|Status DSP	"DSP status" when event occurs.
T-inside	Internal temperature when event occurs.
T-heatsnk max	Temperature at the converter heat sink when the event occurs (in systems: temperature maximum of all systems).
T-rectif. max	Maximum rectifier temperature of all systems on occurence of the event.
T-diff. max	Maximum out of the maximum difference temperatures per each heat sink of power semiconductors, on occurence of the event.
T-cabinet	Maximum cabinet temperature on occurence of the event.

02: to 64:

dito	dito

I-INVERTER DATA

Clk.freq.	Actual pulse frequency of the output-side IGBT converter. If the heat sink temperature of the power semiconductor exceeds a calculated threshold, the pulse frequency will be lowered linear, dependent from the maximum heat sink termperature.
DC-volts	Rectified mains voltage in the intermediate circuit (about peak value of mains voltage).
I-limit	Maximum admissible output current, dependent from - the heat sink temperatures: maximum ("T-heatsnk max") and - the max. difference ("T-diff. max"), - the continuous current, the short-time current and the time limit (see P-Inverter data: "I contin.", "I short", "t short"), - the overload capacity of the power sector.
Para-source	Shows the actually set parameterising competence. Setting is made via parameter "P-INTERFACES:Para-source".
Op.-source	Indicates the actually set operating competence. Setting is made by parameter "P-INTERFACE:Op.-source".
Set source	Here, the actual setpoint source is indicated. It can be set by parameters P-SPEED DEFAULT:n SetpSource; P-PROCESS CONTROL:P SetpSource, resp. P-M-CONTROL:T SetpSource. The setpoint source defines which signal is used for the setpoint value (e.g. Internal, AE1, BUS 1 etc.).
Status	Display of the actual operating status of the inverter.
>Commnd	Display of the next ON-command the inverter is expecting. This value is particularly helpful on commissioning.
RlsMode	The actual value "RlsMode" (mode of release) indicates the internal operating mode of the motor management.
Par-Set	Display of the actually selected parameter set.

I-Inverter temp.

T-inside	Inside temperature of the inverter.
T-heatsnk max	Maximum of the individual heat sink temperatures at the inverter, performed from temperatures "T-cooler 1 to 5" (if available). For cabinet mounted devices again the maximum of the different systems is established.
T-diff. max	Maximum difference of the individual heat sink temperatures at converter "T-cooler 1 to 5" (if available). For systems: the maximum of the different systems is established again.
T-rectif. max	Maximum of the individual rectifier temperatures "T-rectifier" of all systems.
T-cabin. max	0

I-Temp. System1

T-cooler 1	Temperature of inverter heat sink. Systems: Temperature 1 of the respective system.
T-cooler 2	Temperature 2 of the heat sink at the inverter of the respective system.
T-cooler 3	Temperature 3 of the heat sink at the inverter of the respective system.
T-cooler 4	Temperature 4 of the heat sink at the inverter of the respective system.
T-rectifier	Heat sink temperature at the rectifier of system.
T-cabinet	Cabinet temperature of system.

'stems I-Temp. System2 to [no. of systems]

dito	dito

I-Analog input

AI 1	Value of the analog input 1 in % after the preparation. The normalization of the analog value is adjustable in menu "P-ANALOG INPUTS:P-Analog input 1". Depending on the normalization, the value corresponds with a voltage of 0..10V and/or a current value of 0..20mA.
AI 2	Value of the analog input 2 in % after the preparation. The normalization of the analog value is adjustable in menu "P-ANALOG INPUTS:P-Analog input 2". Depending on the normalization, the value corresponds with a voltage of 0..10V and/or a current value of 0..20mA.
AI Sys1	Value of the analog input 1 in % after the preparation. The normalization of the analog value is adjustable in menu "P-ANALOG INPUTS:P-Analog inp. Syst.1". Depending on the normalization, the value corresponds with a voltage of 0..10V and/or a current value of 0..20mA.
AI Sys2	Value of the analog input 2 in % after the preparation. The normalization of the analog value is adjustable in menu "P-ANALOG INPUTS:P-Analog inp. Syst.2". Depending on the normalization, the value corresponds with a voltage of 0..10V and/or a current value of 0..20mA.
AI Sys3	Value of the analog input 3 in % after the preparation. The normalization of the analog value is adjustable in menu "P-ANALOG INPUTS:P-Analog inp. Syst.3". Depending on the normalization, the value corresponds with a voltage of 0..10V and/or a current value of 0..20mA.
AI Sys4	Value of the analog input 4 in % after the preparation. The normalization of the analog value is adjustable in menu "P-ANALOG INPUTS:P-Analog inp. Syst.4". Depending on the normalization, the value corresponds with a voltage of 0..10V and/or a current value of 0..20mA.

I-Terminal inputs

X2:8-16	By this actual value is indicated, which ones of the terminal inputs X2:9 to X2:16 of the control electronics-PCB are engaged. Here is indicated "9" for terminal input X2:9, "A" for X2:10, "1" for X2:11 and so on. If any input is not engaged, "0" is shown on its place. If, for example, inputs X2:9, :10, :11, :12, and :15 are engaged, this is displayed by =9A120050.
X2:8 :27-29	By this actual value is indicated, which ones of the terminal inputs X2:8 and X2:27 to X2:29 of the control electronics-PCB are engaged. Here is indicated "8" for terminal input X2:8, "7" for X2:27, "8" for X2:8 and so on. If any input is not engaged, "0" is shown on its place. If, for example, inputs X2:8, X2:27 and X2:29 are engaged, this is displayed by =8709.
1-X81:..	By this actual value is indicated which ones of the terminal inputs X81:1 to :5, :13 and :14 of the signals-PCB of the FI-system are engaged. Here is indicated "1" for the terminal input X81:1, "2" for X2:2 and so on, and again "3" for X81:13 and "4" for X81:14. If any input is not engaged, "0" is displayed in its place. On the 6th position "0" is always indicated, as the distance between X81:5 and X81:13. If,for example, the inputs X81:1, :3, :4, :5, :13 and :14 are engaged, this is displayed by =10345034.
2-X81:..	By this actual value is indicated which ones of the terminal inputs X81:1 to :5, :13 and :14 of the signals-PCB of the FI-system are engaged. Here is indicated "1" for the terminal input X81:1, "2" for X2:2 and so on, and again "3" for X81:13 and "4" for X81:14. If any input is not engaged, "0" is displayed in its place. On the 6th position "0" is always indicated, as the distance between X81:5 and X81:13. If,for example, the inputs X81:1, :3, :4, :5, :13 and :14 are engaged, this is displayed by =10345034.
3-X81:..	By this actual value is indicated which ones of the terminal inputs X81:1 to :5, :13 and :14 of the signals-PCB of the FI-system are engaged. Here is indicated "1" for the terminal input X81:1, "2" for X2:2 and so on, and again "3" for X81:13 and "4" for X81:14. If any input is not engaged, "0" is displayed in its place. On the 6th position "0" is always indicated, as the distance between X81:5 and X81:13. If,for example, the inputs X81:1, :3, :4, :5, :13 and :14 are engaged, this is displayed by =10345034.
4-X81:..	By this actual value is indicated which ones of the terminal inputs X81:1 to :5, :13 and :14 of the signals-PCB of the FI-system are engaged. Here is indicated "1" for the terminal input X81:1, "2" for X2:2 and so on, and again "3" for X81:13 and "4" for X81:14. If any input is not engaged, "0" is displayed in its place. On the 6th position "0" is always indicated, as the distance between X81:5 and X81:13. If,for example, the inputs X81:1, :3, :4, :5, :13 and :14 are engaged, this is displayed by =10345034.

I-Spec. val. inv.

Date	Actual date.
Time	Actual time.
T1	Text actual values can be parameterized. The texts are available from a selection of standardized text moduls and from the free programmable individual texts (parameterizing only via IMS). Additionally, an alternative value, that is another text can be assigned operatively to the selected text actual value via parameter switch.
T2	Text actual values can be parameterized. The texts are available from a selection of standardized text moduls and from the free programmable individual texts (parameterizing only via IMS). Additionally, an alternative value, that is another text can be assigned operatively to the selected text actual value via parameter switch.
T3	Text actual values can be parameterized. The texts are available from a selection of standardized text moduls and from the free programmable individual texts (parameterizing only via IMS). Additionally, an alternative value, that is another text can be assigned operatively to the selected text actual value via parameter switch.
T4	Text actual values can be parameterized. The texts are available from a selection of standardized text moduls and from the free programmable individual texts (parameterizing only via IMS). Additionally, an alternative value, that is another text can be assigned operatively to the selected text actual value via parameter switch.
User act.1	Actual user value 1: programmable actual value indication for service purposes (selection in menu "P-SERVICE MODULE:Channel 1"!)
User act.2	Actual user value 2: programmable actual value indication for service purposes (selection in menu "P-SERVICE MODULE:Channel 2"!)
User act.3	Actual user value 3: programmable actual value indication for service purposes (selection in menu "P-SERVICE MODULE:Channel 3"!)
User act.4	Actual user value 4: programmable actual value indication for service purposes (selection in menu "P-SERVICE MODULE:Channel 4"!)

I-Device data

Comm. fault	Closed-circuit or full load principle for the fault alarm relay (corr. to switch position of dip switch "S1.2" on the control - PCB!).
FaultSuppr.	This actual value shows the actual setting of function "fault suppression".
Type	Type of inverter is automatically identified by the inverter electronics, depending on the connected power section.
No.of systems	Number of subsystems by which the inverter is composed. Value 0 means, that it is a built-in device, 1 describes a cabinet-mounted device consisting of one system, etc. The control electronics devices the number of systems automatically from the connected power section unit.
Inv.no.	Inverter number, given by the manufacturer (upon final test/ex-factory delivery).
Version	Software version: Status of revision or modification of the internal inverter software.

P-Drive data

A	Application: customized basic parameterizations for frequently used applications (e.g. asynchronous drive and HTL encoder).
ContrMode	Selection of the desired operation control mode. Selection is possible between speed default, process control, torque control and current control. Speed default: The FI follows to a speed proportional set value. Process control: With the internal PID-controller one process value can be controlled (e.g. pressure, flow). Feedback of the actual value of process is required. Moreover, you may determine whether speed, torque or output current shall provide the regulating quantity for the process control. Examples: Setting to process-m for torque regulation with a metering shaft. Setting to process-I for the regulation of the exciting current of a generator if the generator output voltage is given as the actual value. Torque control: As set value of the device the torque is preset. The internally calculated motor torque is used as the actual value for the torque control. The sign of the actual value defines the working direction of the torque. Current control: As set value of the device the current is preset. The motor current measured by the FI is used as the actual value for the current contr Except with Menu=Expert, only the required menu for the selected mode of
fmin	Internal raising of a frequency set value with speed default and "rotating field = CW / CCW". With "rotary field = both", "fmin" acts as Skip frequency band from -fmin to +fmin. With other types of controlling, "fmin" partially has a raising effect.
fmax	The output frequency of the inverter can on no account exceed the here indicated frequency limit "fmax".

	#NV Deckelung der Ausgangsfrequenz auf den parametrierten Wert. ACHTUN! Die Ausgangsfrequenz kann aber durch (Begrenzungs-)Regler über diesen Wert hinaus auf maximal 105% des parametrierten Werts.
Rotation	The admissible rotating field direction of the inverter output frequency takes the here indicated direction. CW : only clockwise rotating field (independent from the set value polarity). CCW : only counterclockwise rotating field (independent from the set value pol.). Both : CW or CCW rotating field, depending on the set value polarity
fno1	Skip frequency band 1 is active only at "ContrMode=Speed". A set value default within the Skip frequency band is clamped FU-internally to the relevant limit of the range.
fno2	Skip frequency band 2 is active only at "ContrMode=Speed". A set value default within the Skip frequency band is clamped FU-internally to the relevant limit of the range.
f-start	To avoid a "too slow rotation" of the drive in case of a very low set speed value (especially with analog rated value setting) use this feature to set a minimum frequency value which is accepted as set value during continuous operation. Hereby, acceleration out of standstill is not influenced.
SetVSmoothg.	The set value is inverter-internal smoothed with the here-indicated smoothing time constant.

P-Interface

Op.-source	By this parameter is defined from where the FI will accept the operating (commands ON/OFF commands etc.). Setting options: internal, AE1, AE1, SetVal1, SetVal2, SetVal3, Mpoti, RS232, RS485, BUS 1, BUS 2. Settings RS232 and RS485 cannot be used as yet.
Reset source	This parameter determines from where the FI will accept a fault acknowledgement.
Para-source	By means of this parameter the parameterising source is set. Speciality T03: At setting value "switch" the parameterising source is defined by the position of switches S1.3 and S1.4. Otherwise, the parameterising source corresponds to the set value.
IMS-timeout	Timeout-time for monitoring of IMS-connection when the IMS is registering temporarily as operating and/or setpoint source at the inverter.

P-RS485

Address	User address of the inverter at the RS485-interface.
RctRS485	By this parameter the reaction of the inverter in case of a failure of the connection at the RS485 interface is determined. The reaction however is performed only if the RS485 interface is operating source and/or setpoint source and/or actual value source.
RS485-TmOut	L05: Only valid where the "RS485-Prot=DCP". If no valid data is transmitted to the DCP interface during the time-out period set in this parameter, the lift cabin will be braked to a stop using the EMERGENCY-STOP.

P-Profibus

BUS address	The transport address of the converter can be specified with PROFIBUS. This parameter is relevant only if the optional PROFIBUS switch-off card is being used. Upon setting of "BUS address = 0" the transport address is determined by the switch-position on the auxiliary card.
Variant	It is selected whether the GSD-file LOHT0842.GSD with the actual PROFIBUS-power rating of T-05 or LOHT3105.GSD with the PROFIBUS-power rating of T-03 are used for planning. Depending on the selected PROFIBUS-power rating a varying number of, e.g., process data, Baud rates is possible and another ID-No. of the FI is fed back to the PROFIBUS.
PZD-OUT	Determination of the number of cyclic process output data from Master to FI, depending from parameter "Variant".

PZD-IN	Determination of the number of cyclic process input data from FI to Master, depending from parameter "Variant".
Revers.	Selection of the bit that triggers the function "reversing" at "Op.-source=BUS".
Reaction	Determination of the FI reaction if the PROFIBUS communication fails or if Bit10 (guidance from master, AD) in the control word STW1 of the Master to FI is not set. The reaction is implied only if the "Timeout time" has elapsed and BUS is selected either as "Op.-source"and/or at "Set source" and/or at "AV-source" and by that is relevant for the guidance of the system.
Time-out t	Determination of the "Timeout time" if the PROFIBUS communication fails or if Bit10 (guide from master/AD) in the control word STW1 of the Master to FI is not set. After elapse of the "Timeout time" the parameterized "Reaction" is implied if BUS is selected either at "Op.-source"and/or at "Set source" and/or at "AV-source" and by that is relevant for the guidance of the system.

P-ZSW1 free Bit

Bit11	Selection of binary information, fed back to Master by the free Bit 11 of the status word ZSW1 via PROFIBUS. Selection is made out of a pool of binary information available in the FI.
Bit12 bis Bit 15	dito

P-ZSW2 free Bit

Bit0	Selection of binary information, fed back to Master by the free Bit 0 of the status word ZSW2 via PROFIBUS. Selection is made out of a pool of binary information available in the FI.
Bit1 bis Bit 15	dito

P-PZD OUT-data

STW 1	Determination at which position of the process output data (Master to FI) the control word STW1 is transmitted. Prerequisit for the transmission is that the selected number of process output data "PZD-OUT" are in the respective position.
BUS-SetVal1	Determination at which position of the process output data (Master to FI) the BUS-set value 1 is transmitted. Prerequisit for the transmission is that the selected number of process output data "PZD-OUT" are in the respective position.
STW 2	Determination at which position of the process output data (Master to FI) the control word STW2 is transmitted. Prerequisit for the transmission is that the selected number of process output data "PZD-OUT" are in the respective position.
BUS-SetVal2	Determination at which position of the process output data (Master to FI) the BUS-set value 2 is transmitted. Prerequisit for the transmission is that the selected number of process output data "PZD-OUT" are in the respective position.
BUS-ActVal	Determination at which position of the process output data (Master to FI) the BUS-actual value is transmitted. Prerequisit for the transmission is that the selected number of process output data "PZD-OUT" are in the respective position.

P-PZD IN-data

PZD 1	Determination which FI-act. value is transmitted at position PZD1 of the process input data (FU to Master) übertragen wird.
PZD 2 - PZD 10	dito

P-SPEED DEFAULT

n SetpSource	By this parameter selection is made which setpoint source is applicable for control mode = speed.
t-accel.	In case of an increase of the set value of frequency the output frequency of the inverter does not rise faster than determined by the acceleration time. The acceleration time indicates the time period for the set value integrator to change the output frequency from 0 Hz to the actual maximum frequency. The rounding of the transition from constant frequency to acceleration and back again is defined by parameters "Rounding 1" and "Rounding 2".
t-decel.	With the decrease of the frequency set value the output frequency of the inverter does not fall faster than determined by the deceleration time. The deceleration time sets the time period during which the set value integrator changes the output frequency from the actual maximum frequency to 0 Hz. The rounding of the transition from constant frequency to deceleration and back again is defined by parameters "Rounding 3" and "Rounding 4".
t-emerg	After activation of "emergency stop" the inverter tries to decelerate the drive to zero with the here set speed. The emergency stop time indicates the time period for the set value integrator to change the output frequency from the actual maximum frequency to 0 Hz in case of an emergency stop. The rounding of the transition from the constant frequency to the emergency stop deceleration is defined by parameters "Round. em." .
Rounding 1	Rounding of the acceleration curve upon start of acceleration. Enter the frequency (in percentage of fmax) at which the rounding is completed and the parameterized acceleration ramp (fmax/t-accel.) is reached. Example: fmax=50,0Hz; upon entering of 10% the set value integrator works in rounding from begin of acceleration until the frequency has changed by 5,0Hz.

Rounding 2

Rounding of the acceleration curve upon reaching the set value.
Enter the frequency (in percentage of fmax) before the set value is reached, at which the rounding shall start.
Example: fmax=50.0Hz; upon entering of 10% the rounding starts at a distance of 5,0Hz before reaching the actual set value.

Rounding 3

Rounding of the braking curve upon start of deceleration.
Enter the frequency (in percentage of fmax) at which the rounding is completed and the parameterized braking ramp (fmax/t-decel.) is reached.
Example: fmax=50,0Hz; upon entering of 10% the set value integrator works in rounding from begin of deceleration until the frequency has changed by 5,0Hz.

Rounding 4

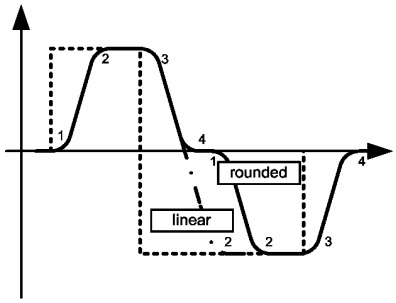
Rounding of the braking curve upon reaching the set value.
Enter the frequency (in percentage of fmax) at which the rounding shall start prior to reaching the set value.
Example: fmax=50.0Hz; upon entering of 10% the rounding starts at a distance of 5,0Hz before reaching the actual set value.

Round. em.

Rounding of the emergency braking curve at the begin of deceleration.
Enter the frequency (in percentage of fmax), at which the rounding shall be completed and the parameterised emergency stop ramp (fmax/t-emerg) is reached.
Example: fmax=50,0Hz; upon input of 10% the set value integrator operates from the begin of the deceleration until the frequency changes in rounding by 5,0Hz.

ZeroPassage

It is selected how the set value integrator carrieds out the reversal of the rotating direction.
With "ZeroPassage=rounded" the rounding "Rounding 4" and after that, upon start into the opposite direction, "Rounding 1" are considered upon deceleration to zero.
With "ZeroPassage=linear" the travel through zero is carried out without rounding.



Unit

For representation of the set value at "ContrMode=Speed" a unit can be selected (e.g. Hz, rpm, St/min etc.).

AftDecPoint

For representation of the set value at "ContrMode=Speed" the number of displayed digits behind the decimal point can be determined.

fnom-M

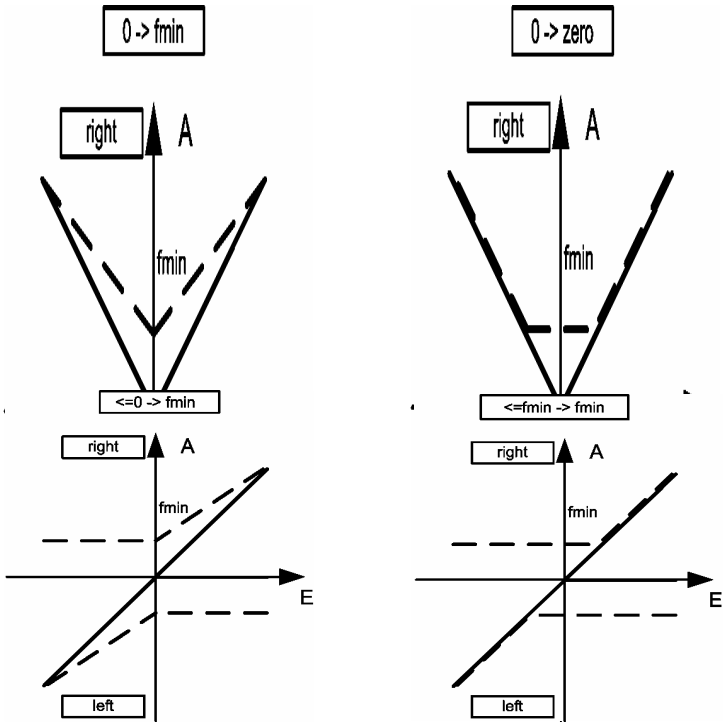
Assignment of rated motor frequency (see P-MOTOR DATA) resp. of synchronous motor speed to set value normalization (unit and digits behind decimal point).
E.g. setting to 100,0 St/min: to indicate that the rated motor frequency (synchronous speed) corresponds to a quantity of 100 St/min.

nAnaSV%

If an analog input is selected as the set value source, the normalization of the analog input is determined by this parameter.
100% (10V/20mA) correspond to the here set value.

Zero pt

"0 -> fmin": [-10V,0V]->[Scale,fmin] ; [0V,10V]->[fmin,Scale];
"0 -> Null": [-10V,0V]->[Scale,0Hz]; [0V,10V]->[0Hz,Scale];
"<=0 -> fmin": [-10V,0V]->[0Hz,0Hz]; [0V,10V]->[fmin,Scale];
"<=fmin -> fmin": [-10V,0V]->[0Hz,0Hz]; [0V,10V]->[0Hz,Scale].
This parameter is only effective for analog set value indication.



Bus SV%

If BUS is selected as the set value source the normalization of the BUS set value is determined by this parameter.
100% (0x4000) correspond to the value set here.

n SV1

Fixed set value 1 with "ContrMode=Speed". The value is entered into the set value normalization (unit, digits behind decimal point).

n SV2

Fixed set value 2 with "ContrMode=Speed". The value is entered into the set value normalization (unit, digits behind decimal point).

n SV3

Fixed set value 3 with "ContrMode=Speed". The value is entered into the set value normalization (unit, digits behind decimal point).

n Add-Source

Source for the additve setpoint value in the respective mode of control.

n Add-Norm

The normalization factor for the additive setpoint value in the respective mode of control. The additive setpoint value is added to the main setpoint value with the correct sign. With negative sign you will achieve an inversion of the additive setpoint value before addition and therefore quasi a subtraction.

P-Limit for n

Function	Here you can select whether an additional limit shall be inactive or on which variable (e.g. frequency, torque) this limit shall effect.
LimSource	Selection of source for the value of the additional limit.
AnaLim%	Normalization of the analog value if used as an additional limiting value.
BusLim%	Normalization of the bus value if used as an additional limiting value.
LimSW1	Constant value for the use as an additional limiting value.
t-Lim	The value of the additional limit is slowly changed by an integrator . Here, you can set the integration time of this integrator. During this action the time is set the integrator needs to adjust the selected variable from 0 to nominal value.

P-PROCESS CONTROL

P SetpSource	By this parameter selection is made which setpoint value is applicable for control mode = process.
P ctrl.	Adjustment of the proportional part "P-gain" of the integrated process controller. Adjustment 1,00 means, that with 100% control offset a variable of 100% is generated.
Tn ctrl.	Adjustment of the integral portion "I-gain" of the integrated process controller. Adjustment 1,0 s means, that with given control offset the "I-gain" generates within this time period (1,0 sec) an additional variable in the amount of the "P-gain" by integration .
D ctrl.	Adjustment of the differential portion "D-gain" of the integrated process controller. Adjustment 1,0 s means, that with a changing speed of the control offset of 100% within this time period (1,0 sec), a variable of 100% is generated by the "D-gain".
AV source	By this parameter selection is made which actual value source is selected as the actual one.
Unit	For the representation of the set value with "ContrMode=process-n/-M/-I" a unit can be selected (e.g. Hz, rpm, St/min etc.).
AftDecPoint	For the representation of the set value with "ContrMode=process-n/-M/-I" can be selected with how many digits behind the decimal point the set value shall be displayed.

MaxSet	Defines the numerical value in the selected unit, that can be entered as the maximum for the set value. With internal set value no higher value can be entered. If a higher value is preset by another set value source, this maximum value is the limit.
PAnaSV%	Determines the normalization of an analog set value. It is preset to which set value in the selected unit an analog signal of 10V/20mA shall correspond. This value can be higher than "MaxSet", whereby an internal limitation to "MaxSet" is set.
Bus SV%	Determines the normalization of a bus set value. It is preset, to which set value in the selected unit a bus signal of 0x4000 shall correspond. This value can be higher than "MaxSet", whereby an internal limitation to "MaxSet" is set.
ActSmoothg	The actual value is inverter-internally smoothed with the here indicated smoothing time-constant.
AnaAct%	Determines the normalization of an analog actual value. It is preset to which actual value in the selected unit an analog signal of 10V/20mA shall correspond.
BusAct%	Determines the normalization of the bus actual value. It is preset to which actual value in the selected unit an bus signal of 0x4000 shall correspond.
P SV1	Fixed set value 1 with "ContrMode=Prozess-n/-M/-I". The value is entered into the set value normalization (unit, digits behind decimal point).
P SV2	Fixed set value 2 with "ContrMode=Prozess-n/-M/-I". The value is entered into the set value normalization (unit, digits behind decimal point).
P SV3	Fixed set value 3 with "ContrMode=Prozess-n/-M/-I". The value is entered into the set value normalization (unit, digits behind decimal point).
P Add-Source	Source for the additive setpoint value in the respective mode of control.
P Add-Norm	The normalization factor for the additive setpoint value in the respective mode of control. The additive setpoint value is added to the main setpoint value with the correct sign. With negative sign you will achieve an inversion of the additive setpoint value before addition and therefore quasi a subtraction.

P-n-precontrol

Action	This parameter is effective only with "control mode = process-n". Thus, you can activate a frequency precontrol. Adjusting facilities: off: No frequency precontrol. add: The controller output signal is added to the value of the precontrol frequency. mult: The controller output signal is multiplied with the value of the precontrol frequency. PrCtr only.: The controller is not active. The value of frequency precontrol is applied.
preCtrSource	By this parameter you are selecting the source for the value of frequency precontrol.
pAnaSV%	By this parameter you are defining the factor for the scaling of an analog value as the value of frequency precontrol. 10V/20mA conforms with the value set here.
pBusSV%	By this parameter you are defining the factor for the scaling of a bus-value as the value for the precontrol frequency. Nominal bus-value (0x4000) conforms with the value set here.
p SV1	Here you can set the constant setpoint value of the precontrol .
Limitation	If with "control mode = process-n" a frequency precontrol with additive or multiplicative intervention is activated (intervention = "add" or = "mult") the maximum intervention of the process controller is defined by this parameter. The input is made in "%". Setting 0,0% causes that the process controller can not interfere in the frequency precontrol. Additive intervention: 100% means that the controller output (adding value) can reach +- 100,0% of fmax at maximum. Multiplicative intervention: 100,0% means that the controller output (multiplying value) can reach value 1 (+- 100,0%), i.e. minimum 0 and maximum 2.

P-M-CONTROL

T SetpSource	By this parameter selection is made which setpoint value is applicable for control mode = torque.
MaxSet	Defines the max. setpoint in case of torque-control. With internal setpoint no higher value can be entered. If by another setpoint source a higher value is preset, limitation to this value is made.
TAnaSV%	Defines the normalisation of an analog setpoint. It is preset, to which torque setpoint an analog signal of 10V/20mA shall correspond. This value can be higher than "MaxSet", in which case an internal limitation to the "MaxSet" is made.
Bus SV%	Defines the normalisation of a bus setpoint. It is preset, to which torque setpoint a bus signal of 0x4000 shall correspond. This value can be higher than "MaxSet", in which case an internal limitation to the "MaxSet" is made.
T SV1	Fixed set value 1 in case of torque-control.

T SV2	Fixed set value 2 in case of torque-control.
T SV3	Fixed set value 3 in case of torque-control.
T Add-Source	Source for the additive setpoint value in the respective mode of control.
T Add-Norm	The normalization factor for the additive setpoint value in the respective mode of control. The additive setpoint value is added to the main setpoint value with the correct sign. With negative sign you will achieve an inversion of the additive setpoint value before addition and therefore quasi a subtraction.
P T-ctr.SVC	Proportional component of the torque controller in case of Space-Vector-Control (motor type = asyn_SVC).
Tr T-ctr.SVC	Reset time of the torque controller in case of Space-Vector-Control (motor type = asyn_SVC).

P-Limit for T

Function	Here you can select whether an additional limit shall be inactive or which varable (e.g. frequency, torque) this limitation shall be effecting.
LimSource	Selection of the source for the limiting value of the additional limitation.
AnaLim%	Normalization of the analog value if used as an additional limiting value.
BusLim%	Normalization of the BUS value if used as an additional limiting value.
LimSW1	Constant for use as an additional limiting value.
t-Lim	The value of the additional limit is slowly changed by an integrator . Here, you can set the integration time of this integrator. During this action the time is set the integrator needs to adjust the selected variable from 0 to nominal value.

P-CURRENT CONTROL

I SetpSource	Setpoint source for the current setpoint with current control.
MaxSet	Maximum current control setpoint value. Higher values will be limited to this maximum value.
Load	Number of phases under load in case of current control. Attention! With a wrong setting the calculation of the output current will also be wrong.
IAnaSV%	Defines the normalization of an analoge setpoint value. It is predefined to which current setpoint an analog signal of 10V/20mA shall correspond in the selected unit . This value may be higher than "MaxSet", however with an internal limitation to "MaxSet" .
Bus SV%	Defines the normalization of a bus setpoint value. It is predefined to which current setpoint a bus signal of 0x4000 shall correspond. This value may be higher than "MaxSet", however with an internal limitation to "MaxSet" .
I SV1	Constant setpoint value 1 with "ContrMode=current".
I SV2	Constant setpoint value 2 with "ContrMode=current".
I SV3	Constant setpoint value 3 with "ContrMode=current".
I Add-Source	Source for the additive setpoint value in the respective mode of control.
I Add-Norm	The normalization factor for the additive setpoint value in the respective mode of control. The additive setpoint value is added to the main setpoint value with the correct sign. With negative sign you will achieve an inversion of the additive setpoint value before addition and therefore quasi a subtraction.
f-source	Selection of the source for the frequency default in the current control mode.
f analog	Normalization of the analog frequency default in current control mode. 10V/20mA corresponds with the here indicated value.
f Bus	Normalization of the frequency default via bus in current control mode. 4000H corresponds with the here indicated value.
f SV1	Default of a fixed frequency value in the current control mode.
t Frequ.	Time for frequency integrator in the current control mode. The time of a frequency change from 0 to fmax is indicated.

P-VOLTAGE CONTROL

V SetpSource	Setpoint-source for the voltage setpoint value in case of voltage control.
MaxSet	Maximum voltage control setpoint. Higher values are limited to this maximum value.
Load	No. of loaded phases with voltage control. Attention! Wrong setting results in wrong calculation of output power.
VAnaSV%	Defines the scaling of an analog setpoint value. It is preset to which voltage setpoint an analog signal of 10V/20mA shall correspond. This value can be higher than "MaxSet", with an internal limitation to "MaxSet".
Bus SV%	Defines the scaling of a bus setpoint value. It is preset to which voltage setpoint an bus signal of 0x4000 shall correspond. This value can be higher than "MaxSet", with an internal limitation to "MaxSet".
V SV1	Fixed setpoint 1 in case of "ContrMode=voltage".
V SV2	Fixed setpoint 2 in case of "ContrMode=voltage".
V SV3	Fixed setpoint 3 in case of "ContrMode=voltage".
V Add-Source	Source for the additive setpoint with the respective control mode.
V Add-Norm	The scaling factor for the additive setpoint with the respective control mode. The additive setpoint is added to the main setpoint with the correct sign. With a negative evaluation you will get an inversion of the additive setpoint priot to the addition, which actually means a subtraction.
f-source	Selection of the source for the frequency default in case of operation by voltage control .
f analog	Scaling of the analog frequency default in case of operation by voltage control . 10V/20mA corresponds with the here indicated value.
f Bus	Scaling of the analog frequency default via bus in case of operation by voltage control. 4000H corresponds with the here indicated value.
f SV1	Default of a fixed frequency in case of operation by voltage control.
t Frequ.	Time of the frequency integrator in case of operation by voltage control. The time for a change of frequency from 0 to fmax is indicated.

P-HOIST./ROT.GEAR

Engag t br.	Via this parameter the reacting time for mechanical brakes of lifting gears is set. With this the inverter can control the mechanical brake in the exact moment.
t-rel mec.br.	This parameter is used for setting the release time of the mechanical brake of lifting-gear drives. This enables the converter to build up a correspondingly long stop point after braking (until the brake has definitiely been applied). For this reason, you must enter here at least the release time of the mechanical brake being used.
R Start.torq.	This parameter defines the starting torque for a setpoint in clockwise direction. The value refers to the nominal torque of the parameterised motor.
L Start.torq.	This parameter defines the starting torque for a setpoint in counter-clockwise direction. The value refers to the nominal torque of the parameterised motor.
f-start	Starting frequency if control mode = hoisting gear and motor type = asnch_SVC (encoderless operation). In case of encoderless operation a minimum actual value of "fstart" shall be applying, so that the inverter is activating the brake and running up to the preset setpoint.
Auto-R1-Measure	When set to Yes, this parameter runs an R1 measurement at every start. This will detect any changes in the stator resistance caused by temperature changes. On systems without an actual value feedback, this parameter shall be set to "yes" if high starting and braking torques at a low frequency are required.

Only with motor type= async_FOC (field-oriented control):

P PosContr.	P-component (amplification) of the position controller: by this, the position control is adapted to the different moments of inertia of the lift. Mind: the higher the "weakening" of the drive, the higher the amplification should be. (Attention: too high values cause "unsmooth" running behaviour or too much noise in the drive during position controlling).

P-f-TORQUE RISE

Function	By parameter Mode you select whether the torque dependent calculation of the frequency is switched off or if the calculated frequency-value is added to or subtracted from the main setpoint value. Ensure also that the value of the frequency is calculated with the correct sign, depending on parameter Mode.
Mode	By parameter "Mode" you select whether the torque-dependent calculation of the frequency shall be made in dependence from surpassing either a clockwise or a counterclockwise rotating torque. E.g. setting of torque ccw If in ccw direction a higher torque signal arises (actual value: "T-mot r/l" is negative) than preset in parameter "T-Start", a frequency is calculated out of the surpassing by multiplication with surpass. The frequency resulting herefrom can be selected as additive setpoint value by selection from n Add-source (control mode=speed) .
T-Start	By this parameter you can define the torque-threshold from which the calculation of a torque-dependent frequency shall start.
Rise	By this parameter you can define the factor of the torque-dependent frequency if "T-Start" is exceeded.
Damping	Normally, a torque-dependent frequency-change causes at first an even higher torque and therefore a direct feedback. This direct feedback resp. the rise of the frequency can be damped by this parameter. Finally however, the higher frequency has to result in a reduction of the required torque.

P-PULSE INPUT

Mode	Operation mode of the pulse input: inactive: X2:27/:28/:29 working as digital inputs. f < 20 kHz: X2:28 for measuring of pulses up to max. 20 kHz. X2:27/:29 working as digital inputs. f > 20 kHz: x2:27 for measuring of pulses up to max. 205 kHz. X2:28/:29 are inactive, Tacho 1 track: speed-measurement with tacho at X2:28. X2:27/:29 working as digital inputs. Max. pulse frequency 20 kHz. Tacho 2 track: X2:27/:28 for evaluation of a pulse tacho. X2:29 is inactive. Max. pulse frequency 205 kHz.
AftDecPoint	Digits after comma for setpoint Frequ.-Set (kHz) resp. Tacho-Set (rpm).
Max.plse.	Maximum value of pulse input (as a frequency in kHz resp. speed in rpm, depending on the mode).
Pulses/360	Pulses per revolution per each track in case of pulse tacho.
Pulse rise	Zero-point rise of the pulse input.
CharactCrv	Describes the way of internal processing of the pulse input : "original": Unchanged imaging of the input value on the internal value (ascending straight line). "negated": A positive input value is imaged on a negative internal value of same amount and vice versa (descending straight line). "invert.": Input value is zero = imaging on the pos. max. value. Input value is pos.max.value = imaging on zero . Input value is neg. max.value = imaging on zero (within the region of negative input values - ascending straight line from zero to max.value; within the region of positive input values - descending straight line from max.value to zero).
Centre point	Center-point rise for pulse input. Typical application: Unipolar input for operation in both senses of rotation. 0 … 0,5*max.pulse = counter-clockwise running; 0,5*max.pulse = speed zero; 0,5*max.pulse … max.pulse = clockwise running.
Pulse mon.	Monitoring threshold of the pulse input.

P-MOTOR DATA

Motor type	Adjustment of the used motor and of the respective control type, e.g. "async_SVC" (asynchronous motor with "space vector control") resp. "async_FOC" (asynchronous motor with "field-oriented control") or e.g. "sync" ("synchronous motor").
P-motor	Enter here the rated value of the motor as per type plate. Note: If several motors are connected to the inverter, the sum of the rated motor powers of all connected motors is to be entered.
n-motor	That speed is to be entered as the rated motor speed, when motor is running with preset rated motor frequency and loaded with nominal torque (type plate specification). The correct adjustment is important particularly with field oriented control (for correct motor saturation). Attention: Each new setting of this parameter leads to another recalculation of the other motor data like "I idle", "R1" etc.. Previous adjustments of these parameters are lost. Note: If several motors are connected to the inverter, the rated motor speed of the motor with the highest performance is to be entered.
I-motor	As the rated motor current that current has to be set, which the motor needs if loaded with the rated torque (type plate indication). Here, the wiring of the motor in star connection or delta connection has to be obeyed. Attention: Each new setting of this parameter leads to another recalculation of the other motor data like "I idle", "R1" etc.. Previous adjustments of these parameters are lost. Note: If several motors are connected to the inverter, the sum of the rated motor currents of all connected motors is to be entered.
fnom-M	As the rated motor frequency that frequency has to be set, at which the motor has its rated operating point according to the type plate. Attention: Each new setting of this parameter leads to another recalculation of the other motor data like "I idle", "R1" etc.. Adjustments made before on these parameters are lost.. Note: If several motors are connected to the inverter, the rated motor frequency of the motor with the highest performance is to be entered.
V-motor	As motor rated voltage this voltage must be set, which is required for motor rated frequency (type plate indication). With this the wiring of the motor in star connection or delta connection has to be obeyed. Attention: Each new setting of this parameter leads to another recalculation of the other motor data like "I idle", "R1" etc.. Adjustments made before on these parameters are lost.
cos phi	For the calculation of the optimum voltage vector the "cos phi" of the motor is needed. For that, the inverter uses a plausible standard value. With unusual motors the exact value as per data plate should be set. Attention: Any new setting of this parameter results in a recalculation of the other motor data like "I idle", "R1" etc.. Previous adjustments of these parameters will be lost. Note: If several motors are connected to the inverter, the "cos phi" of the motor with the highest performance is to be entered.

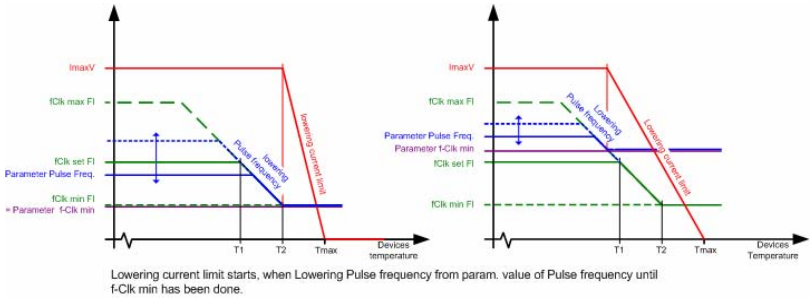
Slipcomp	With motor type "async_SVC" only: Determines, at which percentage the calculated actual slip is compensated (0 % = no slip-compensation, 100 % full compensation of the slip, calculated from the parameterized rated motor speed and the actual load status).
R1	The value can be established by function "Auto-Tuning" (recommended). Alternatively: When measuring with a precision ohmmeter: the R1 value is derived from measuring between any two terminals on the fully wired-up motor (including supply line). Divide this value by 2 to get value R1. Note: If several motors are connected to the inverter, the required R1 is to be established by function "Auto-tuning".
I idle	This value is calculated autonomously by the device on the basis of the motor data. To achieve a particular driving behaviour it also can be set manually. With field-oriented controller (Motor type = "async_FOC") the correct setting is especially important (motor saturation)! Note: If several motors are connected to the inverter, the sum of the no-load currents of all connected motors is to be entered.
I-breakov	As pull-out protection in case of under-saturated operation (e.g. in the field weakening range) the current limit is lowered. Here you have to set the maximum admissible current of the motor, so that the motor will not pull out. For lowering, the set value is evaluated with the ratio of actual to nominal motor saturation. Thus, in case of field weakening, lowering with 1/f is provided. Note: If several motors are connected to the inverter, the maximum possible parameter value is to be set. Pull-out protection cannot be provided if several motors are operated.
ETA	By this parameter the rated motor efficiency is set. This value is required for a more exact consideration of the frequency-dependent motor losses in computing the actual values "P-motor" and "T-motor". The inverter function is not influenced by this. Note: If several motors are connected to the inverter, the mean value of all associated motors is to be entered.
t-exciting	Here, the duration of the excitation phase for the motor (not with synchronous motors) can be defined. This may be useful particularly for the optimization of the sequential process in case of drives for hoisting equipment.
Fan external	If the motor is fitted with forced ventilation, parameters to be set here to "yes".
T-offset	Additive correction signal to the torque actual value of the inverter. By this, the actual values "T-motor", "T-mot r/l" and "P-motor" can be calibrated, for example by means of a torque metering shaft. Effective direction "positive" means clockwise acting torque offset.
T-correction	Correction signal with multiplying effect for the actual values "T-motor", "T-mot r/l", "P-motor". These actual values are multiplied with the parameter value. By that, they can be calibrated, for example, by means of a torque metering shaft.

Stabil.	2-pole motors for higher frequencies tend to swinging current for no-load operation. Using the parameter "Stabil." a current depending intervention is on the motor voltage is performed to damp such a swinging. The parameter describes the power of the intervention "without any units".
Auto-Tuning	Prerequisit for the implementation of this function: "terminal 8" must be triggered. If the parameter is set to "yes", a measuring current will flow through the motor for a few seconds. By that, parameters like, e.g., the stator resistance "R1" are detected automatically.

Only with motor type= async_FOC (field-oriented control):

Sensor	Type of tacho for the actual value feedback: high-resolution incremental encoders with "HTL" or "TTL" level (asynchronous drives) with 4096 pulses/revolution as well as "sincos analog" and "sincos MUX" encoders (synchronous drives) may be used.
Pulses/360	If an "HTL", "TTL" or "sincos" tacho has been chosen as encoder, the no. of pulses per pulse tacho revolution is to be set by this parameter. So-called rotary pulse-encoders or incremental encoders (for asynchronous motors) may be used. DYNAVERT needs only the two tracks that are offset by 90°. For synchronous motors a so-called "sincos" encoder is used.
Sensor sign.	By the two possible settings "A - B" and "B - A" the connection of the encoder conductors (encoder signals A and B) kann be swapped "software·wise".

P-INVERTER DATA



I contin.	With "inverter current limit" the current limit is set, which is valid as limit value for the current limiting controller during continuous operation.
I short	With "inverter peak current" this current limit is set, which is fallen on no account. Using the parameter "t short" it can be temporarily limited.
t short	With this parameter the time period is set, after which the current limit is reduced from inverter peak current to inverter rated current. To realize the time range > 30 s increased cooling is required.
V mains nom.	By means of parameter "V mains nom." the rated voltage of the inverter is set. Basically, the rated mains voltage is independent from the set motor voltage; this however remains restricted to values within the range of the mains voltage (possibly passing into the range of field weakening).
DC min.	Undervoltage threshold in the intermediate circuit. If the intermediate circuit voltage falls below this value, fault message "undervoltage" is put out.
Clk.freq.	Pulse frequency of the output-side IGBT inverter: There are various pulse frequency settings possible, depending on the type of inverter (max. range 1,5 - 10,0 kHz). Attention: the power loss of the inverter increases with the pulse frequency. The additional motor losses and the motor noise however are decreasing with increasing pulse frequency. Observe, that the inverter max.current for the respective nominal pulse frequency as per technical data does not apply to the maximum pulse frequency.
f-pulse min	Here you can limit the inverter pulse frequency to a minimum value. Thus it is prevented that the inverter, depending on temperature, will reduce the pulse frequency to lower values. This is required with, e.g., sinusial filters resp. with high output frequencies.
Overmodulat.	Here, the size of the max. over-modulation can be entered that is carried out in case of high output voltage. 0% means a pure sine-wave modulation. In fact, low-frequency harmonics are generated (5,7 etc.) in the motor current in case of values > 0% , but the fundamential harmonic of the motor voltage is rising.

Random Pattern	By this parameter can be chosen, whether a pulse pattern without (constant pulse frequency) or with Random-Pattern (random slightly variable pulse frequency) is generated.
PWM	Defines whether the inverter shall work with the pulse-pattern specially optimized for motors. The setting "passive load" should be selected only if control-related problems arise in the standard setting "motor". Especially in the case of "passive load"-setting higher voltage-peaks are to be expected at the terminals of the load.
V-motor max.	Maximum effective value of the inverter output voltage (fundamantial harmonic). Input as a percentage of the parametrized mains voltage. Although the inverter is able to generate a higher output voltage (effective value of the fundamental harmonic), the voltage is limited to this value.
Brake	Here it is to be set whether braking device is available and its kind: "off": no braking device available. "on": this inverter is an individual unit (no DC-combination) and it is equipped with a braking device (chopper transistor and resitor). "R-supply": this inverter is not equipped with its own braking device, however it works in DC-combination with another device that is equipped with a braking device (chopper or energy recovery feature).
P-BrakeRes.	Continuous rating of a connected brake rectifier. The inverter prevents overloading if the values of power and resistance are set correctly (see also the parameters for the resistance value and for the brake resistor fault message). For that, the quickly established value of actual power is smoothened with a time constant of 280 s.
R-BrakeRes.	Resistor value of a connected brake resistor.
t-DC.brake	With "t-DC.brake" the period of time can be set, for which the dc braking is performed after falling below the starting frequency. The time period can be parameterized between 0 s and 1000 s, for "0 s" means, no dc braking is done.
I-DC.brake	In case of the inverter falls below the starting frequency when braking, the drive can be broken down to the complete standstill using dc braking.

P-MONITORING

Setp/actv.dev	Here, the quantity of deviation from the set speed value to the actual value can be set, showing the signal "Diff set/act". L05: This parameterization monitors the admissible deviation of the actual value, that is the lift speed, from the set value. The parameter is expressed as a percentage of "v max". The fault indication is output if the lift travels faster than the (process-internal) value of "Setp/actv.dev" (setpoint/actual-value deviation).
I-earth max.	For devices intended for earth-free supply systems a differential-current converter is provided in the mains input . If at such a device an earth-fault occurs at the converter output side, a fault-current is generated, that, among other factors, depends on the size of the load capacity of the mains (see actual value "EarthCurr."). By this parameter the user can set a comparison threshold for this fault current. If the set value is exceeded the respective bit is set. A fault message is given only if the bit is parameterized for fault tripping. Note: For the internal protection of the device the earth-current actual value is monitored for another, not parameterizable threshold.
Delay I-earth	Delay time for the parameterizable earth-current monitoring function (see parameter "I-earth max.").
Sym. phases	Monitoring threshold for the asymetry-monitoring of the motor current. The indication refers to the actual motor current. The higher value from this parameter and from the "I-sym. ph." is used as the actual threshold.
I-sym. ph.	Monitoring threshold for the asymetry-monitoring of the motor current. The higher value from this parameter and from the "Sym. Phases" is used as the actual threshold.

P-Fault suppression

Std.Suppr.	Here, you can define the standard setting of function "fault suppression". You can select whether or not the inverter shall be suppressing certain shut-down actions, only indicating the respective events and generating the common warning . Setting inactive: Any fault results in a shut-down with common fault indication. Setting low: Monitoring that shows unplausible values (possible defect of the monitoring link) does not result in a shut-down.
Input	Here you will set the binary information by which function "fault suppression" is switched over from "Std.Suppr." to "Alt.Suppr.".

Alt.Suppr.	Here you can define the optional setting of function "fault suppression". You can select whether or not the inverter shall be suppressing certain shut-down actions, only indicating the respective events and generating the common warning . The optional value is used if switching-over is effected by the binary signal that has been selected with parameter "Inp.". Setting "inactiv": Any fault is causing a shut-down with common fault indication. Setting "low": Monitoring showing unplausible values (possible defect of the monitoring link) does not result in a shut-down. Setting "mean": Those monitoring features are deactivated additionally, by which no immediate destruction of the device is to be expected (e.g. temperature monitoring). Setting "high": Also monitoring actions are deactivated by which an immediate destruction of the device is to be extected.

P-INV.BEHAVIOUR

Lowvolt.	The device behaviour for mains voltage failure is determined. Store: under voltage failure is stored. Auto.reset: under voltage failure is automatically quitted. Mains off: each mains off is intended; no failure storing fault reset. FaultReset; reset of all faults.
MCfunc	This parameter tells the converter at which point is should begin to use mains contector. If this parameter is not set to "inactiv", it effects undervoltage recognition.
SwiInterlock	The starting lock-out status is an inverter status that will be quit only when the command OFF 1 is cancelled. The parameter defines when the inverter remains in the starting lock-out status: "off": The FI remains never in the starting lock-out status. "on": The FI remains in the starting lock-out status after an OFF 2 command or an emergency stop command. "always": The FI remains in the starting lock-out status after a fault, an OFF 2 command or an emergency stop command.
Synchron.	If the inverter is connected to a running machine, it has to synchronize with the speed of this machine. This can be achieved either by braking the motor until standstill (Synchron. = "off") or that inverter synchronizes with the running machine (Synchron. = "on"), and then runs up to the desired set value.
buffering	If there is a mains failure, the energy required for operating the converter is taken from the kinetic energy of the drive. off : no backup supply on mains failure on : backup supply until mains supply is restored or until drive speed = 0 t-restart: backup supply at most until time specified in "t-restart".
Set.value	In case of mains failure the contents of the motor poti can be selectively handled by - storing : be stored, or - reset : be reset to zero. In case on mains restart (and autom. restart) the inverter either remains in standstill or drives to the set value given before.
Operation	By this paramter the behaviour of the FI, in case of a change-over of the operating source, can be determined. After the change-over the FI reacts to the operating default set by the new operating source. "takeover": Maintaining of the last operating condition and takeover of the required operating commands incl. the setting of the appropriate internal locking for the buttons. "Reset": The operating commands are removed at the moment of change-over. Thus, an operating FI is shut down and taken into "switch interlock"-condition.
t-restart	For the function "automatic restart" valid - max. time - of power failure. With longer lasting mains failure no automatic restart is done.

Auto.reset	This parameter defines whether an automatic fault message acknowledgement shall be carried out: off: No automatic acknowledgement. Overvolt.: Only "Fault overvoltage" will be automatically acknowledged. Failures: All faults are acknowledged with the fault text "fault" . all: All faults are acknowledged.
max.conf.attmpts	This parameter defines the maximum no. of automatic acknowledgements. If faults occur in a number of "max.conf.attmpts" in intervals of less than one hour, no faults are acknowledged automatically any longer.

P-EXTRAS

Language	This parameter sets the language of the inverter display texts.
Parameterset	You can select and store 4 complete parameter sets. All 4 parameter sets are pre-assigned with the factory setting. If you change a parameter, it is only changed in the parameter set selected at that moment. You can copy the factory setting to the parameter set selected at any time in accordance with "Factory parameters".
Menu	Only the menues relevant to the selected menu level (e.g. commissioning, standard etc.) are viewable, which increases traceability.
Date	Date of the inverter internal real-time clock.
Time	Time of the inverter internal real-time-clock.

P-TimeSynchr.

SynchTime	Setting of the time to which the internal clock shall be set when triggered by the "SynchBit" .
SynchBit	Setting of the bit that causes the time-synchronization with ascending slope. Following to the raising edge the used bit must be HIGH for a certain period of time to enable the release of the time synchronization. Additionally, depending on the selected input (directly at the control electronics, at the Peripheral-PCB or in case of cabinet mount devices at the Signal-PCB), a different minimum time for reading the input must be considered. Following minimum time periods for the input signal must be observed: Input directly at the control electronics: 100ms Input at the Peripheral-PCB or the Signal-PCB: 500ms

P-Opr.counter

ON-bit	By this parameter you can select the bit by which the ON-hours meter (act value ON-hrs.) is triggered.
ON-hrs.	By this parameter you can set the actual value ON-hrs. to the desired value.
Opr.-Bit	By this parameter you can select the bit by which the operating-hours meter (act value Opr.-hrs.) is triggered.

P-LOGIC ELEMENTS
P-SELF-HOLDING

The self-holding feature is for the conversion of a key function into a static signal, i.e. it is a flipflop. Any self-holding feature has three inputs:
On: On-key = Set-function of the flipflop (high-active)
Off0: Off-key = Reset-function of the flipflop (low-active).
Off1: Off-key = Reset-function of the flipflop (high-active).

Normally, at On the On-key is connected and at Off0 the Off-key. The Off1 is used to reset the flipflop by the inverter if it wants to reset the self-holding feature. For that, three bit signals are available:
Reset OFF1 Reset for OFF1-commands
ResRelease Reset for controllerrelease commands
ResetSpeed Reset for speed-ON commands

The output signals of the self-holding features are available in the bit-pool for further usage.

P-Selbsthaltung 1

On	Determines, which signal (usually a terminal) shall be used as ON-key for self-holding function 1.
Off0	Determines, which signal (usually a terminal: maker) shall be used as OFF-key for self-holding function 1.
Off1	Determines, which signal (maker) shall be used as OFF-key for the self-holding function 1. Usually, a reset signal generated by the FI is used (according to the operating command for which the self-holding function is used). These are: "Reset OFF1" operating command OFF1), "ResRelease" (operating command controller release) and "ResetSpeed" (operating command speed ON).

P-Self-holding 2 to 5

dito	dito

P-LINKAGES

Linkages are for the logic linking of digital signals. One linkage element has four equivalent inputs. The kind of linkage can be selected.
The output-bit Linkage1 is available in the general bit-pool and shows, depending from the selected function, the following condition:

OR / NOR

Inp.1	Inp.2	Inp.3	Inp.4	Linkage1 at OR	NOR
0	0	0	0	0	1
all other combinations:				1	0

If less than 4 signals are OR/NOR-linked, unassigned inputs are to be laid to LOW or one input signal is to be multiple-assigned.

AND / NAND

Inp. 1	Inp. 2	Inp. 3	Inp.4	Linkage1 at AND	NAND
1	1	1	1	1	0
all other combinations:				0	1

If less than 4 signals are AND/NAND-linked, unassigned inputs are to be laid to HIGH or one input signal is to be multiple-assigned.

XOR / XNOR

Inp. 1	Inp. 2	Inp. 3	Inp.4	Linkage1 at XOR	XNOR
0	0	0	0	0	1
1	1	1	1	0	1
all other combinations:				1	0

In case of linkage with XOR/XNOR each input is to be assigned to a signal. If less than 4 signals are XOR/XNOR-linked, one signal shall be assigned to several inputs

P-Verknüpfungen 1

Inp. 1	Linkages are required for logical linking of digital signals. A linkage element is fitted with four equivalent inputs. This parameter descibes the connection of input 1 of linkage element 1.
Inp. 2	Linkages are required for logical linking of digital signals. A linkage element is fitted with four equivalent inputs. This parameter descibes the connection of input 2 of linkage element 1.
Inp. 3	Linkages are required for logical linking of digital signals. A linkage element is fitted with four equivalent inputs. This parameter descibes the connection of input 3 of linkage element 1.
Inp. 4	Linkages are required for logical linking of digital signals. A linkage element is fitted with four equivalent inputs. This parameter descibes the connection of input 4 of linkage element 1.
Function	Linkages are required for logical linking of digital signals. A linkage element is fitted with four equivalent inputs. This parameter descibes (for linkage 1) by which logic operator (and, or etc.) the four inputs are linked.

P-Linkages 2 to 8

dito	dito

P-OPERATION

Opr.

This parameter determines the functionality of the operating functions (i.e. of all digital inputs on the control electronic board and the periphery board). Hereby, various standard configurations (e.g. Standard, Namur etc.) can be chosen. If these settings are changed by modification of sub-parameters (e.g. P-BEDIENUNG:P-controller release: Local), the actual setting of the parameters is extended by "spec."

MainsFlt

This input determines the signal (usually a terminal) for the operating function "mains failure". Upon activation of this operating function, all the other digital inputs of the inverter are "frozen" at the actual status. The inverter goes to controller lock-out. Additionally, the restart-time is started. This input can be used, in connection with an automatical restart, for the suppression of undesired changes at the terminal inputs.

Feedb.MC

Selection of the signal source for the main contactor feedback (auxiliary making contact). If it is a motor-side contactor, a feedback is definitely required. In case of a mains-side contactor the parameter can also be on "inactiv".

P-ContrlRelease

Local

This parameter determines the signal (e.g. self-holding function of the internal keys) for the operation mode "Controller release" at "OP.-source = Local". The commands P-OPERATION:P-Controller release: global 1 and global 2 must be set additionally.

Remote

This parameter determines the signal (usually a terminal) for the operation mode "Controller release" at "OP.-source = Remote". The commands P-OPERATION:P-Controller release: global 1 and global 2 must be set additionally.

Global 1

This parameter determines the signal (usually a terminal) for the operation mode "Controller release". This signal is always active, independent from the operation source. Additionally, the operating commands for the actual operating source and global 2 (P-OPERATION:P-Controller release: Local, Remote, global 2) must be given.

Global 2

This parameter determines the signal (usually a terminal) for the operation mode "Controller release". This signal is always active, independent from the operation source. Additionally, the operating commands for the actual operating source and global 1 (P-OPERATION:P-Controller release: Local, Remote, global 1) must be given.

P-Speed on

Local	This parameter determines the signal (e.g. self-holding function of the internal keys) for the operation mode "Speed on" at "Op.-source=Local". The commands P-OPERATION:P-Speed on: global 1 and global 2 must be set additionally.
Remote	This parameter determines the signal (usually a terminal) for the operation mode "P-Speed on" at "Op.-source=Remote". The commands P-OPERATION:P-Speed ON: global 1 and global 2 must be set additionally.
Global 1	This parameter determines the signal (usually a terminal) for the operation mode "P-Speed on". This signal is always active, independent from the operating source. Additionally, the operating commands for the actual operating source and global 2 (P-OPERATION:P-Speed on: Local, Remote and global 2) must be set.
Global 2	This parameter determines the signal (usually a terminal) for the operation mode "P-Speed on". This signal is always active, independent from the operating source. Additionally, the operating commands for the actual operating source and global 1 (P-OPERATION:P-Speed on: Local, Remote and global 1) must be set.

P-Off1 (NC)

Local	This parameter determines the signal (e.g. self-holding function of the internal keys) for the operation mode "Speed on" at "Op.-source=Local". The commands P-OPERATION:P-Speed on: global 1 and global 2 must be set additionally.
Remote	This parameter determines the signal (usually a terminal) for the operation mode "P-Speed on" at "Op.-source=Remote". The commands P-OPERATION:P-Speed ON: global 1 and global 2 must be set additionally.
Global 1	This parameter determines the signal (usually a terminal) for the operation mode "P-Speed on". This signal is always active, independent from the operating source. Additionally, the operating commands for the actual operating source and global 2 (P-OPERATION:P-Speed on: Local, Remote and global 2) must be set.
Global 2	This parameter determines the signal (usually a terminal) for the operation mode "P-Speed on". This signal is always active, independent from the operating source. Additionally, the operating commands for the actual operating source and global 1 (P-OPERATION:P-Speed on: Local, Remote and global 1) must be set.
Displayed ind.	Definition whether message text "!!OFF1!! Operation" shall be displayed in case OFF1 is activated.

P-Reset

Local	This parameter determines the signal for the operating mode "Reset" at Op.-source = Local (normally internal key).
Remote	This parameter determines the signal for the reset operating function at Op.-source = Remote (usually a terminal).
Global 1	This parameter determines the signal for the reset operating (usually a terminal). The input is continuously active, independently from the operating source.
Global 2	This parameter determines the signal for the reset operating (usually a terminal). The input is continuously active, independently from the operating source.

P-Emerg.stop(NC)

Global 1	This parameter determines the signal (usually a terminal) for the operating mode "Emerg. Stop" (Emergency stop). This input is always active, independently from the operating source.
Global 2	This parameter determines the signal (usually a terminal) for the operating mode "Emerg. Stop" (Emergency stop). This input is always active, independently from the operating source.

P-Off2(NC)

Global 1	This parameter determines the signal (usually a terminal) for the operating mode "OFF 2". This input is always active, independently from the operating source.
Global 2	This parameter determines the signal (usually a terminal) for the operating mode "OFF 2". This input is always active, independently from the operating source.
T1	Definition of message text line 1 in case OFF2 is activated.
T2	Definition of message text line 2 in case OFF2 is activated.

P-int.ctrl.inhib.

Local	This parameter determines the signal (usually a terminal) for the operating mode "Internal control inhibit" at Op.-source=Local. If "Internal control inhibit" is activated, control inhibit. is generated. However, all self-holding functions remain operative.
Remote	This parameter determines the signal (usually a terminal) for the operating mode "Internal control inhibit" at Op.-source=Remote. If "Internal control inhibit" is activated, control inhibit. is generated. However, all self-holding functions remain operative.
Global 1	This parameter determines the signal (usually a terminal) for the operating mode "Internal control inhibit". This input is always active, independently from the operating source. However, all self-holding functions for the operating commands remain operative.
Global 2	This parameter determines the signal (usually a terminal) for the operating mode "Internal control inhibit". This input is always active, independently from the operating source. However, all self-holding functions for the operating commands remain operative.

P-int.speed off

Local	This parameter determines the signal (usually a terminal) for the operating function "Internal Speed OFF" at Op.-source = Local. If Internal Speed OFF is activated, Speed OFF is generated. However, all self-holding functions for the operating commands will remain.
Remote	This parameter determines the signal (usually a terminal) for the operating function "Internal Speed OFF" at Op.-source = Remote. If Internal Speed OFF is activated, Speed OFF is generated. However, all self-holding functions for the operating commands will remain.
Global 1	This parameter determines the signal (usually a terminal) for the operating function "Internal Speed OFF". This input is always active, independently from the operating source. However, all self-holding functions for the operating commands will remain.
Global 2	This parameter determines the signal (usually a terminal) for the operating function "Internal Speed OFF". This input is always active, independently from the operating source. However, all self-holding functions for the operating commands will remain.

P-Reversing

Local	This parameter determines the signal (usually a terminal) for the operating mode "Reversing" at Op.-source = Local.
Remote	This parameter determines the signal (usually a terminal) for the operating mode "Reversing" at Op.-source = Remote.

P-Motorpoti

Up	Selection of the signal source for the UP-key of the motor poti. The motor poti actually is only active if the set value source is set at "Mpoti".
Down	Selection of the signal source for the DOWN-key of the motor poti. The motor poti actually is only active if the set value source is set at "Mpoti".

P-MessgGen:MESS:

Signal generators MLD are for inverting and time-delaying of any binary signal. Thereby the binary signal will be delayed at first (time-delay can be adjusted seperately with ascending or descending slope) and then inverted if necessary.

P-MessgGenMESS 1

Input	Preparation of message 1 prior to further processing. The message (binary information FI) can be chosen from a selection of individual faults, warnings, messages, terminal inputs etc..
TD: 0->1	Parameterization for a desired delay in time on generation of the message.
TD: 1->0	Parameterization for a desired delay in time on withdrawal of the message.
Inversion	The value of the binary information can be inverted by parameterization of "on" (e.g. for switch-over of operating-current principle/closed-circuit principle).
upon inhib.	By this parameter the value of the output bit of the message generator with inverter being cut-out (=inhibition) is set. There can be chosen whether the output bit shall be a fix "ON", "OFF" or shall depend on the condition of the message generator.

P-MessgGenMESS 2 to 20

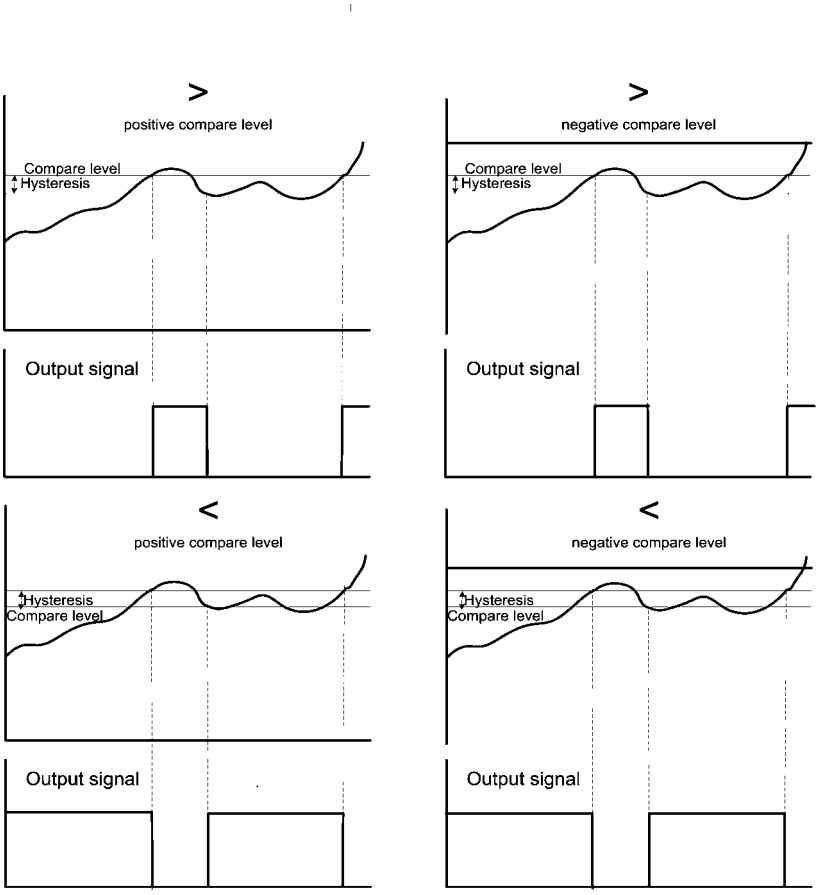
dito	dtio

P-MessgGen.COMP

Message generators COMP are for comparision of continuous signals (e.g. I-Motor, n-Motor etc.) to defined threshhold values of discrete signals (e.g. operating source, setpoint-source etc.) with defined comparative values.

Comparison of continuous signals:
Here, lower (<) and higher (>) are available as relational operators. Additionally, a hysteresis can be set. In case of bi-polar signals also a sum can be formed before the comparison.

The following graphs demonstrate the behaviour of the output signal.



Comparison of discrete signals:
Here, the relational operators equal (=) and unequal (!) are available. The hysteresis has no affect here and is fixed to zero.

Subsequently, the binary signal gained in this way can still be delayed (delay for ascending and descending edges can be parameterized separately).

The output signals of the message generators COMP are available in the bit-pool for further usage.

P-MessgGen COMP 1

By signal generator COMP 1 (comparison) actual values of the FI are monitored for a free selectable threshold. The actual value can also be a text parameter. It is displayed as a three-fold parameter, the displayed unit adapts automatically.

<	Comparison-operator functions for numerical values are ">" (greater) resp. "<" (smaller) and for texts "=" (equal) resp. "!" (unequal).
	Parameter values resp. texts to which comparison shall be made. The indicated unit adapts automatically.
Hyst.	Desired hysteresis between setting and resetting of the comparison message (Text parameters don't need a hysteresis !).
TD: 0->1	Parameterizing for a desired time delay upon generation of the message.
TD: 1->0	Parameterizing for a desired time delay upon withdrawal of the message.
Absolute value	The parameter "Absolute value" is relevant for +/- signals only . That allows to select whether before the comparison the absolute value of the signal is generated (="yes") or if the signal itself is used (="no").
upon inhib.	By this parameter the value of the output bit of the message generator with inverter being cut-out (=inhibition) is set. There can be chosen whether the output bit shall be a fix "ON", "OFF" or shall depend on the condition of the message generator.

P-MessgGen COMP 2 to 8

dito	dito

P-PARAMETER SWITCH

P-ParamSwitch 1

Input	By parameter switch parameters can be switched-over from their original value to an alternative value. With parameter "Input" the binary information triggering the parameter switch is selected. If the binary information is 0/false, the original value is active - if it is 1/true the alternative value is active. If the same parameter is switched over to an alternative value by a number of parameter switches, the parameter switch with the lowest number dominates (priorisation).
Par.	With a parameter switch parameters can be switched-over from their original value to an alternative value. With parameter "Par." that parameter is selected which shall be switched over from its original value to an alternative value. If the same parameter is switched over to an alternative value by a number of parameter switches the parameter switch with the lowest number dominates (priorisation).
AV	With a parameter switch parameters can be switched-over from their original value to an alternative value. With parameter "AV" that alternative value is set to which the parameter switch shall be switched upon triggering of the parameter switch. If the same parameter is switched over to an alternative value by a number of parameter switches, the parameter switch with the lowest number dominates (priorisation).

P-ParamSwitch 2 to 12

dito	dito

P-DIGITAL OUTPUTS (Relay 5…7 with option Periphery 1 and 3 only)

Relay 1	Selection of the signal which shall be put out to relay 1 (L05: terminal X1:1/2/12, T05: terminal X2:37/38/39).
Relay 2	Selection of the signal which shall be put out to relay 2 (L05: terminal X1:3/4, T05: terminal X2:41/42).
Relay 3	Selection of the signal which shall be put out to relay 3 (terminal X2:30/31).
Relay 4	Selection of the signal which shall be put out to relay 4 (terminal X2:32/33).
Relay 5	Selection of the signal das shall be put out to relay 5 (terminal X2:43/44/45, being on the peripheral PCB).
Relay 6	Selection of the signal das shall be put out to relay 6 (terminal X2:46/47, being on the peripheral PCB).
Relay 7	Selection of the signal das shall be put out to relay 7 (terminal X2:48/49, being on the peripheral PCB).

LED 1	Selection of the signal which shall be put out to LED 1 (LED "Ready").
LED 2	Selection of the signal which shall be put out to LED 2 (LED "Working").

P-Outputs System 1 (only for cabinet mount devices)

OC X82:4	Selection of the signal that shall be output to the open-collector-output X82:4 (available only in devices with minimum one system).
OC X82:5	Selection of the signal that shall be output to the open-collector-output X82:5 (available only in devices with minimum one system).
OC X82:6	Selection of the signal that shall be output to the open-collector-output X82:6 (available only in devices with minimum one system).
OC X82:7	Selection of the signal that shall be output to the open-collector-output X82:7 (available only in devices with minimum one system).
OC X82:8	Selection of the signal that shall be output to the open-collector-output X82:8 (available only in devices with minimum one system).

P-Outputs System 2…4 dito, if several systems available

P-ANALOG OUTPUTS

With option Periphery 1…4 only:

only mA AO 3/4	Definition of the output signal for analog outputs 3 and 4. no: Depending on the voltage source (> 1kOhm) resp. current source (< 300 Ohm). yes: always current output.

P-Analog output 1

Value	Actual value delivered at the analog output 1.
100%	Scaling of the analog output 1.
0%	This parameter determines, in conjunction with parameter "100%", the range of values of the signal which is read out to analog output 1.
mA-zero	Typical setting: 0.0 mA or 4.0 mA. For exact tuning to the connected indicator device any other value between 0 and +10 mA can also be entered.
Smoothing	Smoothing of the analog output 1.
Centre point	For the output of bipolar signals, this value is to be set to "yes". Thus, the analog output at signal value zero is half-modulated. Wit negative signal values the output signal goes toward zero, with a positive one toward full modulation (Reasonable e.g. in case of sequential control; see also parameter "centre point" of the analoge inputs).

P-Analog output 2

dito	dito
Value	Actual value delivered at the analog output 2.
100%	Scaling of the analog output 2.
mA-zero	Typical setting : 0.0 mA or 4.0 mA. For accurate tuning to the connected indicator device also any optional values between -10 and +10 mA can be entered.
Smoothing	Smoothing of the analog output 2.
Centre point	For the output of bipolar signals, this value is to be set to "yes". Thus, the analog output at signal value zero is half-modulated. Wit negative signal values the output signal goes toward zero, with a positive one toward full modulation (Reasonable e.g. in case of sequential control; see also parameter "centre point" of the analoge inputs).

With option Periphery 1…4 only:

P-Analog output 3/ 4

P-ANALOG INPUTS

P-Analog input 1

AI-function

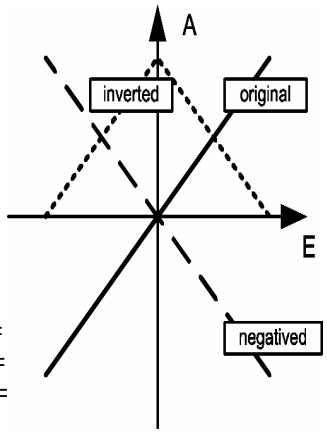
To the analog inputs 3 different functions can be assigned:
Analog: Analog input (e.g. for the set value)
- PTC: PTC-resistor (for monitoring the motor temperature)
- KTY84: for the connection of a temperature sensor type KTY84/130.
Caution with connection of temperature sensors: the analog inputs have no "safe electrical isolation" against the control electronics and the interfaces! For that, temperature sensors should be connected if necessary.

mA-zero

Zero-point raising analog input 1.

CharactCrv

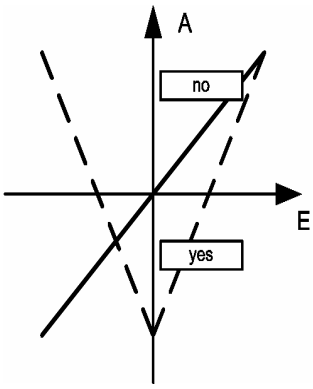
Describes how an incomming set value is processed internally:
"original": Unchanged imaging of the incomming set value upon the internal value (ascending straight line).
"negated": An incomming positive set value is imaged upon a negative internal value of same size, and vice versa (descending straight line).
"inverted":
Incomming positive set value is zero = imaging upon pos. max.value.
Incomming positive set value is pos. max. value = imaging upon zero.
Incomming set value is neg. max. value = imaging upon zero (within the range of negative incomming set values is an ascending straight line from zero to the max. value; within the range of negative incomming set values the straight line is descending from max. value to zero).



original A =
negated A =
inverted A =

Centre point

Centre-point raising for the analog input 1.
Typical application: Unipolar set value source (0..20mA) for operation in both rotating directions.
0...10 mA = CCW-run; 10 mA = zero-speed; 10...20 mA = CW-run.



no
yes

mA-limit — Monitoring threshold of the analog input 1.

R-SensrLine — In order to increase the accuracy of the temperature measurement with sensor type KTY84 at the analog input 1, the actual resistance of the feeder line must be set here.

P-Analog input 2

dito, however without R-SensrLine

P-Analog inp. Syst.1 to [no. of systems]

mA-zero — Zero-point raising analog input 1.

CharactCrv — Describes how an incomming set value is processed internally:
"original": Unchanged imaging of the incomming set value upon the internal value (ascending straight line).
"negated": An incomming positive set value is imaged upon a negative internal value of same size, and vice versa (descending straight line).
"inverted":
Incomming positive set value is zero = imaging upon pos. max.value.
Incomming positive set value is pos. max. value = imaging upon zero.
Incomming set value is neg. max. value = imaging upon zero (within the range of negative incomming set values is an ascending straight line from zero to the max. value; within the range of negative incomming set values the straight line is descending from max. value to zero).

Centre point — Centre-point raising for the analog input 1.
Typical application: Unipolar set value source (0..20mA) for operation in both rotating directions.
0...10 mA = CCW-run; 10 mA = zero-speed; 10...20 mA = CW-run.

mA-limit — Monitoring threshold of the analog input 1.

P-TEXT ACT.VALUES

T1	Text actual values can be parameterized as indicator texts to the status display (e.g. messages/fault texts). The texts are available from a selection of standardized text moduls and from the free programmable individual texts (parameterizing only via IMS). Additionally, an alternative value, that is another text can be assigned operatively to the selected text actual value via parameter switch.
T2	Text actual values can be parameterized as indicator texts to the status display (e.g. messages/fault texts). The texts are available from a selection of standardized text moduls and from the free programmable individual texts (parameterizing only via IMS). Additionally, an alternative value, that is another text can be assigned operatively to the selected text actual value via parameter switch.
T3	Text actual values can be parameterized as indicator texts to the status display (e.g. messages/fault texts). The texts are available from a selection of standardized text moduls and from the free programmable individual texts (parameterizing only via IMS). Additionally, an alternative value, that is another text can be assigned operatively to the selected text actual value via parameter switch.
T4	Text actual values can be parameterized as indicator texts to the status display (e.g. messages/fault texts). The texts are available from a selection of standardized text moduls and from the free programmable individual texts (parameterizing only via IMS). Additionally, an alternative value, that is another text can be assigned operatively to the selected text actual value via parameter switch.

P-PROGRAMMABLE TEXT

P1	Programmable individual text 1. This can be free programmed and used as induvidual text for various text displays (messages, warnings etc.). Parameterizing is possible via IMS only, a desired assignment (selection of the text P_TEXT ACT. VALUES:T1..T4) can also be made via LCD.
P2 to P10	dito

P-MESSAGES

When activated, messages indicate a two-line-text on the LCD-Display (Line 1 to 2). The message is displayed only if presently no message with higher priority is acute (e. g. a fault message). Otherwise the message has no influence on the inverter. Within the range of messages messages 1 has the lowest priority and messages 8 has the highest. For activating a message, the bit signals are available. The two texts for line 1 and 2 can be selected seperately. There is a selection of standardized texts and programmized texts. The programmized texts can only be modified with the PC program IMS via the seriell interface of the inverter. Already stored texts can be selected as message texts via the control panel.

P-Message 1

Input	Selection of signal source for message 1. Messages are indicated in two lines in the status display (call via bit-functionality), provided that no message, warning or fault of higher priority is indicated. The texts of the messages can be selected separately for line 1 and line 2.
T1	Text for message 1 in the 1st line. The text of the message can be chosen from a selection of standardized texts or from the parameterisable individual texts.
T2	Text for message 1 in the 2st line. The text of the message can be chosen from a selection of standardized texts or from the parameterisable individual texts.

P-Message 2 to 8

dito	dito

P-WARNINGS

Warnings are generating a warning text on the display and activate the common warning. The warning text is displayed only if presently no message with higher priority is acute (e.g. a fault message). Within the range of warnings Warning 1 has the lowest priority and Warning 8 the highest. The common warning however will always be set. Moreover, an entry is made in the event memory.
In case of a warning, in line 1 of the LCD always the text "WARNING" is shown, complemented by the system if necessary (high-performance devices are set up by connecting several low-performance power sections (systems) in parallel. In order to be able to localize faults or warnings precisely, the text is complemented by the system no. in case of faults or warnings). In case of programmable warnings it is possible to determine by the System-parameter, which system information shall be displayed (0 = no system information).
The text for line 2 can be selected separately. There is a selection of standardized texts and of programmable texts. The programmable texts can be modified only with the PC-program IMS via the serial interface of the inverter. Already stored texts however can be selected as warning texts by means of the keypad.
For the activation of a message the bit signals of the bit-pool are available.

P-WarnIng 1

Input	Selection of the signal source for warning 1. Warnings are indicated on the status display (call via Bit-functinality), if no warning or fault of higher priority is indicated or is actually active. The first line shows always "!! Prewarning !!“, the text in the second line can be chosen. In case of a warning, always the internal bit "collective warning“ is set.
T	Selection of the desired display text (second line) for warning 1. The text can be chosen from a selection of standardized texts or from the parameterizable individual texts.
System	Indication of the system, if required.

P-Warning 2 to 20

dito	dito

P-FAILURES

Faults are generating a fault text on the display and activate the common fault message, switching off the inverter. The fault text is displayed only if presently no message with higher priority is acute (e.g. another fault message). Within the range of faults Fault 1 has the lowest priority and Fault 12 the highest. Moreover, an entry is made in the event memory.
In case of a warning, in line 1 of the LCD always the text "FAULT" is shown, complemented by the system if necessary (high-performance devices are set up by connecting several low-performance power sections (systems) in parallel. In order to be able to localize faults or warnings precisely, the text is complemented by the system no. in case of faults or warnings). In case of programmable faults it is possible to determine by the System-parameter, which system information shall be displayed (0 = no system information).
The text for line 2 can be selected separately. There is a selection of standardized texts and of programmable texts. The programmable texts can be modified only with the PC-program IMS via the serial interface of the inverter. Already stored texts however can be selected as fault texts by means of the keypad.
For the activation of a fault the bit signals of the bit-pool are available.

P-Fault 1

Input	Selection of the signal source for fault 1. Faults are indicated in two lines on the status display (call via Bit-functionality), provided no fault of higher priority is actually signalled. In the first line is always "!! Fault !!“, the text in the second line can be selected. In case of a fault, always the internal bit "Comm.fault“ is set, the inverter disconnects electronically, LED and relay "Fault" is getting active.
T	Text for fault 1. The text for the fault can be chosen from a selection of standardized texts or from the parameterizable individual texts.
System	Indication of the system, if required.

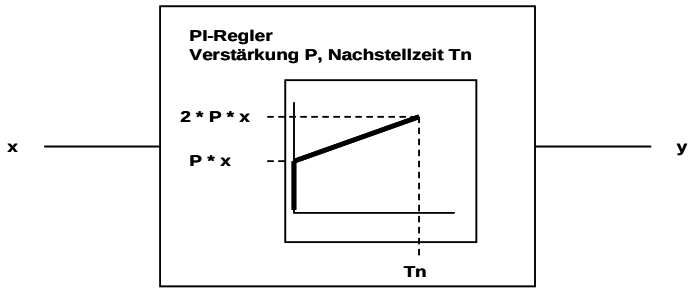
P-Fault 2 to 12

dito	dito

P-SERVICE MODULE

Channel1	Selection of the signal which is indicated with the actual value "I-DRIVE DATA:User act.1".
C1 Amplifi.	No external relevance.
C1 Address	If in parameter "Channel1" the value "Address" is selected, the signal internally stored on this address of the C161 is indicated in "I-DRIVE DATA:User act.1".
C1 format	Setting of the desired number format for the display of parameter "I-DRIVE DATA:User act.1" on the LCD.
Channel2	Selection of the signal which is indicated with the actual value "I-DRIVE DATA:User act.2".
C2 Amplifi.	No external relevance.
C2 Address	If in parameter "Channel2" the value "Address" is selected, the signal internally stored on this address of the C161 is indicated in "I-DRIVE DATA:User act.2".
C2 format	Setting of the desired number format for the display of parameter "I-DRIVE DATA:User act.2" on the LCD.
Channel3	Selection of the signal which is indicated with the actual value "I-DRIVE DATA:User act.3".
C3 Amplifi.	No external relevance.
C3 Address	If in parameter "Channel3" the value "Address" is selected, the signal internally stored on this address of the C161 is indicated in "I-DRIVE DATA:User act.3".
C3 format	Setting of the desired number format for the display of parameter "I-DRIVE DATA:User act.3" on the LCD.
Channel4	Selection of the signal which is indicated with the actual value "I-DRIVE DATA:User act.4".
C4 Amplifi.	No external relevance.
C4 Address	If in parameter "Channel4" the value "Address" is selected, the signal internally stored on this address of the C161 is indicated in "I-DRIVE DATA:User act.4".
C4 format	Setting of the desired number format for the display of parameter "I-DRIVE DATA:User act.4" on the LCD.
Addr. DSP 1	If in parameter "Channel1" ... "Channel2" the value "Adr. DSP 1" or "Adr. DSP 2" is selected, the signal internally stored on this address of the DSP is indicated in "I-DRIVE DATA:User act.1 ... 4".
Addr. DSP 2	If in parameter "Channel1" ... "Channel2" the value "Adr. DSP 1" or "Adr. DSP 2" is selected, the signal internally stored on this address of the DSP is indicated in "I-DRIVE DATA:User act.1 ... 4".

P-CONTROL PARAMETER



FOC: with motor type= async_FOC (field-oriented control); SVC: with motor type= async_SVC (Space-Vector control)

SYN: with motor type= sync

FOC / SYN	P T-ctr.FOC	Proportional component of the torque controller with field-oriented control (motor type = asyn_FOC).
FOC / SYN	Tr T-ctr.FOC	Reset time of the torque controller with field-oriented control (motor type = asyn_FOC).
SVC	P T-lim-ctr	Here you are setting the P-portion of the torque limiting controller. The torque limiting controller becomes active if SVC-control (motor type = asnch_SVC) and limiting function (P-SPEED DEFAULT/P-limit for n, P-M-CONTROL/P-limit for n) are activated to "torque".
SVC	Tr T-lim-ctr	Here you are setting the Tn-portion of the torque limiting controller. The torque limiting controller becomes active if SVC-control (motor type = asnch_SVC) and limiting function (P-SPEED DEFAULT/P-limit for n, P-M-CONTROL/P-limit for T) are activated to "torque".
FOC / SVC / SYN	P I-ctr.	P-component (amplification) of the current controller. Normally no changes are needed! Parameterizing only if no acceptable result can be achieved with the speed controller. Attention: change of set parameters should be coordinated with the factory!
FOC / SVC / SYN	Tr I-ctr.	Readjustment time (I-component) of the current controller. Normally this time does not need to be changed. Changes only in exceptional cases, if e.g. no good result can be achieved with the amplification "P I-ctr." (P I-controller). Generally: increased time would slow down the current control circuit. Attention: change of set parameters should be coordinated with the factory!
SYN	P I-ctr.pos	P-component (amplification) of current controller in case of position control: The same boundary conditions as with the "P I-ctr." (P I-controller) are applying (about the same values should be set there). Attention: change of set parameters should be coordinated with the factory!

SYN	Tr I-ctr.pos	Readjustment time of the current controller in case of position control. Normally this time does not need to be changed. Changes only in exceptional cases. The same boundary conditions as with the "Tr I-ctr." (Tr I-controller) are applying (about the same values should be set there). Attention: change of set parameters should be coordinated with the factory!
SYN	P DC-lim.	Amplification of the voltage limitation controller. Changes should be done only after contacting the service department of the Loher company!
SYN	Tr DC-lim.	Readjustment time of the voltage limitation controller. Changes should be done only after contacting the service department of the Loher company!
SYN	T Compensation	For compensation resp. counteraction in case of possibly extant "torque discontinuity" (ripple torque) with synchronous drives. No consequences with asynchronous drives. Attention! The sdame effect occurs with too high values, as with extant ripple torques themselves!
SYN	T Comp.Angle	By this parameter the angle offset of the compensation signal "T compensation" to the fundamental oscillation is set.
SYN	T Comp.Ordinal	By this parameter the ordinal number of the compensation signal "T compensation" is set.
SVC	P I-ctr.add	In special cases the tendency of the motor to oscillate can be influenced.
SVC	P I-lim.mot	Amplification of the motive current-limit controller. The setting is correct if in motor operation the output current does not oscillate remarkably over the actual current-limit (s. actual value for the actual limitting current "I-limit") and if the frequency at the motive current-limit does not fluctuate to much.
SVC	Tr I-lim.mot	Readjustment time of the motive current-limit contoller. Can be reduced at the motive current-limit to optimize the behaviour , if required. (Shorter readjustment time = faster controlling behaviour, but higher incliniation to oscillate).
SVC	P I-lim.gen	Amplification of the generative current-limit controller. The setting is correct if in generator operation the output current does not oscillate remarkably over the actual current-limit (s. actual value for the actual limitting current "I-limit") and if the frequency at the generative current-limit does not fluctuate to much.
SVC	Tr I-lim.gen	Readjustment time of the generative current-limit contoller. Can be reduced at the generative current-limit to optimize the behaviour , if required. (Shorter readjustment time = faster controlling behaviour, but higher incliniation to oscillate).
FOC / SVC	P DC-lim.	Amplification of the voltage limitation controller. Changes should be done only after contacting the service department of the Loher company!

FOC / SVC	Tr DC-lim.	Readjustment time of the voltage limitation controller. Changes should be done only after contacting the service department of the Loher company!
SVC	P Iact-ctr.	Amplification of the active current controller. Changes should be done only after contacting the service department of the Loher company!
SVC	Tn Iact-ctr.	Readjustment time of the active current controller. Changes should be done only after contacting the service department of the Loher company!

P-STATUS DISPLAY

	Status-Z1	Hereby, desired "status indications" (selectable actual value parameters) can be parameterized to the LCD of the inverter.
	Status-Z2	Hereby, desired "status indications" (selectable actual value parameters) can be parameterized to the LCD of the inverter.
	Status-Z3	Hereby, desired "status indications" (selectable actual value parameters) can be parameterized to the LCD of the inverter.
	Status-Z4	Hereby, desired "status indications" (selectable actual value parameters) can be parameterized to the LCD of the inverter.

7.9 Annex: Choices

Survey of messages, that can be assigned to a parameterizable binary output:
ATTENTION: Not all messages are available at the (for example) binary outputs. Here, you will find only a list of all messages. Which messages are available at which place is shown in the IMS-software.

inactive	Deactivation of a command. Depending on the command this can mean a logical 0 or 1.
always	permanent activation of an operating action
LOW	For the connection of a logical linkage with 0
HIGH	For the connection of a logical linkage with 1
X2:8-16,27-29	Terminal inputs at the control electronics.
X81:1-5 (1-4)	Terminal inputs at the Signals-PCB (cabinet-mount devices only)
X81:13-14 (1-4)	Terminal inputs at the Signals-PCB (cabinet-mount devices only)
X2:18-26	Terminal inputs at the Peripheral-PCB 2/4 (option)
ON internal	ON-key at internal keypad.
OFF intern.	OFF-key at internal keypad. OFF-key pressed corresponds with logical 0.
ResetIntern	Reset function at internal keypad (S+I simultaneously pressed).
ON ext.Ctrl	ON-key at external keypad
OFF extCtrl	OFF-key at external keypad. OFF-key pressed corresponds with logical 0.
Res.extCTRL	Reset function at internal keypad (S+I simultaneously pressed).
Selfholdg 1-5	Output signal of self-holding 1 to 5
Linkage 1-8	Output signal of linkage 1 to 8
STW1 Bit11-15	Profibus control word 1 Bit 11 to Bit 15
STW2 Bit0-15	Profibus control wordt 2 Bit 0 to Bit 15
IMS Fkt. 1-2	Bit of both control keys of the IMS FI-monitor (as from IMS-version N13)
Messg.MESS1-2	Output signal of message generator MESS 1 to MESS 20
Messg.COMP1-	Output signal of message generator COMP1 to COMP8
Rdy f. ON	The FI is in ready-for-start condition.
Rdy.f.work	The FI is in ready-for-operation condition.
Rel.f.work	The FI is in released-for-operation condition .
Working	The FI is in operational conditiond .
SwOnInhib.	The FI is in start-inhibited condition .
Off	An OFF 1 is just active.
Emerg. Stop	An emergency stop is just active and/or the FI in start-inhibited condition as the consequence of an emergency stop.
OFF 2	An OFF2 is just active and/or the FI in start-inhibited condition as the consequence of an OFF2 command.
ContRelease	Command controller release is active (but might not be carried out yet).
Speed on	Command speed ON is active (but might not be carried out yet).
Reset	Reset just being carried out (e.g. by pressing key S+I on the internal keypad).
Reset OFF1	Reset signal for self-holding (operating command = OFF1).
ResRelease	Reset signal for self-holding (operating command = ContRelease).
ResetSpeed	Reset signal for self-holding (operating command = Speed on).
Synchron.	The drive synchronizes to the rotating motor
SetV=ActV	The drive has reached the preset setpoint value.
SetV><ActV	Inverted signal from SetV=ActV.
DriveBlockg	If n = 0 and current limit is reached.
DrivRunning	If setpoint value > starting frequency and all ON-commands are set and f > motor slip
Speed zero	Inverted signal from drive is running
CntrVal got	If current or voltage limitting controller in action.
GeneratorOp	Regenerative operation
Motor rot.	During the preparatory time of the inverter after an ON command and when the FI is clocking.
Mains off	The FI is in mains-off condition.
MainCntctr	Triggering signal for a main contactor.
Mech.Brake	Triggering signal for a mechanical brake.
Fan on	Internal fans are engaged (high speed).
E mA AE 1	Input signal of AE1 is below the parameterized monitoring threshold
E mA AE 2	Input signal of AE2 is below the parameterized monitoring threshold

E mA AE (1)	Input signal of AE of the Signals-PCB, system 1 is below the parameterized monitoring threshold
E mA AE (2)	Input signal of AE of the Signals-PCB, system 2 is below the parameterized monitoring threshold
E mA AE (3)	Input signal of AE of the Signals-PCB, system 3 is below the parameterized monitoring threshold
E mA AE (4)	Input signal of AE of the Signals-PCB, system 4 is below the parameterized monitoring threshold
Bypass	The FI indicates a fault; exceptions are: undervoltage, phase failure or a parameterized failure.
I-asym.	Current-asymetry on the motor side, e.g. usable for phase-failure recognition.
Exc.pulse	Input signal of the pulse input is below the parameterized monitoring threshold
SV limited	Limited setpoint value (see also chapter "Limitting function")
BUS general	Communication to BUS disconnected
BUS source	Communication to BUS disconnected and at the same time setpoint source or operation source parameterized from the BUS.
RS485 gen.	Communication to the external display disconnected at the RS485.
RS485Source	Communication to the external display disconnected at the RS485 and at the same time setpoint source or operation source parameterized from the ext. display .
No warning	There is no warning active (common warning).
Warning	There is an active warning (common warning).
Wrg>RFlt (1)	Temperature of the filter resistor (System 1) too high.
Wrg>RFlt (2)	Temperature of the filter resistor (System 2) zu gross.
Wrg>RFlt (3)	Temperature of the filter resistor (System 3) too high.
Wrg>RFlt (4)	Temperature of the filter resistor (System 4) too high.
Wrg>AD.2 (1)	Temperature of output reactor 2 (System 1) too high.
Wrg>AD.2 (2)	Temperature of output reactor 2 (System 2) too high.
Wrg>AD.2 (3)	Temperature of output reactor 2 (System 3) too high.
Wrg>AD.2 (4)	Temperature of output reactor 2 (System 4) too high.
Wrg>ED.2 (1)	Temperature of input reactor 2 (System 1) too high.
Wrg>ED.2 (2)	Temperature of input reactor 2 (System 2) too high.
Wrg>ED.2 (3)	Temperature of input reactor 2 (System 3) too high.
Wrg>ED.2 (4)	Temperature of input reactor 2 (System 4) too high.
Wrg>InvExTe	Warning inverter over-temperature
PTC X2:27	A thermistor connected to terminal X2:27 has tripped.
PTC X2:28	A thermistor connected to terminal X2:28 has tripped.
EarthCurr.	The admissible parameterized earth current has been exceeded. Note: only possible with optional differential current measuring.
Flt>Mains	Mains failure (as long as function t-restart is active there is no output of a failure)
Wrg>R-Brake	A brake resistor is under heavy thermic load, e.g. owing to multiple braking actions
PTC AE 1	A thermistor connected to AE1 has tripped.
PTC AE 2	A thermistor connected to AE2 has tripped.
PTCX3:92/93	A thermistor connected to the PTC-input -X3:92/93, Peripheral-PCB, has tripped.
Fault	There is a failure occuring (common fault).
Flt>Fan	Monitoring device for fan (if provided) has tripped.
Flt>MainsPh	The phase failure monitoring device has tripped.
PTC X3:90	A thermistor connected to the PTC-input -X3:90/91, Peripheral-PCB, has tripped.
Safe halt active	An opening contact for safe halt connected to input -X3:17/18, Peripheral-PCB has opened. Permanent activation of a command.

Servicestationen/ servicecenters

Deutschland/ Germany

Elektromotor & Technik GmbH
Vertrieb und Service
Friedrichstraße 14
09380 Thalheim/Erzgebirge
Tel.-Nr. 03721-84313
Fax Nr. 03721-84256
e-mail elektromotorthalheim@t-online.de

EAB Elektro Anlagenbau GmbH
Flethstraße 29
21683 Stade-Buetzfleth
Tel.-Nr. 04146-9088-0
Fax Nr. 04146-9088-50
e-mail eab@eab-stade.de

Naumann Alfred
Elektr. Masch. Bau
Inh. Friedrich Martin
Hertzstraße 5
30827 Garbsen
Tel.-Nr. 05131-1548
Fax Nr. 05131-95025
e-mail t.heeren@alfrednaumann.de

Vogelsang & Benning GmbH
Hansastr. 92
44866 Bochum-Wattenscheid
Tel.-Nr. 02327-547-0
Fax. Nr. 02327-547-100
e-mail info@vogelsangbenning.de

Hiller Antriebssysteme GmbH
In der Vorstadt 19/1
72768 Reutlingen
Tel.-Nr. 07121-5807-08
Fax Nr. 07121-5807-38
e-mail service@hiller-Antriebssysteme.de

Scheba
Hafenstraße 36
97424 Schweinfurt
Tel.-Nr. 09721-69079
Fax Nr. 09721-609506
e-mail engelbrecht@scheba.de

Hansa-Motoren Reparaturbetr. GmbH & Co.KG
Dannenkamp 26-28
22869 Schenefeld / Hamburg
Tel-Nr. 040-853-771-0
Fax-Nr. 040-853-771-33
e-mail info@hansa-motoren.de

Siebert Elektromaschinenbau GmbH
Bunsenstraße 5-7
64295 Darmstadt
Tel. 06151-824462
Fax-Nr. 06151-895590
e-mail info@siebertgmbh.de

Ausland/ international

NIEDERLANDE
LOHER Benelux
NL-3771 ME Barneveld
Tel.-Nr. 0031-342-404660
Fax Nr. 0031-342-404661
e-mail t.brink@loher.nl

ISRAEL
Amin Engineers Ltd.
POB 1676
IL-Ramat Hasharon 47-113
Tel.-Nr. 00972-3-5408577
Fax Nr. 00972-3-5493974
e-mai l rosmeir@amin.co.il

UNGARN
Elmot Kft.
Pf. 7
1276 Budapest
Tel.-Nr. 0036-26-389 035
Fax Nr. 0036-26-389 943
e-mail elmot@mail.matav.hu

GROSSBRITANNIEN
ILE Manufacturing Limited
Service Department
Wanlip Road
Syston, Leicester UK-LE7 1PD
Tel.-Nr. 0044/116-2690900
Fax Nr. 0044/116-2690939
Mobil 0044-7971951222
e-mail r.taylor@ilem.co.uk

SPANIEN
SICAL Automation S.L.
C/Motilla del Palancar, 13
28043 Madrid
Tel.-Nr. 0034-91-300 55 15
Fax Nr. 0034-91-300 57 81
e-mail alvarob-sical@ctv.es

CHINA
LM LIFTMATERIAL
(Hong Kong) LTD.
Rm. 1403, Winning Centre 29
Tai Yau St., San Po Kong
Kowloon, Hong Kong, lmhkg
Tel. Nr. 00852-2194 1766
Mobil: 00852-9735 6781
Fax Nr. 00852 2194 7322
e-mail lmhkg@hkstar.com

Shanxi Explosion-Proof Motor (Group) CO.,Ltd.
Cheng Bei Street
13903451122
046011 Shanxi China
Tel.-Nr. 0086-355-2078620
Handy 0086-13903451122
Fax Nr. 0086-355-2078666
e-mail gfw3451122@sohu.com

LOHER GmbH

Postfach 1164
94095 Ruhstorf
Hans-Loher-Straße 32
94099 Ruhstorf

Servicezentrale/: Tel.-Nr. 08531-39-554
servicecenter Fax Nr. 08531-39-569
e-mail service.sys@loher.de
24 h hotline: Tel.-Nr. 08531-39-222
Internet: http://www.loher.de