SIEMENS

SIMATIC

Process Control System PCS 7 Basis Library (V9.0 SP3)

Function Manual

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Valid for PCS 7 as of V9.0 SP2

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Legal information

Warning notice system

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

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

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

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

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

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

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Security information 1

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

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https://www.siemens.com/industrialsecurity.

General Information About Block Description 2

The setup of the block description is always uniform and contains the following sections:

Header of the block description

Example: CTRL_PID: PID controller block

The header begins with the type name of the block (e.g., “"CTRL_PID"). This symbol name is entered in the symbol table and must be unique within the project.
In addition to the type name, you will also see a keyword indicating the purpose or function of the block (e.g., "PID controller block").

Object name (type + number)

FB x

The object name for the block type is made up of the type of implementation (function block = FB, function = FC) and the block number = x.

Links for displaying block I/Os

Example:

- CTRL_PID block I/Os

Click the "Block I/Os" link to display a list of block I/Os for the designated block.

Links for displaying the block icon and faceplate

If the block is intended for operator control and monitoring and a block icon and faceplate exist, the corresponding image and description can be displayed directly by clicking these links.

Example:

- CTRL_PID block icon
- CTRL_PID faceplate

Function

Here, you will find a brief description of the block function.
You will find additional information about complex blocks in the "How it works" section.

How it works

Here, you will find more detailed information, for example about the function of specific inputs, operating modes or time sequences. You must be familiar with these relationships in order to use the block effectively.

Calling OBs

Here you will find information on the organization blocks (OBs), in which the described block must be installed. If the CFC is used, the block is automatically installed in the cyclic OB (cyclic interrupt) and in the OBs listed in the block's task list (for eample in restart OB100).

CFC generates the required OBs during compilation. If you use the blocks without CFC, you will have to program these OBs and call their instance within the blocks.

Error handling

The **ENO** Boolean block output indicates the error in the CFC chart.
The value is equivalent to the **BIE** (binary result in STEP 7 STL, after completion of the block) or **OK** bit (in SCL notation) and indicates:

ENO = BIE = OK = 1 (TRUE) -> The result of the block is free of errors.

ENO = BIE = OK = 0 (FALSE) -> Invalid result or constraints (for example, input values and modes).

The FBs also return the inverted BIE at the **QERR** output of the instance DB.

QERR = NOT ENO

The error message is generated in two separate operations:

- The operating system detects a processing error (e.g. value overflow, system functions called return an error ID with BIE = 0).
  This is a system function and is not specifically mentioned in the block description.
- The block algorithm checks for functional invalidity of values and operating modes. These error events are logged in the block description.

You can evaluate the error display, for example, to generate messages or use substitute values for invalid results. You will find more information about messages in the "Message blocks" section.

Startup characteristics

The different startup behaviors are as follows:

- Initial start
  The block is called for the first time from the OB in which it has been inserted. This is usually the OB that performs the standard, process-specific operations (for example, the cyclic interrupt OB).
  The block adopts a status that conforms to its input parameters. These may be default values (additional information in "I/Os" section) or values you have already configured, for example, in CFC. The initial startup characteristics are not described separately unless the block does not conform to this rule.
- Startup
  The block is executed once during CPU startup. The block is called in the startup OB (where it is additionally installed either automatically in the ES or manually in STEP 7). In this case, the startup characteristics are described.
  Please note that the block outputs have default values and that these can take effect during the CPU startup with other blocks, if these are processed first.
  The correct startup behavior of the blocks is the responsibility of the configuration engineer.

Time response

A block assigned this function must be installed in a cyclic interrupt OB. It calculates its time constants/parameters on the basis of its sampling time (the time which elapses between two consecutive cyclic operations).

In a CFC configuration on ES, the sampling time is also determined by the segmentation of the runtime group, which ensures that the block is not executed during every OB run.

This sampling time is entered at the I/Os, in the SAMPLE_T parameter.

When configuring with CFC, this occurs automatically once the block has been inserted in the OB and the runtime group. For this reason, this input is set to invisible in CFC.

During the STEP 7 configuration, you set the time response manually.

Time response is mentioned only if the block has been assigned this feature.

Message response

A block with message response reports various events to the higher level OS. Existing parameters required for the generation of messages are documented.

Blocks without message response can be expanded with additional message blocks. A reference to the message response is found in the description of the individual message blocks.

I/Os

The I/Os of the block represent its data interface. These I/Os can be used either to transfer data to the block or to fetch results from the block.

I/O (parameter)	Meaning	Data type	Default
U1	Addend 1	REAL	0
.....			

The "I/O" table lists all I/O parameters of the block type. You can access these lists using the engineering tools. They are in alphabetical order. Elements accessible only via the block algorithm (internal variables) are not listed.
The meaning of the columns is as follows:

- **I/O**
  Name of the parameter, derived from the English, e.g. PV_IN = **P**rocess **V**ariable **IN**put (process variable, controlled variable).
  The SIMATIC naming conventions have been applied.
  The block representation in CFC as supplied is as follows:
  I/O name in **bold** characters = I/O is visible, regular = I/O is invisible.
- **Meaning**
  Function (possibly also short description)
- **Data type**
  S7 data type of the parameter (BOOL, REAL, etc.)
- **Default (default value)**
  The value of the parameter before the block runs for the first time (unless changed in the configuration)

Display for avoiding stop without asset management

3

Block icon "OB_BEGIN_BASE" / "OB_BEGIN_PN_BASE" / "OB_BEGIN_HPN_BASE "

If your system does not have ASSET diagnostics, a separate block icon for the avoidance of stop is provided on the OS in the template @TemplateBasisLibraryV8.

Configuration

You configure a corresponding block icon for each AS. You then interconnect each block icon with the corresponding structure variable.

To achieve all the required interconnections to the block icon, it is best to use the PCS 7 WinCC Wizard for interconnecting faceplates to process tags. In the tag dialog "List of all structure variables", you can select the relevant block instance.

Note on the faceplate

In the OB_BEGIN/ OB_BEGIN_PN/OB_BEGIN_HPN and CPU_RT faceplates without asset management, the message view, the performance view and the detailed views (OB3x and OB8x/ OB1) are displayed if SFC78 is supported on the AS. If SFC78 is not supported, only the message view of the faceplate is displayed.

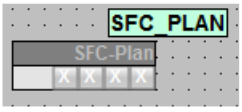
The identification view and parameter view are not shown.

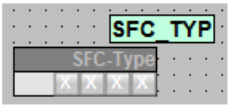
Icons for user-defined SFC types

4

Icons for user-defined SFC types

The following icons are available in the template for user-defined SFC types "@TemplateBasisLibraryV8".





For more information, refer to the manual SFC Visualization - Manual for S7 or in Simatic Manager to the "SFC properties" dialog, "OS" tab or the "Properties for SFC type/SFC instance" dialog, "Options" tab.

Family: CONTROL

5

5.1 FM_CO: Coordination of function blocks which read data records

5.1.1 Description of FM_CO

Object name (type + number)

FB 79

- FM_CO block I/Os (Page 25)

Function

The block coordinates the data record reading of the blocks

Block	Library	Module
FM_CNT	PCS 7 Basic Library	FM350-1, FM350-2
FMCS_PID	PCS 7 Library	FM355
FMT_PID	PCS 7 Library	FM355-2
REAS355P	PCS 7 Library	FM355, FM355-2
FmCont	PCS 7 APL	FM355
FmTemp	PCS 7 APL	FM355-2

The block is installed and the parameters interconnected by the driver generator.

Block	Configuration of the coordination number	Interconnections between FM_CO and the data record reading instance: FM_CO - DS reading instance
FM_CNT, FMCS_PID	CO_NO	EN_CO_x <-> EN_CO
FM_PID, READ355P	CO_NO	ENCOx_yy <-> ENCO
FmCont, FmTemp	CoordNo	EN_CO_x <-> EnCoord ENCOx_yy <-> EnCoNum

Where:

x = Sequence of data record reading blocks (0 to 7)

yy = Coordination number within a sequence (0 to 63)

It is possible to include data record reading blocks of other modules in the coordination.

How it works

The FM_CO block can start a maximum of 8 block sequences.

The blocks connected to the output structure EN_COx check whether the current coordination number (EN_COx.CO_ACT) corresponds to their own coordination number (CO_NO/CoordNo). If this is the case, they read their data records from the module and reduce the coordination number EN_COx.CO_ACT by 1, so that the next block can read out its data records.

If the current coordination number of a sequence (EN_COx.CO_ACT) has a value less than 1, the FM_CO block determines the highest number assigned in sequence x based on its inputs ENCOx_yy. The data reading blocks supply the inputs ENCOx_yy with their respective coordination number via an interconnection. The highest coordination number is the number for which ENCOx_yy = yy still applies. The FM_CO module restarts the sequence in which it sets EN_COx.CO_ACT to this value.

This algorithm ensures that no more than one read data record operation ever takes place at any given time within the block sequence.

Calling OBs

The fastest cyclic interrupt OB of all OBs in which you have installed data reading block instances and OB100 as well.

Use in CFC

When using the CFC function "**Generate Module Drivers**", the block is automatically installed and the connections, such as those described under "Installation regulation" are made.

If you install, delete or move blocks of an existing block sequence in other OBs or runtime groups, the driver generator must be called.

Should the sequence not start up as expected (after CPU restart) or not continue to run (after downloading changes), you must set ACC_ID to 1.

Installation rules/capacity

One FM_CO is responsible for one DP master system and has 8 sequences with data record reading block instances that are coordinated in parallel. The first block sequence contains instances of the data recording reading blocks that relate to the DP slaves 1, 9, 17 and so on. The second block sequence contains instances of the data recording reading blocks that relate to the DP slaves 2, 10, 18 and so on. The same principle applies to the remainder of the eight block sequences.

Note

When an instance is added to a sequence by a data recording reading block, the sampling time of all instances in the sequence increases. If, for example, an instance from DP slave 9 is added to the sequence 1, then the sampling time of all instances of sequence 1 increases including the instances from DP slave 1.

A sequence may contain up to 63 data recording reading instances of the following blocks:

Block	Data record reading channels	Module
FM_CNT	One instance of FM_CNT is required for each module. 4 channels are read with one data record read operation per cycle	FM350-1, FM350-2
FMCS_PID, FMT_PID, FmCont, FmTemp	The module has 4 controller channels. One channel is read with one data record read operation per cycle.	FM355, FM355-2
READ355P	Certain process values of all 4 channels are read with one data record read operation per cycle.	FM355, FM355-2

The FM_CO must always be installed before the first data record reading instance in the fastest cyclic interrupt OB. The output structure EN_COx for the DP slave is connected to the input structures EN_COx or EnCoord of all data record reading instances that communicate with the controller modules of rack x. The output ENCO or EnCoNum of each data record reading instance is connected to an input ENCOx_yy (yy corresponds to the coordination number CO_NO or CoordNo assigned to each data recording reading instance) of the FM_CO block.

The selection of the cyclic interrupt OB depends on the CPU load. Note that the CPU has no reserves for other "Read data record" jobs if operating with eight or more DP slaves because only eight jobs can be buffered per DP master system. Simply inserting a module would lead to an overflow. It is advisable to operate only up to six DP slaves on a DP master system. The remaining DP slaves must be distributed on other DP master systems with further FM_CO blocks.

When selecting the cyclic OB, remember that the new data will be available at the earliest after two cycles. Make sure that the maximum runtime of this OB does not have any negative impact on overall system runtime as a result of the number of blocks installed. If the data recording reading block instances to be processed exceed the runtime limit, group the DP slaves with the FM350/FM355 modules in fast and slow control loops.

Startup characteristics

EN_CO_x.CO_ACT = 1 is set at all outputs during startup (restart).

Time response

Not available

Message functionality

Not available

5.1.2 I/Os of FM_CO

The factory setting of the block display in the CFC is identified in the "I/O" column: I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
ENCOx_yy	The coordination number yy is assigned in the rack x if the input has the value yy (x = 0 - 7, yy = 1 - 64)	BYTE	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
EN_CO_x	Coordination number of the block that can read data records	STRUCT	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	Restart all sequences	BOOL	1

Family: @System

6

6.1 CONEC: Monitoring the AS connection status

6.1.1 Description of CONEC

Object name (type + number)

FB 88

- CONEC Block I/Os (Page 29)

Area of application

The CONEC block monitors the status of AS connections, and reports the associated error events.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 100	Warm restart

Use in CFC

With the "**Generate module drivers**" CFC function, the CONEC block is automatically installed in the OBs listed above.

Function and method of operation

The CONEC block generates messages which are output at ALARM_8P to WinCC (see "Message response"). For connection diagnostics, SFC 87 (C_DIAG) is called at intervals of 10 seconds in the cyclic interrupt OB 32. Up to 128 simple and up to 64 redundant connections are monitored.

Note

The messages "Failure or loss of redundancy connection ID" are generated by each CPU of the two connected AS except when the CPU (or both H-CPUs) of an AS fails.
The connection ID determines whether a message is output.
If the connection ID >= 16#C00 **no** message is generated.

Formation of the maintenance status MS

If any connection in the CONEC block is detected as having failed, the "Maintenance alarm" maintenance status is output.

If any connection in the CONEC block is detected as a redundancy loss, the "Maintenance demanded" maintenance status is output.

If the messages are disabled via the parameter EN_MSG in the CONEC block, the maintenance status "Unchecked / Unknown" is output.

Error handling

Error handling for the block is limited to the evaluation of the error information of ALARM_8P. You will find additional information in the

"Error Information of Output Parameter MSG_STAT" (Page 530) section.

Startup characteristics

The CONEC block initializes the messages of ALARM_8P.

If there is a CPU with SFC 87, connection diagnostics is initialized. After this, there is a wait time of approx. 1 minute in the cyclic interrupt OB before the connection diagnostics messages are generated.

Overload behavior

Not available

Time response

For additional information, refer to "Message response".

Message response

The block generates the following messages in the OBs listed below:

OB	Start Event	Message
OB 32	1 sec. cyclic interrupt or alternative cyclic interrupt OB	Failure connection ID: xx incoming/outgoing Loss of redundancy connection ID: xx entering/exiting state

If EN_MSG = FALSE, messaging is disabled.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of CONEC (Page 30)

Maintenance status MS (Page 533)

6.1.2 I/Os of CONEC

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number for ALARM_8P_x (x = 1 - 24, assigned by the ES)	DWORD	0
MS	Maintenance status	DWORD	0
SAMPLE_T	Sampling time OB in seconds	REAL	1.0

Output parameters

I/O (parameter)	Meaning	Data type	Default
MSGSTAx	Output STATUS of the ALARM_8P_x (x = 1 - 24)	WORD	0
O_MS	Maintenance status	DWORD	0
QMSGERx	Error output of the ALARM_8P_x (x = 1 - 24)	BOOL	0

Additional information

For additional information, refer to the sections:

Message texts and associated values of CONEC (Page 30)

Maintenance status MS (Page 533)

6.1.3 Message texts and associated values of CONEC

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class (Page 531)
EV_ID1 to EV_ID16	1	Failure connection ID: 16#@1%X@	PLC Process Control Message - Failure
	2	Failure connection ID: 16#@2%X@	PLC Process Control Message - Failure
	3	Failure connection ID: 16#@3%X@	PLC Process Control Message - Failure
	4	Failure connection ID: 16#@4%X@	PLC Process Control Message - Failure
	5	Failure connection ID: 16#@5%X@	PLC Process Control Message - Failure
	6	Failure connection ID: 16#@6%X@	PLC Process Control Message - Failure
	7	Failure connection ID: 16#@7%X@	PLC Process Control Message - Failure
	8	Failure connection ID: 16#@8%X@	PLC Process Control Message - Failure
EV_ID17 to EV_ID24	1	Loss of redundancy connection ID: 16#@1%X@	PLC Process Control Message - Error
	2	Loss of redundancy connection ID: 16#@2%X@	PLC Process Control Message - Error
	3	Loss of redundancy connection ID: 16#@3%X@	PLC Process Control Message - Error
	4	Loss of redundancy connection ID: 16#@4%X@	PLC Process Control Message - Error
	5	Loss of redundancy connection ID: 16#@5%X@	PLC Process Control Message - Error
	6	Loss of redundancy connection ID: 16#@6%X@	PLC Process Control Message - Error
	7	Loss of redundancy connection ID: 16#@7%X@	PLC Process Control Message - Error
	8	Loss of redundancy connection ID: 16#@8%X@	PLC Process Control Message - Error

Assignment of associated values

Process control messages are generated with EV_ID1 up to EV_ID24 via ALARM_8P associated values. The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameter	Data type
EV_ID1... EV_ID24	1	Connection_ID 1+x	WORD
	2	Connection_ID 2+x	WORD
	3	Connection_ID 3+x	WORD
	4	Connection_ID 4+x	WORD
	5	Connection_ID 5+x	WORD
	6	Connection_ID 6+x	WORD
	7	Connection_ID 7+x	WORD
	8	Connection_ID 8+x	WORD

x = 0 for EV_ID1, x = 8 for EV_ID2, x = 16 for EV_ID3 etc. up to x = 120 for EV_ID16
x = 0 for EV_ID17, x = 8 for EV_ID18, x = 16 for EV_ID19 etc. up to x = 56 for EV_ID24

6.2 CPU_RT: Determination of the runtime of OBs

6.2.1 Description of CPU_RT

Object name (type + number)

FB 128

- CPU_RT block I/Os (Page 38)

Area of application

The CPU_RT block is installed by the CFC in OB 100, OB 1, in all OB 3x as well as OB 8x, if this is used by the user program.

The CPU_RT determines the runtime of the individual OBs and their participation in the cycle time. If there is CPU overload (OB 80 cycle time exceeded), it instigates suitable actions selected by the user in limits to ensure operability of the AS.

This situation is designated as emergency operation and is made clearly visible by a process control message. Buffered start events (OB 3x still executing) are also detected and displayed. The loss of start events is reported as error.

Use in CFC

During compilation of the CFC, a chart is automatically created with the name @CPU_RT. The CPU_RT block is already included in it.

Note

Never attempt to insert the CPU_RT block in a different block because it is a system block.

Function and method of operation

At CPU restart and when downloading changes the slowest OB 3x is determined with SZL ID 822 (data records of all assigned alarms of an alarm class).

Note: The slowest cyclic OB 3x (slowest OB) must also have the lowest priority set so that a useful analysis is possible.

If there are implausible settings in OB-BEGIN, a "Priorities of cyclic OBs do not conform to PCS 7" EV_ID2 signal 3 message is output and the maintenance status (MS) is set to "Maintenance demanded" = 16#00000005.

SFC78 is used to determine the OB runtimes. If it is not present, no warning limit will be output as a message.

Note

Older CPUs do not support SFC78. Use SSL112 to check whether SFC78 is available.

Note

The status of CPU_RT is reset when you download.

Behavior at higher CPU load

If the average value of all net runtimes (in % of OB 3x, OB 8x + OB 1) exceeds the value MAX_LIM, then in OB_BEGIN, the message EV_ID2- signal 1 "Net time consumption of all OBs exceeds max limit" is output.

The maintenance status MS is set to "Maintenance demand" = 16#00000005 in OB_BEGIN.

The message and MS are cleared with a value less than MAX_LIM – HYS.

Behavior in the event of OB request errors

If a programmable number of these OB 3x events has been exceeded or if an OB 1 event is detected without an OB 1 having been processed, the message EV_ID3 – Signal 2 "OB request: OB 3x still being processed" is output in OB_BEGIN. The number of OB 3x events can be set at the input "N_REG_ERR"; the default value = 4.

The maintenance status MS is set to "Uncertain maintenance demanded" = 16#00000006 in OB_BEGIN.

If an OB 1 is then run through again, the MS is reset and this process control message will be marked as "outgoing".

In the faceplate of OB_BEGIN, there is a display of the request error for each OB 3x. The first occurrence of a request error is be displayed. These displays can be reset with the reset key.

Behavior when the maximum cycle time is exceeded

If the maximum cycle time is exceeded, a message EV_ID3 – Signal 1 "Cycle time exceeded: @1d@ OB@2d@" is output.

The maintenance status MS is set to "Bad or maintenance alarm" = 16#00000007 in OB_BEGIN.

If an OB 1 is then run through again, the MS is reset and this process control message will be marked as "outgoing".

Behavior to prevent stop

If the cycle time is exceeded twice without an OB 1 being processed, this results in **Emergency Operation** with stop avoidance activated. The process control message EV_ID1 – Signal 3 "Emergency operation, reducing ratio of cyclic OBs" is output.

The maintenance status MS is set to "Bad or maintenance alarm" = 16#00000007.

If the CPU resumes normal operation after the problem has been eliminated, the MS is reset and this process control message is marked as "outgoing".

Behavior during downloading

The status of CPU_RT is reset when you download.

Measures for avoiding stop

When the CPU is overloaded you can prevent the CPU from becoming inoperable by "load shedding". Load shedding is achieved by suspending the cyclic levels and is an emergency mode. The user can still exclude individual OBs for the first escalation stage, for example the level with the F drivers.

To avoid a CPU stop, CPU_RT takes the following measures in OB 80 when reaching a cycle overflow occurs:

- Cycle time monitoring is triggered with an SFC43 call, to prevent a CPU stop.
- A memory bit is set to detect the next immediate OB 80 call within an OB 1 call, so that, if necessary, measures can be initiated that prevent an overload of the AS.

In OB 80, the measures to prevent the overload are initiated and they reversed in the slowest OB.

Two escalation stages can be set:

Stage 1: None of the used OB 3x blocks will be processed for one cycle, unless they have been excluded by the user (OB3x_ATTN = FALSE).

Stage 2: Now all previously excluded OB 3x blocks will likewise not be processed for one cycle. If this does not have a steadying effect, whenever OB 3x blocks are executed their execution will be suspended again for one cycle.

Assign the parameters in CPU_RT for each OB 3x at the following inputs:

OB3x_ATTN = TRUE	The OB is included in the measures to prevent overload. Default is "TRUE".

The maximum number of SFC43 calls can be set at the input MAX_RTRG. If the maximum number x is exceeded, the CPU goes to stop.

The number x is reset when there is an OB 1 call again.

If you set MAX_RTRG = 0, then the function stop avoidance on overload function is deactivated.

If the measures are effective, in other words OB 1 is run through again, a calculation is made at that point to determine whether canceling the measures would again result in overload. If yes, the measures remain in effect. The measures are reduced step-by-step, when safe operation is possible again.

Reversal of the measures for stop avoidance

To initiate a reversal the percentage sum of the cyclic OBs calculated back to a lower reduction ratio, must be less than full CPU utilization.

Use the parameter MAX_VAL to set the value that corresponds to full CPU utilization. The value "95" is default.

The calculation is made according to the following formula:

```
((NET30PERint * (OB30_N_START+1) / OB30_N_START)+
 (NET31PERint * (OB31_N_START+1) / OB31_N_START)+
 (NET32PERint * (OB32_N_START+1) / OB32_N_START)+
 (NET33PERint * (OB33_N_START+1) / OB33_N_START)+
 (NET34PERint * (OB34_N_START+1) / OB34_N_START)+
 (NET35PERint * (OB35_N_START+1) / OB35_N_START)+
 (NET36PERint * (OB36_N_START+1) / OB36_N_START)+
 (NET37PERint * (OB37_N_START+1) / OB37_N_START)+
 (NET38PERint * (OB38_N_START+1) / OB38_N_START)+
 NET01PER)< MAX_VAL
```

NETxxPERint is the percentage share of a cyclic OB in the total runtime as a mean value and (OB30_N_START+1) is the current reduction factor of the OB.

The net percentage values are also mean values, because in case of reduction, averaging is a must.

For the calculation, a separate mean value generation was used that has a separate sample factor (SAMPLE_RE).

If the condition is satisfied, then after a number of cycles in the slowest OB (parameter "UndoCycle") the reduction factor is decremented by 1 for all OBs.

If the total sum of the OBs is still below MAX_VAL after this, then after a number of cycles in the slowest OB (UndoCycle), the factor will continue to be decremented until the used cyclic OBs have reached the reduction factor 1.

After this, for the OBs (OB3x_ATTN = FALSE) excluded by the user, the reduction ratio will be set to 0.

Finally. the reduction ratio will be set to 0 for all other cyclic OBs.

If no SFC78 is present, then the time at which reversal of the stop avoidance measures can be triggered cannot be calculated.

The reversal of reduction ratios is started when the slowest OB has again processed a number of cycles (UndoCycle).

The value of the UndoCycle in this case should not be too low, to avoid a frequent back and forth between stop avoidance measures and normal operation.

For the reduction ratio in the CFC, two parameters are available in the CPU_RT block for each cyclic OB:

OB3x_N_START	The start value for reduction ratio is specified by the input OB3x_N of CPU_RT and also in OB3x_N_CNT
OB3x_N_CNT	The counter is decremented in the CFC at each OB call. For OB3x_N_CNT <= 0 there is complete OB processing and OB3x_N_START will be re-entered in OB3x_N_CNT.

The CPU block is also called when reduction becomes necessary, so that in emergency operation an evaluation of the averaged cycle time is possible.

Utilization display with SFC78

When the block executes, the calling OB is determined. For every OB with the system function SFC78, it reads the net runtime, LAST_RTxx, and the gross runtime LAST_Etxx of the last completed OB processing. The absolute times are specified in milliseconds.

The mean value is generated for each OB (OB 3x and OB 8x) according to the formula

Mean value = mean value + (new value – mean value) / sample_AV

SAMPLE_AV is a parameter that is calculated separately for each OB 3x, OB 8x. If necessary, you can adapt the precision of the mean value with this parameter that is based on the number of measuring cycles, or on the influence of the new value on the mean value.

The default of SAMPLE_AV = 25 cycles, based on the slowest cyclic OB.

The actual sample factor for specific OBs is determined according to the following formula:

SampleOB3x = Sample * execution frequency of the slowest OB / execution frequency of OB3x

This ensures equally-weighted mean value generation over time for all cyclic OBs.

The sample factor for the total mean value of OB 1, and for OB 8x, is set to = sample, because the basis for these values is also the execution frequency of the slowest OB.

Use the reset button on the faceplate of OB_BEGIN to reset mean value generation.

After the reset, the divisor "Sample" of 1 per cycle is incremented by 1.

This means that with the reset, mean value generation is initially imprecise and it becomes more precise through the factor "sample". The influence of the new value on the mean value initially is significant and diminishes as the "sample" factor becomes greater.

By resetting the data, a fresh measuring cycle can be started at anytime.

The reset of all mean values takes place in OB 1. Mean value generation does not take place during this time.

Note

After CPU restart/reset, the block has a value of TOTALMIN = 100 and TOTALMAX = 0 till the slowest OB3x has been run, before reaching its first process cycle. After the first cycle the values are updated from the calculated actual value (TOTALMIN value decreases and TOTALMAX value increases).

Connection load display

The connection states of the configured connections from the CPU ≥ V6 are queried through the block. The data are evaluated for all connections*. The 5 connections with the highest load are set at the CON1-5 block outputs.

Connection type

The connection type specifies the kind of connection involved. These are listed in the following table:

CONx_TYPE	Type of connection
0	Invalid connection type
1	Fixed configured S7 connection
2	Fixed configured S7 connection (fault-tolerant)
3	T connection (TCP native)
4	T connection (UDP)
5	T connection (ISO-on-TCP)
6	Routed connection
7	PG connection
8	OP connection
9	OMS connection
10	Free connection
11	Free connection (TCP)
12	System connection
13	RPC7 connection
14	Connection for basic communication

Identification / partner

You can use this to recognize the connection involved. This connection must be unique. Depending on the connection type, the ID and the partner are determined as follows:

Connection type	Text	tag
1-2	Local ID: a	a = User ID (hex)
3-5	AWP ID: 16# a	a = User ID (hex)
6	-	-
7-9	Partner address: a.b.c.d*	a..d = CONx_R_ADDR0..3*
10-11	-	-

12	Device ID 16# a R/S b/c	a = UserId (hex), b = rackNr c = slotNr
13-14	Partner address: a.b.c.d*	a..d = CONx_R_ADDR0..3*

* CONx_R_ADDR_LEN is used to determine the length of the CONx_R_ADDR0..3 = a..d to be represented. Only the number of bytes actually addressed are displayed.

Last

This shows the load of the connection in percent, associated with the CONx_PER tag

Error handling

If the read-out of data from the cyclic OB fails for the CPU_RT block, then ERR_NUM = 1 is set and processing of the CPU_RT block is abandoned, because these data are the basic prerequisite for useful processing.

Startup characteristics

Calculations with SFC78 are restarted only after a number of cycles (RunUpCyc) after restart. The RunUpCyles are counted down in the slowest cyclic OB.

Time response

Not applicable.

Message response

The block reports via OB_BEGIN (Page 270)

Operator control and monitoring:

If asset management is used in the project and the diagnostics screens have been generated, the faceplate can be called via the block icon of the AS.

- OB_BEGIN faceplate
- Asset Management block icons (for additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual)

If no asset management is used in the project, the "OB-BEGIN" block icon is used to display avoidance of stop.

Additional information

You can find additional information on this subject in the following sections:

Message texts and associated values of OB_BEGIN (Page 275)

Maintenance status MS (Page 533)

6.2.2 I/Os of CPU_RT

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O	Meaning	Type	Default
DELTA_L	Flag for change compile	BOOL	1
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
HYS	Hysteresis of the max. total number	INT	5
MAX_LIM	Max. total number	REAL	75
MAX_RTRG	Max. number of calls (for SFC 43)	INT	50
MAX_VAL	Max. value for calculating the reset of reduction ratios	REAL	95
N_REQ_ERR	Number of OB 3x request errors	INT	4
OB3x_ATTN	(x = 0 – 8) OB 3x: 1 = participates in measures to prevent overloads	BOOL	1
RESET	Resets the mean values, minimum values, and maximum values	BOOL	1
RUNUPCYC	Number of start-up cycles	INT	5
SAMPLE_AV	Sample factor for mean value generation	INT	50
SAMPLE_RE	Sample factor for mean value generation internal	INT	50
UNDO_CYC	Counter in the slowest OB for emergency operation	INT	100

Output parameters

I/O	Meaning	Type	Default
CON_LOAD_ACT	1 = I/O for loading function is available	BOOL	0
CONx_TYPE	(x = 1 - 5) I/O type	WORD	0
CONx_USER_ID	(x = 1 - 5) I/O ID from NetPro	WORD	0
CONx_INT_CN_ID	(x = 1 - 5) Unique internal name of I/O	WORD	0
CONx_DEVICE_ID	(x = 1 - 5) Low byte: Device I/O, high byte: Rack/Slot of the CP	WORD	0
CONx_MAXP	(x = 1 - 5) Maximum proportion of bytes, sent and received	INT	0
CONx_REM_ADDR_LEN	(x = 1 - 5) Length of the I/O address	WORD	0
CONx_REM_ADDR0..7	(x = 1 - 5) I/O address 0 to 7	BYTE	0
CONx_LOAD	(x = 1 - 5) Number of bytes sent and received during the sampling time	DINT	0
CONx_PER	(x = 1 - 5) Percentage of total number of bytes	INT	0
CPU_RT_DATA	System structure: Performance data	STRUCT	
DAT_PLAU	1 = slowest OB 3x has the lowest priority	BOOL	0
ERR_NUM	1 = occurrence of an error	INT	
EXC_FR3x	(x = 0 – 8) execution cycle (in ms) of the OB 3x	INT	0

I/O	Meaning	Type	Default
GRO3xAV	(x = 0 – 8) gross mean value	REAL	0
GRO3xCUR	(x = 0 – 8) gross current value	REAL	0
GRO3xMAX	(x = 0 – 8) gross maximum value	REAL	0
GRO3xMIN	(x = 0 – 8) gross minimum value	REAL	0
GRO3xPER	(x = 0 – 8) gross mean value (in %)	REAL	0
MAXCYCTI	Set scan cycle monitoring time	INT	0
N_OB1_CYC	Number of OB 1 calls during a cycle of the slowest OB	INT	0
NET01AV	Net mean value of OB 1 (in ms)	REAL	0
NET01CUR	Net current value of OB 1 (in ms)	REAL	0
NET01MAX	Net maximum value of OB 1 (in ms)	REAL	0
NET01MIN	Net minimum value of OB 1 (in ms)	REAL	0
NET01PER	Net mean value of OB 1 (in %)	REAL	0
NET3xAV	(x = 0 – 8) net mean value of OB 3x (in ms)	REAL	0
NET3xCUR	(x = 0 – 8) net current value of OB 3x (in ms)	REAL	0
NET3xMAX	(x = 0 – 8) net maximum value of OB 3x (in ms)	REAL	0
NET3xMIN	(x = 0 – 8) net minimum value of OB 3x (in ms)	DINT	0
NET3xPER	(x = 0 – 8) net mean value of OB 3x (in %)	REAL	0
NET8xAV	(x = 0 – 8) net mean value of OB 8x (in ms)	REAL	0
NET8xCUR	(x = 0 – 8) net current value of OB 8x (in ms)	REAL	0
NET8xMAX	(x = 0 – 8) net maximum value of OB 8x (in ms)	REAL	0
NET8xPER	(x = 0 – 8) net mean value of OB 8x (in %)	REAL	0
OB3x_N_CNT	(x = 0 – 8) decrementing counter for reduction ratio	INT	0
OB3x_N_START	(x = 0 – 8) start value for reduction ratio	INT	0
REQ01ERR	(x = 0 – 8) OB request errors since the last reset	BOOL	0
REQ3xERR	(x = 0 – 8) OB request errors	BOOL	0
SFC78_EX	1 = SFC 78 available in CPU	BOOL	0
SL_OB	Slowest OB 3x	BYTE	0
SL_OB_EXC_FR	Number of calls of the slowest OB 3x	INT	0
TOTALAV	Total average value of all OB 1, OB 3x, OB 8x (in %)	DINT	0
TOTALCUR	Total current value of all OB 1, OB 3x, OB 8x (in %)	DINT	0
TOTALMAX	Total maximum value of all OB 1, OB 3x, OB 8x (in %)	DINT	0
TOTALMIN	Total minimum value of all OB 1, OB 3x, OB 8x (in %)	DINT	0

In/out parameters

I/O	Meaning	Type	Default
IDLE_CYC	CPU utilization display	INT	0

Additional information

You can find additional information on this subject in the following sections:

Message texts and associated values of OB_BEGIN (Page 275)

6.3 DIAG_AB: Evaluation of statusword AB7000

6.3.1 Description of DIAG_AB

Object name (type + number)

FB 414

- DIAG_AB Block I/Os (Page 42)

Area of application

The DIAG_AB block evaluates the status word of an AB7000 slave and acknowledges newly reported errors via the control word of the slave.

Calling OBs

The cyclic OB and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is installed in the run sequence before the MOD_PAL0 or MOD_PAX0 block, both of which are also installed by the driver generator. The install is executed in the same cyclic OB as the associated signal processing blocks FF_A_xx.
- Parameters are assigned to the LADDR_C input with the address of the control word of the AB7000.
- Parameters are assigned to the input LADDR_S with the address control word of the AB7000.
- The OUT structure CPU_DIAG of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of DIAG_AB.
- The input mode of the DIAG_AB block is interconnected with the output OMODE_00 of the PADP_L10 or PADP_L01 block.
- The input PA_DIAG of the DIAG_AB block is interconnected with the output PA_DIAG of the PADP_L10 or PADP_L01 block.
- The output OMODE of the DIAG_AB block is interconnected with the input MODE_00 of the MOD_PAL0 or MOD_PAX0 block.
- The output ODIAG of the DIAG_AB block is interconnected with the input PA_DIAG of the MOD_PAL0 or MOD_PAX0 block.

Function and method of operation

The DIAG_AB block cyclically analyses the status word of the AB7000 slave,

If a Modbus device fails, or if there is a higher-level error at the MODE input, then the OMODE and PA_DIAG outputs are set to "Bad":

Parameters	Value	Description
OMODE	16#40000001	Higher level error
ODIAG	16#00400000	Due to process no valid values

After an error exiting state the outputs are set to the status "Good":

Parameters	Value	Description
OMODE	16#80000001	Valid value
ODIAG	PA_DIAG	Diagnostics information from PADP_L10 or PADP_L01 block

The outputs SR_CODE and SR_DATA show the last values of a status tab sent by the AB7000. The meaning of SR_DATA depends on SR_CODE:

SR_CODE	SR_DATA	Description
16#00	Number of re-transmissions	Reading or writing an FIM tab needed to be executed again due to an error
16#01	Address of the FIM	No connection to the FIM
16#03	Address of the FIM	The FIM has sent more data than expected
16#04	Address of the FIM	An error has occurred, no more data is available
16#13		No error if SR_DATA = 16#00; otherwise, failure of the FIM (with the address in SR_DATA)
16#1F	---	An error is no longer present

Error handling

The validity of input parameters is not checked.

Startup characteristics

Initialization of outputs OMODE with 16#80000001 ("valid value") and ODIAG with 16#00000000 ("no error")

Time response

Not available

Message response

Not available

Operator control and monitoring

Not available

6.3.2 I/Os of DIAG_AB

The factory setting of the block display in CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: General Information About Block Description (Page 15).

Input parameters

I/O	Meaning	Type	Default
LADDR_C	Logical address of the control word	INT	0
LADDR_S	Logical address of the control word	INT	0
MODE	Value status	DWORD	16#80 000 000
PA_DIAG	Diagnostic information	DWORD	0

Output parameters

I/O	Meaning	Type	Default
ODIAG	Field devices diagnostics information	DWORD	0
OMODE	Value status of the slave	DWORD	0
SR_CODE	Code of the status tab	BYTE	0
SR_DATA	Data of the status tab	BYTE	0

In-out parameters

I/O	Meaning	Type	Default
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	

6.4 DPAY_V0: Monitoring DP/PA and Y-Link operating as V0 slave

6.4.1 Description of DPAY_V0

Object name (type + number)

FB 108

- DPAY_V0 block I/Os (Page 47)

Area of application

Block DPAY_V0 monitors the status of a DP/PA or Y-Link as a V0 slave (IM 157) and reports the corresponding error events.

The DP/PA link operates as a PA master for the lower-level PA field devices and as a slave on the DP bus.

The Y-Link operates as a DP master for the lower-level DP field devices and as a slave on the higher-level DP bus.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 70	I/O redundancy error
OB 72	CPU redundancy error
OB 82	Diagnostic interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is integrated in the run sequence downstream from the SUBNET block and upstream from the PADP_L0x block.
- RACK_NO (rack/station number) is configured.
- SUBN_TYP (internal/external PROFIBUS interface) is set.
- SUBN1_ID (ID of the master systems) is set.
- SUBN2_ID (ID of the redundant master system) is set.
- DADDR (diagnostic address of the DP/PA or Y-Link) is set.

- DPPA_xx (slave xx address), 1st module (slot) address of slave xx in the link, number of slots of slave xx are set.
- The CPU_DIAG of the OB_BEGIN block and SUB_DIAG of the SUBNET block OUT structures are interconnected with the IN_OUT structures of the same name of DPAY_V0.
- In the case of PA or DP field devices, they are interconnected with PADP_L0x.

Function and method of operation

If redundancy losses and link failures occur, the DPAY_V0 block generates a control-system error message for the OS. The block also indicates error events at active links (SUBN1ERR, SUBN2ERR) and at the preferred channel (SUBN1ACT, SUBN2ACT) in the output status bar. The output structure RAC_DIAG contains the geographic address of the link as well as the group error information RACK_ERR. The corresponding link is not available if RACK_ERR = 1.

The block requires a PROFIBUS DP interface. This can either be integrated in the CPU or provided by means of an external DP interface (CP). PROFIBUS DP is converted to PROFIBUS PA by means of a SIMATIC DP/PA-Link.

The field devices of a link are always addressed at the higher-level DP bus via the DP address of IM 157.

The AS addresses the field devices via the link, i.e., indirectly. The topological structure of the PA bus is mapped in the flat structure of the slave interface. A maximum of 64 field devices can be operated downstream from a link. Each field device can use any number of virtual slots at the link, up to 223 maximum.

In order to enable the assignment of diagnostic data to the field devices, the block provides each field device a DPPA_xx input structure consisting of 3 bytes with the following contents:

- Byte (SLAV_NO) = node number (address) of the field device at the PA/DP master system of the LINK
- Byte (SLOT_NO) = 1st module address of the field device in the link
- Byte (SLAV_SL) = number of slots of the field device

The "Generate module drivers" CFC function fetches this data from HW Config.

The start information is read from the CPU_DIAG I/O structure. This structure must be interconnected to the CPU_DIAG structure of the OB_BEGIN block (carried out by the CFC function "Generate module drivers").

The block generates a corresponding message (see "Message Response") on the basis of the startup information of calling OBs, if the current instance is affected.

When operating with redundant PROFIBUS DP interfaces, the block determines the currently active preferred channel (SUBN1ACT, SUBN2ACT) by evaluating the error events as well as via the diagnostic address DADDR of the link.

SFC 13 (DPNRM_DG, read diagnostic data consistently) reads the diagnostic data (OB 82). The reading process can take several cycles (OB 1). It is therefore possible in a few rare cases that the triggering diagnostic event cannot be recognized.

Diagnostic user data contains information about the status of the link, and of connected field devices. The structure DPPA_ST indicates the link status.

The status of a field device is entered in the structure DPA_M_xx.
A field device can have a maximum of 32 slots (modules). Three block types are available, according to the number of slots on the field device:

- PADP_L00 (field device with max. 7 slots)
- PADP_L01 (field device with max. 16 slots)
- PADP_L02 (field device with max. 32 slots)

The structure DPA_M_xx is interconnected to the structure DPA_M and the output EN_Mx with EN of one of the PADP_Lxx blocks (carried out by the CFC function "Generate module drivers").

The DPA_M_xx structure consists of two DWORD value (S_01 for modules 1 to 16 and S_02 for modules 17 to 32) and one BOOL value (S_ERR = DP/PA field device faulty). Two bits of the DWORD are assigned to each slot of the DP/PA field device, whereby bit 0 and bit 1 belong to slot 1 (module 1) of the DP/PA field device, etc. These bits are defined as follows:

Status Bit 0	Status Bit 1	Meaning
0	0	Module x OK (valid user data)
0	1	Module x error (invalid user data)
1	0	Wrong module x (invalid user data)
1	1	No module x (invalid user data)

If the diagnostics alarm applies to the entire DP/PA field device, then DPA_M_xx.S_ERR = TRUE is set.

Note: If you want to change the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs online, you must set input ACC_ID = TRUE. This verifies the Link states and updates output values.

Redundancy

The block supports redundant DP master systems in an H system (distributed I/Os only). The SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs of the SUBNET block are configured with the numbers of the redundant DP master systems. If the DP master systems are not redundant, the remaining input is set to 16#FF (default).

Error handling

Error handling for the block is limited to the evaluation of the error information of ALARM_8P. For additional information on this, refer to the section:

Error information of the MSG_STAT output parameter (Page 530)" section.

Startup characteristics

The block initializes the messages of ALARM_8P. Availability of the link is verified. In H systems, determines the preferred channel of the link.

Overload behavior

The block counts OB 86 (no DP master system failure, see SUBNET block) and OB 82 calls. Both counters are reset in OB 1. If more than five OB 86 events or more than five OB 82 events in succession before the cycle control point is reached (OB 1), these events are discarded and the message ""DP-Link DP-Master:x Rack:y: Multiple failure" or the message "DP-Link Master:x Rack:y: Muktiple alarm (OB 82)" is output. 1 minute later the status of the link will be re-checked.

Time response

Not available

Message response

After its call by OB 70, OB 72, OB 85 or OB 86, the block analyzes the status of its assigned CPU, DP master and link. If the link loses redundancy or fails, the block outputs corresponding messages via ALARM_8P.

The block generally reports only the events generated in the link that it monitors. Redundancy loss and link failures which are caused by the failure of a DP masters or of a CPU, are initially neither signaled nor indicated at the outputs SUBN1ERR and SUBN2ERR.

The DELAY input is used to delay the output of error messages for higher-priority outgoing errors. This delay time is configurable. When the block recognizes an outgoing error at an interconnected DP master, it initially assumes that there is a faulty assigned DP slave in the link it monitors and sets the corresponding output SUBNxERR. The error status is not reset until the DP slave returns (in this case: OB 86, OB 70). The blocks delay error messages relevant to any slave failure states for a time in seconds as specified in DELAY, in order not to trigger the output of surge of messages from DP slaves which are not yet synchronized after the master has returned. An error message is only output to the OS when the DP slave has not reported its return before this delay time has expired.

Do not set the value of DELAY too high, since messages reporting faulty DP slaves or their removal during a master failure will be output too late to the OS after the DP master returns.

The block generates the following messages in the OBs listed below:

OB no.	Start Event	Message
OB 1	Cyclic processing	Repeat the update of ALARM_8P outputs/messages, if necessary
OB 70	Redundancy loss	Link redundancy loss/return
OB 85	Program execution error	Link failure going
OB 86	Rack failure	Link failure coming/going
OB 100	Restart	Initialization of ALARM_8P

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of DPAY_V0 (Page 48)

Maintenance status MS (Page 533)

6.4.2 I/Os of DPAY_V0

I/Os

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: General Information About Block Description (Page 15).

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnostic address of the DP slave	INT	0
DELAY	Interrupt delay (s)	INT	15
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
DPPA_xx	Information of the DP/PA slave (xx = 00 - 63)	STRUCT	
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number	DWORD	0
MS	Maintenance status	DWORD	0
RACK_NO	Rack/station number	WORD	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
DPA_M_xx	Status of the DP/PA slave (xx = 00 - 63)	STRUCT	
DPPA_ST	DP/PA/Y-Link status	STRUCT	
EN_Mxx	1 = Enable modules (xx = 00 - 63)	BOOL	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
RAC_DIAG	Rack diagnostics	BOOL	0

I/O (parameter)	Meaning	Data type	Default
SUBN1ACT	1 = Slave 1 is active	BOOL	0
SUBN1ERR	1 = Error in DP master system 1	BOOL	0
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN2ERR	1 = Error in DP master system 2	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	
SUB_DIAG	OB startup information	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of DPAY_V0 (Page 48)

Maintenance status MS (Page 533)

6.4.3 Message texts and associated values of DPAY_V0

Assignment of message text and message class

Message no.	Default message text	Message class
1	DP Link @1%d@/ @3%d@: Redundancy loss	PLC Process Control Message - Error
2	DP Link @2%d@/ @3%d@: Redundancy loss	PLC Process Control Message - Error
3	DP Link @1%d@/ @3%d@: Failure	PLC Process Control Message - Failure
4	DP Link @2%d@/ @3%d@: Failure	PLC Process Control Message - Failure
5	-	No message
6	-	No message
7	DP LINK @1%d@/ @3%d@: Multiple alarm (OB 82)	PLC Process Control Message - Failure
8	DP LINK @1%d@/ @3%d@: Multiple failure	PLC Process Control Message - Failure

Assignment of associated values

Associated value	Block parameter
1	ID of the primary DP master system (SUBN1_ID)
2	ID of the redundant DP master system (SUBN2_ID)
3	Rack/station number (RACK_NO)

See also

Message Classes (Page 531)

6.5 DPAY_V1: Enabling blocks downstream of a DP/PA and Y-Link operating as V1 slave

6.5.1 Description of DPAY_V1

Object name (type + number)

FB 115

- DPAY_V1 Block I/Os (Page 51)

Area of application

The DPAY_V1 block enables the field device-specific blocks downstream of the DP/PA or Y links.

The DP/PA link acts as a PA master for the lower-level PA field devices, and as a slave on the DP bus.

The Y link acts as a DP master for the lower-level DP field devices, and as a slave on the higher-level DP bus.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 55	Status interrupt
OB 56	Update interrupt
OB 57	Vendor-specific interrupts
OB 70	I/O redundancy error
OB 72	CPU redundancy error
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error

OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is integrated in the run sequence after the OB_DIAG1 block.
- SUBN_1ID (ID of primary DP master system) is configured.
- SUBN_2ID (ID of secondary DP master system) is configured.
- RACK_NO (rack/station number) is configured.
- The OUT structure CPU_DIAG of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of DPAY_V1.
- The OUT structure CPU_OB_5X of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of DPAY_V1.
- EN_Mxx are interconnected with EN of OB_DIAG1 and PADP_L10 for each field device.

Function and method of operation

The start information is read from the CPU_DIAG I/O structure. The structure must be interconnected with the CPU_DIAG structure of OB_BEGIN (carried out by the CFC function “Generate module drivers”). The affected downstream blocks will be enabled according to the start information.

OB 5x characteristics

Enables the output for the affected field device.

Redundancy

The redundancy is evaluated in OB_DIAG1.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

The block initializes its outputs.

Overload behavior

OB_DIAG1 disables the block in response to an overload.

Time response

Not available

Message response

Not available

Operator control and monitoring

The block has no faceplate.

6.5.2 I/Os of DPAY V1

The factory setting of the block display in CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	
CPU_OB_5X	OB_5x startup information	STRUCT	
DPPA_xx	Information about the DP/PA slave (xx = 00 - 63)	STRUCT	
RACK_NO	Rack/station number	WORD	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	
CPU_OB_5X	OB_5x startup information	STRUCT	
EN_Mxx	1 = Enable slave (xx = 00 - 63)	BOOL	0

6.6 DPAY_V1_PN: Enabling blocks downstream of a DP/PA and Y-link operating as a V1 Slave

6.6.1 Description of DPAY_V1_PN

Object name (type + number)

FB 204

- I/Os of DPAY_V1_PN (Page 52)

Area of application

The DPAY_V1_PN block releases the field device-specific blocks downstream of the IE/PB link.

The IE/PB link operates as a PA master for the lower-level PA field devices and as a slave on the IE bus.

See also

General Information About Block Description (Page 15)

6.6.2 I/Os of DPAY_V1_PN

The factory setting of the block display in CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DPPA_00	Information about the DP/PA slave (xx = 00 - 63)	STRUCT	
RACK_NO	Rack number	BYTE	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 2 ID (100 - 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
EN_Mxx	1 = Enable slave (xx = 00 - 63)	BOOL	0

In-out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	
CPU_OB_5X	OB_5x startup information	STRUCT	

6.7 DPDIAGV0: Monitoring the status of ET 200S modules acting as DPV0 slaves after the Y link

6.7.1 Description of DPDIAGV0

Object name (type + number)

FB 117

- DPDIAGV0 Block I/Os (Page 55)

Area of application

The DPDIAGV0 block monitors the status of the modules of an ET 200S acting as a DPV0 slave (IM 151-1 High Feature) after a Y link.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is integrated in the run sequence after the OB_DIAG1 block.
- The following inputs are configured:
  - SUBN_1ID (ID primary DP master system)
  - SUBN_2ID (ID secondary DP master system)
  - RACK_NO (rack/station number)
- The following I/Os are interconnected:
  - The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block with the DPDIAGV0-block IN_OUT structures of the same name
  - EN_Mxx with EN of the OB_DIAG1 block and the DPDIAGV0 block of each ET 200S
  - The DPA_M_xx outputs with the DPA_M input and EN_Mxx output with EN of a MOD_4 block.

Function and method of operation

In the event of a diagnostic interrupt, the DPDIAGV0 block analyzes the ID-specific diagnostic data, and the module status of an ET 200S in DPV0 mode after a Y link.

The upstream OB_DIAG1 block detects the failure/restart of an ET 200S.

The AS addresses the devices via the link, i.e., indirectly. The topological structure of the DP bus is mapped in the flat structure of the slave interface. There may be up to 64 devices downstream of a Link. Each device can be assigned any number of virtual slots (max. 223) of the link. To assign the diagnostic data of an ET 200S, the block uses the following inputs of data type BYTE with the meaning shown below:

- SUBN1_ID = Primary ID of the master system
- SUBN2_ID = Secondary ID of the master system
- RACK_NO = Station number (address) of the DP master system of the link
- PADP_ADR = Station number (address) of the ET 200S
- SLAVE _NO = 1st module address of the ET 200S in the link
- SLAVE_SL = Number of slots at the ET 200S

The "Generate module drivers" CFC function fetches this data from HW Config.

The useful diagnostic data contains information about the ET 200S status.

The status of an ET 200S module is entered in byte DPA_M_xx.
An ET 200S can have up to 64 slots (modules).

Bits 0 to 2 of DPA_M are defined as follows:

Status Bit 2	Status Bit 1	Status Bit 0	Meaning
0	0	0	Module x OK (valid user data)
0	1	0	Module x error (invalid user data)

Status Bit 2	Status Bit 1	Status Bit 0	Meaning
0	0	1	Wrong module x (invalid user data)
0	1	1	No module x (invalid user data)
1	x	x	ET 200S failure (invalid user data)

Note: If you want to change the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs online, you must set input ACC_ID = TRUE. This verifies the Link states and updates output values.

Redundancy

Only non-redundant devices may be used downstream of a Y link.

Error handling

The validity of input parameters is not checked.

Startup characteristics

The system verifies that the ET 200S is available.

Overload behavior

The overload behavior takes place in the upstream OB_DIAG1 block.

Time response

Not available

Message response

Not available

Operator control and monitoring

The block has no faceplate.

6.7.2 I/Os of DPDIAGV0

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnostic address of the Y-Link	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
PADP_ADR	DP address ET 200S	BYTE	255
RACK_NO	Rack/station number	BYTE	0
SLAVE_NO	1st slot number of the slave in the Y-link	BYTE	0
SLAVE_SL	Number of ET 200S slots	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
DPA_M_xx	Status of the DP/PA slave (xx = 00 - 63)	BYTE	0
EN_Mxx	1 = Enable modules (xx = 00 - 63)	BOOL	0
QRACKF	1 = higher-level error	BOOL	0
SUBNERR	1 = Y link failure	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	
RAC_DIAG	Rack diagnostics of the DP slave downstream of Y link (system structure)	STRUCT	

6.8 DREP: Diagnostic Repeater in the DP master system

6.8.1 Description of DREP

Object name (type + number)

FB 113

- DREP block I/Os (Page 61)

Area of application

The DREP block evaluates the diagnostic data from a SIMATIC diagnostic repeater for PROFIBUS DP. This repeater must be connected to a DP master.

Calling OBs

OB 1	Cyclic processing
OB 82	Diagnostic interrupt
OB 86	Rack failure
OB 100	Warm restart (startup, message initialization)

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- Block OB_DIAG1 is installed in the run sequence upstream of the DREP block.
- The following addresses are configured:
  - The diagnostic address DADDR of the diagnostics repeater
  - The geographic address (SUBN_ID and PADP_ADR)
- The following I/Os are interconnected:
  - The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the OB_DIAG1 block with the IN_OUT structures of the same name of the DREP block.
  - The EN input with the output of an AND block.
  - The inputs of the AND block with the EN_SUBx outputs (x = number of the DP master system) of the OB_BEGIN block, with EN_Rxxx (xxx = rack/station number) of the SUBNET block and with EN_F of the OB_DIAG1 block.
  - EN_DIAG with the EN_DIAG output of the OB_DIAG1 block.

Function and method of operation

The diagnostics repeater is assigned the following tasks:

- Diagnostics function for two PROFIBUS segments (DP2 and DP3):
  The diagnostics function returns the location and cause of line faults, such as a wire break or missing terminating resistors.
  The error location is output, including a reference to the relevant nodes, e.g., "Short-circuit to shielding at signal line A, node 12 and 13".
- Repeater function for three PROFIBUS segments (DP1, DP2, DP3):
  The diagnostics repeater amplifies data signals on the bus and interconnects the relevant RS-485 segments.
- Galvanic/electrical isolation of the PG interface from other bus segments:
  Even if the system is operating at higher transmission rates, interference due to the removal or connection of PG cables is not to be expected at the other PROFIBUS DP segments.

The manual titled *Diagnostic Repeaters for PROFIBUS DP* contains information about the structure of line error states at the DP1, DP2 and DP3 segments and describes the PG interface.

Block DREP reports only the diagnostic events at segments DP2 and DP3 of the diagnostic repeater.

Events of the DP1 segment are reported as general "Cable disturbance" group error.

The PG interface is not evaluated and does not result in a message.

Failure and return of the diagnostics repeater are detected by the upstream OB_DIAG1 block, and are forwarded to the block to report "DR failure".

If an error occurs, an incoming "line error" group message is generated for each segment (DP2 or DP3) when a diagnostic repeater detects the error event (bits in the diagnostic message frame indicating the cause of error):

Bit	Description
A.0	1: The location and cause of the error cannot be identified (possibly electromagnetic interference)
A.1	CPU redundancy loss
A.2	1: - -
A.3	1: Further measurement circuits at the segment, the other diagnostic repeater is connected to its segment DP2
A.4	1: Further measurement circuits at the segment, the other diagnostic repeater is connected to its segment DP3
A.5	1: - -
A.6	1: Cause of error is not clearly identified
A.7	1: Critical message frame error rate
B.0	1:- -.
B.1	1: - -
B.2	1: - -
B.3	1: - -
B.4	1: - -.
B.5	1: - -
B.6	1: - -.
B.7	1: - -
C.0	1: Segment automatically switched off due to continuous zero level on the line.
C.1	1: Segment automatically switched off due to constantly fluctuating line levels.
C.2	1: - -
C.3	1: - -
C.4	1: More than 32 nodes connected to the measurement segment.
C.5	1: The distance between the node and the diagnostic repeater exceeds the permitted line length.
C.6	1: The maximum permitted number of diagnostic repeaters connected in series has been exceeded.
C.7	1: - -

The outgoing message will be generated when all segment bits are equal to zero.

Call HW Config to analyze details of events output by the diagnostic repeater.

An appropriate incoming/outgoing message will be generated for each segment (DP2 or DP3) in response to the following events detected by a diagnostic repeater:

Bit	Description
A.0	1: -
A.1	1:-
A.2	1: -
A.3	1: -
A.4	1: -
A.5	1: -
A.6	1: -
A.7	1:
B.0	1: Wire break on signal line A.
B.1	1: Short-circuit to shield on signal line B.
B.2	1: -
B.3	1: Short-circuit to shield on signal line A.
B.4	1: Wire break on signal line B.
B.5	1: -
B.6	1: Wire break on signal line A and/or B, or the terminating resistor is missing.
B.7	1: Short-circuit between signal line A and/or B, or an additional terminating resistor has been installed.
C.0	1: -
C.1	1: -
C.2	1: -
C.3	1: -
C.4	1: -
C.5	1: -.
C.6	1: -
C.7	1: -

Events detected by the diagnostics repeater are acquired synchronously in OB 82. Diagnostic event data is fetched via SFB 54 in the OB_BEGIN block and written to the structure DINFO. The function always sets just one bit to indicate the cause of an event-entering state. Bit C7 may also be set if the diagnostics repeater has detected further errors. In this case, all previously reported events will be queued. DREP generates a corresponding group error message via ALARM_8P. Flutter messages may occur, particularly in response to error causes A.0.1 and A.6.1. They are suppressed as follows:

After an outgoing message, a new outgoing message will be delayed by the time in [s] set at the DELAY parameter. If a further error is queued, the outgoing message will not be generated until this error has been reported outgoing.

Error handling

The block evaluates the error information from ALARM_8P, and writes it to the corresponding output parameters. You will find additional information about this in the "Error information of output parameter MSG_STAT (Page 530)" section.

The block reports a diagnostic error if an error occurs while reading the diagnostic data, or if any other fault corrupts diagnostic data.

Startup characteristics

ALARM_8P messages are initialized by the DREP block. This uses SFC13 (DPNRM_DG) to read the latest diagnostic information from the diagnostic repeater.

Overload behavior

The interconnected OB_DIAG1 locks the call of DREP for diagnostics if an overload has occurred.

Dynamic response:

Not available

Message response:

The multiple instances ALARM_8P are only called if a message is to be output by this instance. It is only at this point that previously acknowledged messages are updated by the corresponding ALARM block. If the connection to WinCC is down, each ALARM_8P instance can hold up to two message statuses of its event ID. (Usually two messages maximum). Flutter messages can be suppressed via the DELAY input.

The block generates the messages listed below:

OB no.	Start Event	Message
1	Cyclic processing	Call of ALARM_8P due to incomplete transfer or unacknowledged message
82	Diagnostic interrupt	Group message
100	Restart	Initialization of ALARM_8P

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of DREP (Page 62)

Maintenance status MS (Page 533)

6.8.2 I/Os of DREP

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
DADDR	Diagnostic address of the diagnostic repeater	INT	0
DELAY	Interrupt delay (s)	INT	2
DIAG_BUF	Entry in CPU diagnostic buffer	BOOL	0
EN_DIAG	1 = Queued diagnostic event	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_IDx	Message number	DWORD	0
MS	Maintenance status	DWORD	0
PADP_ADR	DP/PA address of the diagnostic repeater	BYTE	255
SUBN_ID	DP master system ID	BYTE	255

Output parameters

I/O (parameter)	Meaning	Type	Default
DINFO	Diagnostic information from the diagnostic repeater	STRUCT	
MSG_ACKx	Message acknowledgment	WORD	0
MSG_STATx	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
QDREPF	1 = Removed/faulty diagnostic repeater	BOOL	0
QERR	1 = program error	BOOL	1

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics	STRUCT	
RAC_DIAG	OB_DIAG1 diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of DREP (Page 62)

Maintenance status MS (Page 533)

6.8.3 Message texts and associated values of DREP

Assignment of message text and message class

Message block ALARM_8P	Message no.	Default message text	Message class
EV_ID1	1	DR @1%d@/@2%d@/ Segment DP2: Line fault	PLC Process Control Message - Failure
	2	DR @1%d@/@2%d@/DP2: → @5%d@.@6%d@m/wire break A / @3%d@ ↔ @4%d@	PLC Process Control Message - Failure
	3	DR @1%d@/@2%d@/DP2: → @5%d@.@6%d@m/short A/@3%d@ ↔ @4%d@	PLC Process Control Message - Failure
	4	1%d@/@2%d@/DP2: → @5%d@.@6%d@m/wire break B/ @3%d@↔@4%d@	PLC Process Control Message - Failure
	5	DR @1%d@/@2%d@/DP2: → @5%d@.@6%d@m/short B/@3%d@↔ @4%d@	PLC Process Control Message - Failure
	6	DR @1%d@/@2%d@/DP2: → @5%d@.@6%d@m/wire break AB or terminating resistor missing/@3%d@↔ @4%d@	PLC Process Control Message - Failure
	7	DR @1%d@/@2%d@/DP2: → @5%d@.@6%d@m/short AB or too many terminating resistors/@3%d@↔ @4%d@	PLC Process Control Message - Failure
	8	DR @1%d@/@2%d@/ segment DP1: Line fault	PLC Process Control Message - Failure
EV_ID2	1	DR @1%d@/@2%d@/ segment DP3: Line fault	PLC Process Control Message - Failure
	2	DR @1%d@/@2%d@/DP3: → @5%d@.@6%d@m/wire break A / @3%d@ ↔ @4%d@	PLC Process Control Message - Failure
	3	DR @1%d@/@2%d@/DP3: → @5%d@.@6%d@m/short A/@3%d@ ↔ @4%d@	PLC Process Control Message - Failure
	4	DR @1%d@/@2%d@/DP3: → @5%d@.@6%d@m/wire break B/ @3%d@↔@4%d@	PLC Process Control Message - Failure
	5	DR @1%d@/@2%d@/DP3: → @5%d@.@6%d@m/short B/@3%d@↔ @4%d@	PLC Process Control Message - Failure

Message block ALARM_8P	Message no.	Default message text	Message class
	6	DR @1%d@/@2%d@/DP3: → @5%d@.@6%d@m/wire break AB or terminating resistor missing/@3%d@↔ @4%d@	PLC Process Control Message - Failure
	7	DR @1%d@/@2%d@/DP3: → @5%d@.@6%d@m/short AB or too many terminating resistors/@3%d@↔ @4%d@	PLC Process Control Message - Failure
	8	DR @1%d@/@2%d@: @7W %t#DREP_TXT@	PLC Process Control Message - Failure

You will find the message texts and their text numbers in "Text library for DREP (Page 537)".

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameter	Meaning
EV_ID1	1	SUBN_ID	DP master system ID (byte)
	2	PADP_ADR	Address of diagnostic repeater (byte)
	3		Station x (segment DP2)
	4		Station y (segment DP2)
	5		Removal of diagnostic repeater (segment DP2)
	6		Removal of diagnostic repeater (segment DP2)
EV_ID2	1	SUBN_ID	DP master system ID (byte)
	2	PADP_ADR	Address of diagnostic repeater (byte)
	3		Station x (segment DP3)
	4		Station y (segment DP3)
	5		Removal of diagnostic repeater (segment DP3)
	6		Removal of diagnostic repeater (segment DP3)
	7		Text number (Message 1 - 2) of DREP_TXT

See also

Message Classes (Page 531)

6.9 DREP_L: Diagnostic Repeater downstream of a Y-Link

6.9.1 Description of DREP_L

Object name (type + number)

FB 125

- DREP_L block I/Os (Page 68)

Area of application

The DREP_L block evaluates diagnostic data from a SIMATIC diagnostic repeater for PROFIBUS DP. The diagnostic repeater (after DPV0) must be connected downstream of a Y-Link (after DPV1).

Calling OBs

OB 1	Cyclic processing
OB 82	Diagnostic interrupt
OB 86	Rack failure
OB 100	Warm restart (startup, message initialization)

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The OB_DIAG1 block is integrated into the run sequence upstream of DREP_L.
- The following addresses are configured:
  - The diagnostic address of the DP/PA link (DADDR) is connected downstream of the diagnostic repeater
  - The geographical address (SUBN1_ID, SUBN2_ID, RACK_NO and PADP_ADR)
- The following I/Os are interconnected:
  - The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the OB_DIAG1 block with the DREP_L INOUT structures of the same name.
  - The EN input is interconnected with the output of an AND block.
    The inputs of the AND block with the EN_SUBx outputs (x = number of the DP master system) of the OB_BEGIN block, with EN_Rxxx (xxx = rack/station number) of the SUBNET block and with EN_F of the OB_DIAG1 block.
  - EN_DIAG with the EN_DIAG output of the OB_DIAG1 block.

Function and method of operation

The diagnostics repeater is assigned the following tasks:

- Diagnostics function for two PROFIBUS segments (DP2 and DP3):
  The diagnostics function returns the location and cause of line faults, such as a wire break or missing terminating resistors.
  The error location is output, including a reference to the relevant nodes, e.g., "Short-circuit to shielding at signal line A, node 12 and 13".
- Repeater function for three PROFIBUS segments (DP1, DP2, DP3):
  The diagnostics repeater amplifies data signals on the bus and interconnects the relevant RS-485 segments.
- Galvanic/electrical isolation of the PG interface from other bus segments:
  Even if the system is operating at higher transmission rates, interference due to the removal or connection of PG cables is not to be expected at the other PROFIBUS DP segments.

The manual titled *Diagnostic Repeaters for PROFIBUS DP* contains information about the structure of line error states at the DP1, DP2 and DP3 segments and describes the PG interface.

Block DREP_L only reports diagnostic events at segments DP2 and DP3 of the diagnostic repeater.

Events of the DP1 segment are reported as general "Cable disturbance" group error.

The PG interface is not evaluated and does not result in a message.

Failure and return of the diagnostics repeater are detected by the upstream OB_DIAG1 block, and are forwarded to the block to report "DR failure".

If an error occurs, an incoming "line error" group message is generated for each segment (DP2 or DP3) when a diagnostic repeater detects the error event (bits in the diagnostic message frame indicating the cause of error):

Bit	Description
A.0	1: The location and cause of the error cannot be identified (possibly electromagnetic interference)
A.1	CPU redundancy loss
A.2	1: - -
A.3	1: Further measurement circuits at the segment, the other diagnostic repeater is connected to its segment DP2
A.4	1: Further measurement circuits at the segment, the other diagnostic repeater is connected to its segment DP3
A.5	1: - -
A.6	1: Cause of error is not clearly identified
A.7	1: Critical message frame error rate
B.0	1:
B.1	1:
B.2	1: - -
B.3	1:
B.4	1:
B.5	1: - -
B.6	1:
B.7	1:
C.0	1: Segment automatically switched off due to continuous zero level on the line.

Bit	Description
C.1	1: Segment automatically switched off due to constantly fluctuating line levels.
C.2	1: - -
C.3	1: - -
C.4	1: More than 32 nodes connected to the measurement segment
C.5	1: The distance between the node and the diagnostic repeater exceeds the permitted line length
C.6	1: The maximum permitted number of diagnostic repeaters connected in series has been exceeded
C.7	1: - -

The outgoing message will be generated when all segment bits are equal to zero.

Call HW Config to analyze details of events output by the diagnostic repeater.

An appropriate incoming/outgoing message will be generated for each segment (DP2 or DP3) in response to the following events detected by a diagnostic repeater:

Bit	Description
A.0	1: -
A.1	1:-
A.2	1: -
A.3	1: -
A.4	1: -
A.5	1: -
A.6	1: -
A.7	1:
B.0	1: Wire break at signal line A
B.1	1: Short-circuit to shielding at signal line B
B.2	1: -
B.3	1: Short-circuit to shielding at signal line A
B.4	1: Wire break at signal line B
B.5	1: -
B.6	1: Wire break at signal line A and/or B, or the terminating resistor is missing
B.7	1: Short-circuit between signal line A and/or B, or an additional terminating resistor has been installed
C.0	1: -
C.1	1: -
C.2	1: -
C.3	1: -
C.4	1: -
C.5	1: -.
C.6	1: -
C.7	1: -

Events detected by the diagnostics repeater are acquired synchronously in OB 82. Diagnostic event data is fetched via SFB 54 in the OB_BEGIN block and written to the structure DINFO. The function always sets only one bit to indicate the cause of an incoming event. Bit C7 may also be

set if the diagnostics repeater has detected further errors. In this case, all previously reported events will be queued. DREP_L generates a corresponding group error message via ALARM_8P. Flutter messages may occur, particularly in response to error causes A.0.1 and A.6.1. They are suppressed as follows:

After an outgoing message, a new outgoing message will be delayed by the time in [s] set at the DELAY parameter. If a further fault is queued, the outgoing message will not be generated until this fault is outgoing.

Error handling

The block evaluates the error information from ALARM_8P, and writes it to the corresponding output parameters.

You will find additional information in the "Error information of output parameter MSG_STATx (Page 530)" section.

The block reports a diagnostic error if an error occurs while reading the diagnostic data, or if any other fault corrupts diagnostic data.

Startup characteristics

ALARM_8P messages are initialized by the DREP_L block The current diagnostics information is read from the diagnostics repeater using SFB 52 (RDREC).

Overload behavior

In the event of an overload, the upstream OB_DIAG1 block prevents DREP_L being called for diagnostics.

Dynamic response:

Not available

Message response:

The multiple instances ALARM_8P are only called if a message is to be output by this instance. It is only at this point that previously acknowledged messages are updated by the corresponding ALARM block. If the connection to WinCC is down, each ALARM_8P instance can hold up to two message statuses of its event ID. Flutter messages can be suppressed via the DELAY input.

The block generates the messages listed below:

OB no.	Start event	Message
1	Cyclic processing	Call of ALARM_8P due to incomplete transfer or unacknowledged message
82	Diagnostic interrupt	Group message
100	Restart	Initialization of ALARM_8P

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of DREP_L (Page 69)

Maintenance status MS (Page 533)

6.9.2 I/Os of DREP_L

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
DADDR	Diagnostic address of the DP/PA link	INT	0
DELAY	Interrupt delay (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_DIAG	1 = Queued diagnostic event	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_IDx	Message number	DWORD	0
MS	Maintenance status	DWORD	0
PADP_ADR	DP/PA address of the diagnostic repeater	BYTE	255
RACK_NO	Number of the rack	BYTE	255
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Type	Default
DINFO	Diagnostic information from the diagnostic repeater	STRUCT	
MSG_ACKx	Message acknowledgment	WORD	0

I/O (parameter)	Meaning	Type	Default
MSG_STATx	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
QDREPF	1 = Removed/faulty diagnostic repeater	BOOL	0
QERR	1 = program error	BOOL	1

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics	STRUCT	
RAC_DIAG	OB_DIAG1 diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of DREP_L (Page 69)

Maintenance status MS (Page 533)

6.9.3 Message texts and associated values of DREP_L

Assignment of message text and message class

Message block ALARM_8P	Message no.	Default message text	Message class
EV_ID1	1	DR @1%d@/@2%d@/@3%d@/ Segment DP2: Line fault	PLC Process Control Message - Failure
	2	DR @1%d@/@2%d@/@3%d@/DP2: → @6%d@.@7%d@m/wire break A/ @4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	3	DR @1%d@/@2%d@/@3%d@/DP2: → @6%d@.@7%d@m/short A/@4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	4	DR @1%d@/@2%d@/@3%d@/DP2: → @6%d@.@7%d@m/wire break B/ @4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	5	DR @1%d@/@2%d@/@3%d@/DP2: → @6%d@.@7%d@m/short B/@4%d@ ↔ @5%d@	PLC Process Control Message - Failure

Message block ALARM_8P	Message no.	Default message text	Message class
	6	DR @1%d@/@2%d@/@3%d@/DP2: → @6%d@.@7%d@m/wire break AB or terminating resistor missing/@4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	7	DR @1%d@/@2%d@/@3%d@/DP2: → @6%d@.@7%d@m/short AB or too many terminating resistors/@4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	8	DR @1%d@/@2%d@/@3%d@/ Segment DP1: Line fault	PLC Process Control Message - Failure
EV_ID2	1	DR @1%d@/@2%d@/@3%d@/ Segment DP3: Line fault	PLC Process Control Message - Failure
	2	DR @1%d@/@2%d@/@3%d@/DP3: → @6%d@.@7%d@m/wire break A/ @4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	3	DR @1%d@/@2%d@/@3%d@/DP3: → @6%d@.@7%d@m/short A/@4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	4	DR @1%d@/@2%d@/@3%d@/DP3: → @6%d@.@7%d@m/wire break B/ @4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	5	DR @1%d@/@2%d@/@3%d@/DP3: → @6%d@.@7%d@m/short B/@4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	6	DR @1%d@/@2%d@/@3%d@/DP3: → @6%d@.@7%d@m/wire break AB or terminating resistor missing/@4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	7	DR @1%d@/@2%d@/@3%d@/DP3: → @6%d@.@7%d@m/short AB or too many terminating resistors/@4%d@ ↔ @5%d@	PLC Process Control Message - Failure
	8	DR @1%d@/@2%d@/@3%d@: @8W %t#DREP_L_TXT@	PLC Process Control Message - Failure

You will find the message texts and their text numbers in "Text library for DREP_L (Page 537)".

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameter	Meaning
EV_ID1	1	SUBN_ID1	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	Address of diagnostic repeater (byte)
	4		Station x (segment DP2)
	5		Station y (segment DP2)
	6		Removal of diagnostic repeater (segment DP2)

Message block ALARM_8P	Associated value	Block parameter	Meaning
	7		Removal of diagnostic repeater (segment DP2)
EV_ID2	1	SUBN_ID1	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	Address of diagnostic repeater (byte)
	4		Station x (segment DP3)
	5		Station y (segment DP3)
	6		Removal of diagnostic repeater (segment DP3)
	7		Removal of diagnostic repeater (segment DP3)

If SUBN_ID1 = 16#FF, SUBN_ID2 is used as associated value 1.

See also

Message Classes (Page 531)

6.10 FFD_CIF: Monitoring FF slaves in CIF mode

6.10.1 Description of FFD_CIF

Object name (type + number)

FB 145

- I/Os of FFD_CIF (Page 73)

Area of application and method of operation

The FFD_CIF blocks monitors the higher-level errors of a field device, such as failure/return. The block runs acyclically.

The block FFD_CIF is enabled to run by the higher-level DPAY_V1 block. Start and diagnostic information is read from the CPU_DIAG structure. The event to be evaluated is entered in the start information (CPU_DIAG) of OB_BEGIN. The block FFD_CIF checks the geographic address and SLOT_NO of the FF device to determine whether it is responsible for this event.

Byte 3 of the additional alarm information contains the slot number of the field device that triggered the diagnostic interrupt. The corresponding slot is enabled.

The parameter EN_MSG_D = 1 is still set here. This means that the AS asset faceplate for the FF device accesses this block; messages and maintenance state are generated here.

Use in CFC

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The FFD_CIF block is installed downstream from the DPAY_V1 block.
- The RACK_NO, DADDR, EN_MSG_D, SUBN1_ID, SUBN2_ID, SLOT_NO and FFDP_ADR inputs are configured.
- The EN input is interconnected with the output of an AND block. These block inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block, with EN_Mx (x= number of the FF device) of the DPAY_V1 block and EN_F of the OB_DIAGF block.
- The CPU_DIAG OUT structure of the OB_BEGIN block and SUB_DIAG of the SUBNET block are interconnected with the IN_OUT structures of the FFD_CIF block.
- RAC_DIAG is interconnected with the OUT structure RAC_DIAG of OB_DIAGF block.
- DINFO is interconnected with the OUT structure DINFO of the OB_DIAGF block.
- The OUT structure FF_DIAG of OB_DIAGF is interconnected with the IN_OUT structure of the same name of FFD_CIF.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 72	CPU redundancy loss
OB 70	Redundancy loss
OB 82	Diagnostic interrupt
OB 83	Remove/insert module interrupt (failure/return of a field device)
OB 86	Rack failure
OB 100	Restart

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Message response

The DELAY input is used to delay the outputting of error messages for an outgoing, higher-priority error. For example, if the FFD_CIF block recognizes an outgoing error at a DP master connected to it, it initially assumes that there is a faulty assigned DP slave in the rack it monitors, and sets the corresponding output SUBNxERR. The error status is not reset until the DP slave returns (in this case: OB 86, OB 70). The FFD_CIF blocks suppress the potential slave failure states for DELAY seconds so as not to trigger a surge of messages from DP slaves which are not yet synchronized when the master returns. An error message is only output to the OS when the DP slave has not reported its return before this delay time has expired.

Note: Do not set the value of DELAY too high, since messages reporting faulty DP slaves or their removal during a master failure will be output too late to the OS after the DP master returns.

6.10.2 I/Os of FFD_CIF

I/Os of FFD_CIF

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnostic address of the FF link	INT	0
DELAY	Interrupt delay (s)	INT	15
DINFO	Diagnostic information	STRUCT	
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable interrupt	BOOL	1
EN_MSG_D	1 = Enable message "Device failure"	BOOL	1
EV_ID	Message number	DWORD	0
FFDP_ADR	FF slave address	BYTE	16#FF
MS	Maintenance status	DWORD	0
RACK_NO	Rack number	BYTE	16#FF
SLOT_NO	Slot number	BYTE	16#FF
SUBN1_ID	ID of the primary DP master system	BYTE	16#FF
SUBN2_ID	ID of the redundant DP master system	BYTE	16#FF
SUBN_TYP	1 = external DP interface	BOOL	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Error message status	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE	Channel 0 mode	DWORD	0
QMODF	1 = module removed/defective	BOOL	0
QRACKF	1 = higher-level error	BOOL	0
RETURN_CODE	Return value of the function	INT	
SUBN1ACT	1 = Slave 1 is active	BOOL	0
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN1ERR	1 = Error in the primary DP master system	BOOL	0
SUBN2ERR	1 = Error in the redundant DP master system	BOOL	0
V1_MODE	1 = DPV1 mode of the DP master system	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
FF_DIAG	Diagnostics of the FF device	STRUCT	
RAC_DIAG	System structure RACK diagnostics	STRUCT	
SUB_DIAG	System structure: SUBNET diagnostics	STRUCT	

6.10.3 Message texts and associated values of FFD_CIF

Message texts and associated values of FFD_CIF

Assignment of message text and message class (Page 531)

Message block	Message number	Default message text	Message class
EV_ID1 (ALARM_8P)	1	Device @1%d@/ @2%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Device @1%d@/ @2%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 83)	PLC Process Control Message - Failure
	4	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 82)	PLC Process Control Message - Failure
	5	Device @1%d@/ @2%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
	6		No message
	7	Device @1%d@/ @2%d@/@3%d@: Configuration error: Name does not match address	PLC Process Control Message - Failure
	8	Device @1%d@/ @2%d@/@3%d@: Failure	PLC Process Control Message - Failure

Assignment of Associated Values

Associated value	Block parameters
1	DP master system ID (SUBN_ID)
2	Rack/station number (RACK_NO)
3	FF slave address (FFDP_ADR)

6.11 FFDP_L1: Monitoring FF slaves with maximum 32 values

6.11.1 Description of FFDP_L1

Object name (type + number)

FB 139

- I/Os of FFDP_L1 (Page 77)

Area of application and method of operation

The FFDP_L1 block monitors the higher-level errors of a field device, such as failure/return and runs acyclically.

The FFDP_L1 block is enabled to run by the higher-level DPAY_V1 block. The event to be evaluated is entered in the start information (CPU_DIAG) of OB_BEGIN. The FFDP_L1 block checks the geographic address and SLOT_NO of the FF device to determine whether it is responsible for this event.

Byte 3 of the additional alarm information contains the slot number of the field device that triggered the diagnostic interrupt. The corresponding slot is enabled.

If a higher-level error goes away the diagnostics is read per SFC 13 from FF link (the data are all located locally on the link and do not have to be retrieved by the FF device) and reported accordingly.

The FFDP_L1 block monitors

- FF devices downstream from an FF link (DPV1 slave)

It generates the MODE (FF_MODE) and the value status for the signal processing blocks. The subordinate blocks FF_MOD32 are always enabled for processing and run cyclically. The information is relayed via the structure FF_DIAG to the FF_MOD32. This structure outputs the message.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 72	CPU redundancy loss
OB 70	Redundancy loss
OB 82	Diagnostic interrupt
OB 83	Remove/insert module interrupt (failure/return of a field device)
OB 85	Program execution error
OB 86	Rack failure
OB 100	Restart

Use in CFC

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The FFDP_L1 block is installed downstream from the DPAY_V1 block.
- The CPU_DIAG OUT structure of the OB_BEGIN block and SUB_DIAG of the SUBNET block are interconnected with the IN_OUT structures of the same name of block FFDP_L1.
- RAC_DIAG is interconnected with the OUT structure RAC_DIAG of OB_DIAGF block.

- The following will be configured:
  - Diagnostic address of the FF link DADDR
  - Geographical address (SUBN1_ID, SUBN2_ID, RACK_NO) of the FF device
  - SLOT_NO
  - FF address of the FF device (FFDP_ADR)
  - MODE_xy (mode of the FF device)
  - NUM_IODATA
- The EN input is interconnected with the output of an AND block. These block inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block, with EN_Mx (x= number of the FF device) of the DPAY_V1 block and EN_F of the OB_DIAGF block.
- The QPERAF output is interconnected with the PERAF input of the FF_MOD32.
- The QMODF output is interconnected with the MODF input of the FF_MOD32.
- The FF_DIAG output is interconnected with the FF_DIAG input of the FF_MOD32.
- DINFO is interconnected with the OUT structure DINFO of the OB_DIAGF block.

Message response

The DELAY input is used to delay the outputting of error messages for an outgoing, higher-priority error. For example, if the FFDP_L1 block recognizes an outgoing error at a DP master connected with it, it initially assumes that there is a faulty assigned DP slave in the rack it monitors, and sets the corresponding output SUBNxERR. The error status is not reset until the DP slave returns (in this case: OB 86, OB 70). The FFDP_L1 blocks suppress the potential slave failure states for DELAY seconds so as not to trigger a surge of messages from DP slaves which are not yet synchronized when the master returns. An error message is only output to the OS when the DP slave has not reported its return before this delay time has expired.

Note: Do not set the value of DELAY too high, since messages reporting faulty DP slaves or their removal during a master failure will be output too late to the OS after the DP master returns.

6.11.2 I/Os of FFDP_L1

I/Os of FFDP_L1

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnostic address of the FF link	INT	0
DELAY	Interrupt delay (s)	INT	15
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
FFDP_ADR	Address of the FF device	BYTE	0
MODE	Device status	WORD	0
NUM_IODATA	Number of I/O data in the FF device	INT	0
RACK_NO	Number of the rack	BYTE	0
SLOT_NO	Number of the slot	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	16#FF
SUBN2_ID	ID of the redundant DP master system	BYTE	16#FF

Output parameters

I/O (parameter)	Meaning	Data type	Default
EN_D_Q	1 = Processing of the quality code	BOOL	0
FF_DIAG	FF device diagnostics	DWORD	0
OMODE	Operating mode slot	DWORD	0
QERR	1 = Error runtime	BOOL	1
QMODF	1 = Error/defect field device	BOOL	0
QPERAF	1 = Access error I/O	BOOL	0
QRACKF	1 = higher-level error	BOOL	0
RAC_DIAG	System structure RACK diagnostics	STRUCT	
RETURN_CODE_O	Return value	INT	0
SUBN1ACT	1 = Slave 1 is active	BOOL	0
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN1ERR	1 = Error in the primary DP master system	BOOL	0
SUBN2ERR	1 = Error in the redundant DP master system	BOOL	0
V1_MODE	DPV1 mode of the DP master system	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics	STRUCT	
DINFO	Diagnostic information	STRUCT	
FF_DIAG_I	Diagnostics of the FF device	STRUCT	
SUB_DIAG	System structure: SUBNET diagnostics	STRUCT	

6.12 FF_MOD32: Diagnostics of an FF slave (downstream from FF link DPV1)

6.12.1 Description of FF_MOD32

Object name (type + number)

FB 124

- I/Os of FF_MOD32 (Page 80)

Area of application and method of operation

The block reports the maintenance status of an FF field device downstream from an FF link. For diagnostics in the Maintenance Station, all error sources will be linked with OR and the worst will be assigned to the MS output. The channel blocks (FbAnIn, FbAnOu, FbDiIn, FbDiOu) will be controlled by quality codes.

The block analyses cyclically all events that affect an FF device and reports the following events:

- Evaluation of the RAC_DIAG info (from FFDP_L1): Device failure
- Evaluation of the FF_DIAG info (from FFDP_L1): Diagnostics

Use in CFC

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The block is integrated in the run sequence upstream of the FbAxXx, FbDxXx block.
- The SUBN1_ID, SUBN2_ID, RACK_NO, SLOT_NO, FFDP_ADR and NUM_IODATA inputs are configured.
- The block inputs are interconnected with the following outputs:
  - FF_DIAG with FF_DIAG output of the FFDP_L1 block
  - MODE_xy with OMODE_xy outputs of the FFDP_L1 block
  - MODF, PERAF with QMODF and QPERAF outputs of the FFDP_L1 block
  - RAC_DIAG with output structure RAC_DIAG of the OB_DIAGF block
  - QC_x input with icon of the FF field device
  - EN_D_Q with EN_DQ output of the FFDP_L1 block
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

- The output parameter of OMODE_xy is interconnected with the following channel block at the OMODE_xy parameter.
- The OUT structure CPU_DIAG of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of the FFDP_L1 block.

Calling OBs

OB no.	Start Event	Message
OB 1	Cyclic program	
OB 100	Warm restart	The Alarm_8P is initialized at startup (OB 100)

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

6.12.2 I/Os of FF_MOD32

I/Os of FF_MOD32

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
EN_D_Q	1 = Processing of the quality code	BOOL	0
EN_MSG	1 = enable interrupt	BOOL	1
EV_ID1	Message number 1	DWORD	0
EV_ID2	Message number 2	DWORD	0
FFDP_ADR	Address of the FF device	BYTE	0
FF_DIAG	Diagnostics of the FF device	DWORD	
MODE_xx	Device mode (xx = IOData 0 - 31)	DWORD	0
MODF	1 = field device error/fault	BOOL	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
NUM_IODATA	Number of I/O data in the FF device	INT	0

I/O (parameter)	Meaning	Data type	Default
PERAF	1 = I/O access error	BOOL	0
QC_xx	Status of FF field device (x = channel 0 to 31)	BYTE	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN1_ID	ID of the primary DP master system	BYTE	16#FF
SUBN2_ID	ID of the redundant DP master system	BYTE	16#FF

Output parameter

I/O (parameter)	Meaning	Data type	Default
B_QC	Quality code, bit-granular	STRUCT	
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
DXCHG1	Bidirectional data exchange channel	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	0
IODATA_ACTIVE	Channel active	DWORD	16#00000000
IODATA_EXIST	I/O data available	DWORD	0
IODATA_OK	I/O data OK	DWORD	0
MS_XCHG_00	Maintenance Status - Data exchange channel	DWORD	0
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 31)	DWORD	0
MSGSTAT1	Message error - information 1	WORD	0
MSGSTAT2	Message error - information 2	WORD	0
MSG_ACK1	Message acknowledgment 1	WORD	0
OMODE_xx	Value status FF field device (xx = IOData 0 to 31)	DWORD	0
O_MS	Maintenance status	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = field device error/fault	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	CPU diagnostics	STRUCT	
RAC_DIAG	System structure: SUBNET diagnostics	STRUCT	

6.12.3 Message texts and associated values of FF_MOD32

Message texts and associated values of FF_MOD32

Assignment of message text and message class (Page 531)

Message block	Message no.	Default message text	Message class
EV_ID1 (ALARM_8P)	1	Device @1%d@/ @2%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Device @1%d@/ @2%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Device @1%d@/ @2%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
	4	Device @1%d@/ @2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	5	Device @1%d@/@2%d@/@3%d@: @4W %#FF_MOD32_TXT@	PLC Process Control Message - Failure
	6	No message	No message
	7	Device @1%d@/ @2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Device @1%d@/ @2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard
EV_ID2 (NOTIFY_8P)	1	Device @1%d@/ @2%d@/@3%d@: Goes to fail-safe position	Status Message - PLC
	2	Device @1%d@/ @2%d@/@3%d@: Making configuration change	Status Message - PLC
	3	Device @1%d@/ @2%d@/@3%d@: Simulation	Status Message - PLC
	4	Device @1%d@/ @2%d@/@3%d@: Process-related, no maintenance	Status Message - PLC
	5	Device @1%d@/ @2%d@/@3%d@: Process-related, no maintenance	Status Message - PLC
	6	Device @1%d@/ @2%d@/@3%d@: Local operation/functional check	Status Message - PLC
	7	Device @1%d@/ @2%d@/@3%d@: Device passivated	Status Message - PLC
	8		No message

Assignment of Associated Values

Associated value	Block parameters
1	DP master system ID (SUBN_ID)
2	Rack/station number (RACK_NO)
3	FF slave address (FFDP_ADR)
4	Text number (message 5) from FF_MOD32_TXT

You can find the message texts and their text numbers in the section "Text library for FF_MOD32 (Page 536)".

6.13 FM_CNT: Programming and controlling FM 350 modules

6.13.1 Description of FM_CNT

Object name (type + number)

FB 126

- FM_CNT Block I/Os (Page 86)

Area of application

The FM_CNT block assigns parameters and controls the FM 350-1 and FM 350-2 modules It writes the counter levels, limits and comparison values of the FM 350-2 module.

Calling OBs

OB 100 and the cyclic OB (100 ms recommended) used for transmitting data.

Also note the assignments (Page 532) to the FM_CO block.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is installed in the cyclic OB upstream of the CH_CNT blocks.
- The block runtime group is installed in OB 100 downstream of MOD_D1.
- The LADDR, FM_MODE, RACK_NO, SUBN1_ID, SUBN2_ID, and SLOT_NO inputs are configured.
- The MODEx inputs are interconnected with the OMODEx outputs of the MOD_D1 block.
- The FM_DATA output structure is interconnected with the structure of the same name of the CH_CNT block.
- The OMODEx output is interconnected with the MODE input of the CH_CNT block.
- The OUT structure CPU_DIAG of OB_BEGIN is interconnected with the IN_OUT structure of the same name of FM_CNT.
- The EN_CO input structure is interconnected with the EN_CO_x output structure of the FM_CO block (x = number of the rack).
- The output ENCO is connected to the input ENCOx_yy of the FM_CO block (x = number of the rack, yy = coordination number).

Addressing

The logical base address of the module is entered in the LADDR I/O by the CFC driver generator.

Redundancy

Higher-level block MOD_D1 evaluates the redundancy of DP master systems operating in an H system. Redundancy for two FM 350-1 or FM 350-2 modules is not supported, and must be controlled by the user outside the block.

MODE Setting

Signal states of the MODE_xx input, or QMODE_xx output of the FM_CNT block are described under the MODE settings.

MODE_xx input parameters are available for up to 8 signal channels. Their default setting is "0" (no signal). For each signal channel xx, the operating mode of the FM 350 module must be set at the MODE_xx input (the CFC driver generator does this for you).

The module recognizes the following modes:

Term	Coding MODE	Description
Channel not used	16#0000	Channel of the FM 350 not used.
Continuous counting	16#xx01	The FM 350 counts continuously, starting with the current counter level when the internal gate opens.
One-time counting	16#xx02	The FM 350 counts from the start value to the end value when the internal gate opens.
Periodic counting	16#xx03	The FM 350 counts between the start value and the end value when the internal gate opens.
Frequency measurement	16#xx04	The FM 350 determines the frequency pulse sequence at the input.
Speed measurement	16#xx05	The FM 350 determines the speed of the device connected to the input.
Period duration measurement	16#xx06	The FM 350 determines the duration of the pulse sequence at the input.
Dosing	16#xx07	Four channels of the FM 350-2 are used for dosing.

The count and measured values can be recorded with the FM 350-2 module, either via the process image (fast update) or via "Read data record" (slower update).
If the count and measured values of a channel in the process image are made available, they have to be in alignment in the process image. The following variants are possible.

Term	Coding MODE	Description
Count and measured value are not in the process image	16#Cxxx	Read count and measured values via data record
Only the count value is in the process image	16#8xxx	Read measured value via data record and count value in the process image
Only the measured value is in the process image	16#4xxx	Read count values via data record and measured value in the process image

Term	Coding MODE	Description
Count and measured value are in the process image	16#0xxx	Read count and measured value in the process image
Data type DWORD count and measured value	16#x0xx	Count value before measured value, both of the data type DWORD
Data type WORD count value	16#x1xx	Count value of the the data type WORD before measured value of the data type DWORD
Data type WORD measured value	16#x2xx	Count value of the data type DWORD before measured value of the data type WORD
Data type WORD count and measured value	16#x3xx	Measured value before count value, both of the data type WORD
Data type DWORD count and measured value	16#x8xx	Measured value before count value, both of the data type DWORD
Data type WORD count value	16#x9xx	Measured value of the the data type DWORD before count value of the data type WORD
Data type WORD measured value	16#xAxx	Measured value of the the data type WORD before count value of the data type DWORD
Data type WORD count and measured value	16#xBxx	Count value before measured value, both of the data type WORD

MODE is formed by the linking the operating mode code, and the access type value.
Example: Count and measured value in "Dosing" mode of the the data type DWORD is not in the process image MODE = 16#C007.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

Whenever the system or FM 350-1/FM 350-2 starts up, the block coordinates the restart with the module. The CMP_VALx parameters are then loaded into the FM 350.

ALARM_8P is initialized.

Overload behavior

Not available

Time response

Not available

Message response

The block reports operating and data errors for the FM 350-1 module, and data errors for FM 350-2 using ALARM_8P. The message function can be disabled by setting EN_MSG = FALSE. The MOD_D1 block reports diagnostic interrupts from the FM 350-1 or FM 350-2.

Operator control and monitoring

The block has no faceplate.

Additional information

For additional information, refer to the sections:

Message texts and associated values of FM_CNT (Page 87)

6.13.2 I/Os of FM_CNT

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CO_NO	Coordination number for data record reading	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number	DWORD	0
FM_MODE	0 = FM 350-1, >0 = FM 350-2	BYTE	0
LADDR	Logical address FM 350	INT	0
MODEx	Mode channel (x = 0 to 7)	DWORD	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
FM_DATA	Structure FM 350 data	STRUCT	
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
OMODEx	Mode channel (x = 0 to 7)	DWORD	0
QDATA_ERR	1 = Data error	BOOL	0
QDONE	1 = Write new data	BOOL	0

I/O (parameter)	Meaning	Data type	Default
QDONE_RD	1 = New data read	BOOL	0
QMODF	1 = Error FM 350	BOOL	0
QPARF	1 = Module not programmed	BOOL	0
QRD_ERR	1 = Error when reading data	BOOL	0
QWR_ERR	1 = Error read data	BOOL	0
STATUS_RD	Read status of data record	DWORD	0
STATUS_WR	Write status of data record	DWORD	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
EN_CO	Current coordination number	STRUCT	
ENCO	Coordination number	BYTE	0
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	

Additional information

Additional information is available in the section:

Message texts and associated values of FM_CNT (Page 87)

6.13.3 Message texts and associated values of FM_CNT

Assignment of message text and message class

Message block ALARM_8P	Message no.	Default message text	Message class
EV_ID	1	FM 350 @1%d@/@2%d@/@3%d @data error number@4%d@	PLC Process Control Message - Failure
	2	FM 350 @1%d@/@2%d@/@3%d @data error number @5%d@	PLC Process Control Message - Failure
	3		No message
	4		No message
	5		No message
	6		No message
	7		No message
	8		No message

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameters	Meaning
EV_ID	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)
	4	DA_ERR_W	Data error number
	5	OT_ERR_B	Operator error number

See also

Message Classes (Page 531)

6.14 IM_TS_PN: Status alarms with time stamps

6.14.1 Description of IM_TS_PN

Object name (type + number)

FB 420

- I/Os of IM_TS_PN (Page 90)

Area of application

The block IM_TS_PM transfers time-stamped process signal changes in a PNIO System to the EventTs/Event16Ts block and reports SOE information from the time stamping DI module to the RACK_PNT block.

Use in CFC

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The IM_TS_PN block is copied from the library and instantiated in a system chart. The block is installed in its runtime group after the RACK_PNT block runtime group in the OB 1, OB 55, and OB 100.
- OR_32TPN is always interconnected between Pcs7DiIT and IM_TS_PN.
- The logical addresses LADDR0/LADDR1 are configured with the logical address(es) of the IM(s) (diagnostics address).

- The RAC_DIAG structure of the RACK_PNT block is interconnected with the structure of the same name of the IM_TS_PN block.
- The S_CH_xxx and TINF_xxx inputs of the TRIG_INF structure are set. Every signal that is time-stamped by the IM has a unique assignment identified by the slot of the module combined with the corresponding channel number. For all 512 channels, this information is entered in the block inputs S_CH_xxx. The information about the triggering is entered in structure TRIG_INF.

Block functions

The IM_TS_PN block reads the messages from the message buffers (up to approx.. 100 data records, max 4096 Bytes) of an IM, and transfers them to a message block for time stamping (EventTs/Event16Ts). The Event-block sends the messages via an ALARM_8P block whose time stamps for its 8 messages are entered in the 1st associated value in an ARRAY of BYTE.

- Hardware interrupt (OB 55): The IM generates a hardware interrupt if there are new messages. The time-stamp status, including the number of the IM data record to be fetched and the number of messages in the data record, are fetched from the start information of the status alarm OB and stored for cyclic processing. If the maximum capacity of the interrupt stack is exceeded, all new information will be lost. The loss of information is indicated by the "Loss of message at IM (buffer overflow)" message.
- Cyclic processing: If any messages are queued in the stack, SFB 52 (RDREC, read data record) reads the relevant data record (message buffer). If there are several data records to be fetched, it will fetch the record that contains the oldest messages (oldest hardware interrupt). The block instance temporarily stores a maximum of 4096 Bytes of data records.The IM can enter new messages in a data record once it has been read. If all data records are in use, the IM enters "Loss of message at IM (buffer overflow)" (incoming) as the last message in the message buffer. "Loss of message at IM (buffer overflow)" (outgoing) is then entered as the first message in the first free data record. Messages received within the interval between a buffer overflow and the enabling of a record will be lost. The slot number/channel number of the stored messages are compared with the input parameters of the block for slot number/channel number (S_CH_xxx). If they match, the message is written to the corresponding output (TS_xxx).

Startup characteristics

During startup/restart of the IM, the system will generate process interrupts once again for those records which were occupied prior to restart but had not been fetched. The message "Startup data (incoming)" is entered as the first message of the first free data record. After restart, the system checks all monitored digital signals for changes, outputs a message if appropriate. It finally generates the message "Startup data (outgoing)".

During an initial startup, the signal state is set to "Zero". During startup, the block verifies the existence of an IM at its logical address set in LADDR. If this does not exist, it sets the QPARF output to TRUE, and does not access any I/Os in its subsequent cycles. QPARF = FALSE and I/O access is enabled only after the correct module has been inserted, or the logical address has been set correctly. Stored process interrupt data which were not computed before the restart will be deleted.

Error handling

Errors occurring during data exchange between the block and IM are reported to the RACK_PNT block.

- I/O access error: QPERAF The block could not access the IM. A data record could not be read.
- Block processing error: QERR A block execution error has occurred.
- Module parameter assignment error: QPARF Faulty block configuration: Incorrect logical basic address entered.
- Parameter assignment error: QBPARF Faulty block configuration: The slot/channel number of an IM message does not match any slot/channel number of the block input parameters.
- Rack error: QRACKF Failure of the rack containing the IM or IM failure.

6.14.2 I/Os of IM_TS_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
EN	Enable the block	BOOL	1
ACC_MODE	Assign the record to be read (0 -1)	BOOL	0
DIAG_BUF	Release the diagnostic buffer input (Debugging)	BOOL	0
LADDR0	Logical address IM-Left	INT	0
LADDR1	Logical address IM-Right	INT	0
S_CH_xxx	Slot/ Channel Number (xxx=0..511)	WORD	0
TRIG_INF	Flank selection for all 512 channels 0 = Trigger 0 ->1, 1 = Trigger 1 -> 0	STRUCT (from 512 BOOLs)	
FEATURE	Features of hardware parameter	DWORD	0
TS_SI_IN	Source identification	STRUCT	
TS_TmStat_NoSync_IN	Time status observer		
TS_TmStat_Jitter_IN	Time status observer		
TS_BufStat_APP_IN	Buffer status appears		
TS_BufStat_DAPP_IN	Buffer status disappers		
TS_SIObStop_APP_IN	Source identification observer stop appears		
TS_SIObStop_DAPP_IN	Source identification observer stop disappears		

I/O (parameter)	Meaning	Data type	Default
TS_TmStatOb-Stop_APP_IN	Time status observer stop appears		
TS_TmStatOb-Stop_DAPP_IN	Time status observer stop disappears		
TS_BufStatOb-Stop_APP_IN	Buffer status observer stop appears		
TS_BufStatOb-Stop_DAPP_IN	Buffer status observer stop disappears		
TS_SRLObStop_APP_IN	SRL observer stop appears		
TS_SRLObStop_DAPP_IN	SRL observer stop disappears		
TS_DIObStop_APP_IN	Observer digital input observer stop appears		
TS_DIObStop_DAPP_IN	Observer digital input observer stop disappears		
TS_SRL_APP_IN	System redundancy layer appears		
TS_SRL_DAPP_IN	System redundancy layer disappears		
TS_DIN_IN_xxx	Digital input observer (xxx=0..511)		

Output parameter

I/O (parameter)	Meaning	Data type	Default
DIAG_INF	Module diagnosis	STRUCT	
DIAG_INF_SRAL	Diagnostic Information Structure	STRUCT	
TS_DIN_xxx (xxx=0..511)	Time stamp in DT format	STRUCT Year:INT:=0; Month:INT:=0; Day:INT:=0; Hour:INT:=0; Minute:INT:=0; Second:INT:=0; MilliSecond:INT:=0; MicroSecond:INT:=0; NanoSecond:INT:=0; Msg:BOOL:=0; END_STRUCT	
TS_SI	Time stamp in DT format	STRUCT	
TS_TmStat_NoSync	Time stamp in DT format	STRUCT	
TS_TmStat_Jitter	Time stamp in DT format	STRUCT	
TS_BufStat_APP	Time stamp in DT format	STRUCT	
TS_BufStat_DAPP	Time stamp in DT format	STRUCT	
TS_SIObStop_APP		STRUCT	
TS_SIObStop_DAPP		STRUCT	
TS_TmStatObStop_APP		STRUCT	

I/O (parameter)	Meaning	Data type	Default
TS_TmStatObStop_DAPP	Time stamp in DT format	STRUCT	
TS_BufStatObStop_APP	Time stamp in DT format	STRUCT	
TS_BufStatObStop_DAPP	Time stamp in DT format	STRUCT	
TS_SRLObStop_APP	Time stamp in DT format	STRUCT	
TS_SRLObStop_DAPP		STRUCT	
TS_DIObStop_APP		STRUCT	
TS_DIObStop_DAPP		STRUCT	
TS_SRL_APP		STRUCT	
TS_SRL_DAPP		STRUCT	
QERR	1 = Processing Error block	BOOL	1
QPARF	1 = Parameterization error module	BOOL	0
QBPARF	1 = Parameterization error block	BOOL	0
QPERAF	1 = Peripheral access error	BOOL	0
QRACKF	1 = Module carrier error	BOOL	0
QTS_NCON	1 = TS_xxx is not interconnected	BOOL	0
TS_xxx	Timestamp (xxx = 000 - 511) Bit 0: Signal condition (MsgSig) Bit 1: Information flank change (TriInf) Bit 2: Handshake (HdSh) Byte 1: Timestamp's quality code (ST) DWORD TS0: Date/ Timestamp in ISP format (seconds) DWORD TS1: Date/ Timestamp in ISP format (split seconds/ second fragments)	STRUCT DigValTS2	
TS_OSO_DI_DT_xxx	Observer status observer – digital input (xxx = 000..511)	STRUCT	
TS_C_xxx	TS communication (xxx = 000 - 511) Bit 0: Transaction acknowledgment (HS) Bit 1: Interconnection check (LI)	BYTE	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = Save settings	BOOL	0
ACK_E061	1 = Acknowledge the messages	BOOL	0
CPU_DIAG_PN	System structure: CPU Diagnosis	STRUCT	
OB_55_PN	System structure: status alarm diagnosis	STRUCT	
RAC_DIAG	Status information rack	STRUCT	

I/O (parameter)	Meaning	Data type	Default

RACK_TS_XCHG	SoE Message Exchange with higher order block	STRUCT
		PERAF: BOOL; // 1=Module I/O Access Failure
		PARF: BOOL; // 1=Parameter Assignment Error Module
		RET: WORD;
		BUFOV : BOOL; //Buffer overflow
		DIOF: BOOL; //Digital input observer failure
		BSOF : BOOL; //Buffer status observer failure
		TSOF: BOOL; //Time status observer failure
		SRLOF: BOOL; //System redundancy layer observer failure
		SIOF: BOOL; //Source identification observer failure
		BPARF: BOOL; // 1=Parameter Assignment Error Block
		TS_NCON : BOOL; // 1=TS_xxx is not connected
		SICH : BOOL; // Source identification channel
		TMSTAT : BOOL; // Time status
		SRLS : BOOL; // Redundancy status
		MSG_BUSY : BOOL; // reserve
		RESV1 : BOOL; // reserve
		RESV2 :BOOL; // reserve
		SUBNET: BYTE;
		RACK: BYTE;
		SLOT: BYTE;
		CHANNEL: BYTE;
		SaS_TS_00: ARRAY [0..65] OF BYTE; //Timestamp ALARM_T-Call 0, 1 Format, 2..65 8*TS
		SaS_TS_01: ARRAY [0..65] OF BYTE; //Timestamp ALARM_T-Call 0,1 Format, 2..65 8*TS
		END_STRUCT;	

I/O (parameter)	Meaning	Data type	Default
TIME_STATUS		STRUCT CPU_NO_SYNC:BOOL; CPU_JITTER_MSG:BOOL; TmStat_R1:BOOL; ... TmStat_R256:BOOL; TmStat_Lim:BOOL; END_STRUCT	
SaS_TS_00	Time stamp	STRUCT BYTE0: BYTE; .... BYTE65: BYTE; END_STRUCT	
SaS_TS_01	Time stamp	STRUCT BYTE0: BYTE; .... BYTE65: BYTE; END_STRUCT	

6.15 IMDRV_TS: Transferring time-stamped process-signal changes

6.15.1 Description of IMDRV_TS

Object name (type + number)

FB 129

- IMDRV_TS Block I/Os (Page 98)

Area of application

The IMDRV_TS block transfers time-stamped process signal changes to the MSG_TS blocks, and messages from the interface module (IM) to the OS.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 40	Hardware interrupt
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The IMDRV_TS block is copied from the library and instantiated in a system chart. The block is installed in its runtime group after the RACK block runtime group in the above-mentioned OBs.
- OR_32_TS is always interconnected between MSG_TS and IMDRV_TS.
- The logical address LADDR is configured with the logical address of the IM (diagnostics address). If you operate the DP master system in DPV1 mode, the input address of the IM is entered.
- The RAC_DIAG structure of the RACK block is interconnected with the structure of the same name of the IMDRV_TS block.
- The S_CH_xxx and TINF_xxx inputs of the TRIG_INF structure are set.
  Every signal that is time-stamped by the IM has a unique assignment identified by the slot of the module combined with the corresponding channel number. There are 128 inputs of the WORD data type for 128 signals. The slot number of the relevant digital input module is entered in the more significant byte and the channel number (signal of the digital input module) is entered into the less significant byte. The slot and channel number of the process signals are entered in the block inputs S_CH_xxx.
  Example:
  In HW Config, you have activated time-stamping for the digital signal of channel 10 of a digital input module that is inserted in slot 5 of an ET 200M. The number 16#050A is entered at the first available input S_CH_xxx of the IM_DRV_TS.
  The information about the edge evaluation for the event entering state is stored in the TINF_xxx parameters of the TRIG_INF structure.
  0 means: 0 -> 1 is event entering state
  1 means: 1 -> 0 is event entering state.

Description of the functions

The IMDRV_TS block reads the messages from the message buffers (up to 15 data records, each with 20 messages) of an IM, and transfers them to a message block for time stamps (MSG_TS). The MSG_TS sends the messages via an ALARM_8P block whose time stamps for its 8 messages are entered in the 1st associated value in an ARRAY of BYTE.

How it works

- Hardware interrupt (OB 40): The IM generates a hardware interrupt if there are new messages. The time-stamp status, including the number of the IM data record to be fetched and the number of messages in the data record, are fetched from the start information of the process interrupt OB and stored for cyclic processing. The interrupt stack can hold up to 17 process interrupts. If this maximum is exceeded, all new information will be lost. The loss of information is indicated by the "Loss of message at IM (buffer overflow)" message.
- Cyclic processing: If any messages are queued in the stack, SFB 52 (RDREC, read data record) reads the relevant data record (message buffer). If there are several data records to be fetched, it will fetch the record that contains the oldest messages (oldest hardware interrupt). The block instance temporarily stores a maximum of 20 messages of a data record. The IM can enter new messages in a data record once it has been read. If all data records are in use, the IM enters "Loss of message at IM (buffer overflow)" (incoming) as the last message in the message buffer. "Loss of message at IM (buffer overflow)" (outgoing) is then entered as the first message in the first free data record. Messages received within the interval between a buffer overflow and the enabling of a record will be lost.
  The slot number/channel number of the stored messages are compared with the input parameters of the block for slot number/channel number (S_CH_xxx). If they match, the message is written to the corresponding output (TS_xxx).
  Errors occurring during data exchange between the block and IM are reported by the ALARM_8P block (for example, an I/O access error).

Quality code for the time stamp TS_xxx.TS0/TS1

A quality code QC_TS is formed for the time stamp TS0/TS1, and entered in TS_xxx.

State	Quality code TS_xxx.QC_TS
Valid value	16#80
Invalid value (higher level error) • Time-of-day frame failure • Stop the time stamp function • Message loss on IM (buffer overflow) • Loss of information with redundancy	16#40
Invalid value	16##00

Addressing

For general information, see also Addressing (Page 530)

The logical address of the IM obtained in HW Config (corresponds to the diagnostic address, or the input address of the IM for a DP master system in DPV1 mode) is entered at the driver's block input (LADDR) by the "Generate module driver" CFC function. Any change to the LADDR block input will initiate a single check of the logical address according to the startup characteristics of the block.

Process signals that require a time stamp and are detected via an IM must be configured accordingly in HW Config.

Error handling

I/O access error:

QPERAF	The block could not access the IM. A data record could not be read.

Block processing error:

QERR	A block execution error has occurred.

Module parameter assignment error:

QPARF	Faulty block configuration: Incorrect logical basic address entered.

Parameter assignment error:

QBPARF	Faulty block configuration: The slot/channel number of an IM message does not match any slot/channel number of the block input parameters.

Rack error:

QRACKF	Failure of the rack containing the IM or IM failure.

IM Startup Characteristics

During startup/restart of the IM, the system will generate process interrupts once again for those records which were occupied prior to restart but had not been fetched.

The message "Startup data (incoming)" is entered as the first message of the first free data record. After restart, the system checks all monitored digital signals for changes, outputs a message if appropriate. It finally generates the message "Startup data (outgoing)".

IMDRV_TS driver block startup characteristics

Initializes the ALARM_8P blocks using the data stored prior to the CPU transition to STOP. During an initial startup, the signal state is set to "Zero".

During startup, the block verifies the existence of an IM at its logical address set in LADDR. If this does not exist, it sets the QPARF output to TRUE, and does not access any I/Os in its subsequent cycles. QPARF = FALSE and I/O access is enabled only after the correct module has been inserted, or the logical address has been set correctly. Stored process interrupt data which were not computed before the restart will be deleted.

Redundancy

Time stamping in H systems equipped with two IM units is redundant under the following conditions:

- Both IM units communicate via the communication (K) bus.
- No error has occurred during the update of the active and passive IM.

The SUBNET and RACK blocks report loss of redundancy (failure of an IM), separately from the IMDRV_TS block.

Time stamping is interrupted for the duration of the changeover between the active and passive IM. This period of interruption is indicated by the message "Redundant changeover" (incoming/outgoing state).

The active IM usually reports the current I/O status to the redundant IM. If this communication is disrupted, the message "Loss of information with redundancy" (entering state) is output. When the I/O statuses of the active and redundant IM are synchronized, the message "Loss of information with redundancy" (outgoing) is output.

Time response

Not available

Message response

The block signals system messages from the IM via the ALARM_8P block. The time-stamped hardware interrupts are forwarded to the MSG_TS IM message block via OR_32_TS.

Operator control and monitoring:

The block does not have a faceplate.

Additional information

You will find more information in:

Message texts of IMDRV_TS (Page 100)

6.15.2 I/Os of IMDRV_TS

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EV_ID	Message number for ALARM_8P	DWORD	0
EV_ID_00	Message number 0 for ALARM_8P	DWORD	0
LADDR	Logic address IM	INT	0
S_CH_xxx	Slot/channel number (xxx = 000 - 127)	WORD	0
TRIG_INF	Edge evaluation: 0 = trigger 0 -> 1, 1 = trigger 1 -> 0	STRUCT	

Output parameters

I/O (parameter)	Meaning	Data type	Default
M_ACK_00	Message acknowledgment	WORD	0
Q_ERR_00	Message error	BOOL	0
QERR	1 = processing error block	BOOL	1
QPARF	1 = parameter assignment error module	BOOL	0
QBPARF	1 = parameter assignment error block	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0
QTS_NCON	1 = TS_xxx is not interconnected	BOOL	0
STAT_00	Status output	WORD	0
TS_xxx	Time stamp (xxx = 000 – 127) Bit 0: Message signal state (MsgSig) Bit 1: Edge change information (TriInf) Bit 2: Handshake (HdSh) Byte 1: Quality code of the time stamp (ST) DWORD TS0: Date/time stamp in ISP format (seconds) DWORD TS1: Date/time stamp in ISP format (fractions of seconds)	STRUCT	
TS_C_xxx	TS communication (xxx = 000 - 127) Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
RAC_DIAG	Rack status information	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts of IMDRV_TS (Page 100)

6.15.3 Message texts of IMDRV_TS

Assignment of message text and message class

You will find more information in Message classes (Page 531)

Message block	Message no.	Default message text	Message class
EV_ID (ALARM_8P)	1	IM @1%d@@2%d@: Parameter assignment error Slot=@3%d@ Channel=@4%d@	PLC Process Control Message - Failure
	2	IM @1%d@@2%d@: I/O access error: Ret_Val@5%d@	PLC Process Control Message - Failure
	3	IM @1%d@@2%d@: Parameter assignment error LADDR	PLC Process Control Message - Failure
	4	IM @1%d@@2%d@: Output TS_xxx of S_CHxx: Slot=@3%d@ Channel=@4%d@ is not interconnected	PLC Process Control Message - Failure
	5	Reserve5	No message
	6	Reserve6	No message
	7	Reserve7	No message
	8	Reserve8	No message
EV_ID_00 (ALARM_T)	1	IM @3%d@@4%d@: Startup data	PLC Process Control Message - Failure
	2	IM @3%d@@4%d@: Time-of-day frame failure	PLC Process Control Message - Failure
	3		No message
	4	IM @3%d@@4%d@: Time difference between the frame and the internal clock may cause inaccuracy	PLC Process Control Message - Failure
	5	IM @3%d@@4%d@: Stop the time stamp function	PLC Process Control Message - Failure
	6	IM @3%d@@4%d@: Message loss on IM (buffer overflow)	PLC Process Control Message - Failure
	7	IM @3%d@@4%d@: Redundant changeover	PLC Process Control Message - Failure
	8	IM @3%d@@4%d@: Loss of information with redundancy	PLC Process Control Message - Failure

Note

The message "IM @1%d@@2%d@: Output TS_xxx of S_CHxx: Slot=@3%d@ Channel=@4%d@ is not interconnected" is generated when the time stamp of a signal could not be forwarded. The reason for this could be configured but not interconnected time stamp signals (e.g. missing channel block PCS7DiIT and missing message block EventTs).

6.16 MHA_CO: Multi HART variable read coordination (0 - 15 Channel)

6.16.1 Description of MHA_CO

Object name (type + number)

FB 426

- I/Os of MHA_CO (Page 101)

Area of application

The MHA_CO block coordinates the reading of the MultiHART variables for ET 200SP HA HART modules.

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The MHA_CO block is installed in OB 1.
- MODE1_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block.
- The OUT structure CPU_DIAG_PN of the OB_BEGIN_PN block is interconnected with the IN_OUT structures of the same name of the MHA_CO block.
- The MULTI_HART_xx outputs are interconnected with the inputs of the Pcs7HaAI/Pcs7HaAO blocks.

Error handling

The plausibility of input parameters is not checked.

Block functions

The MHA_CO block reads the values of the HART auxiliary variables for which the HVPriEn / HV_SecEN / HV_TerEn / HV_QuaEn is selected at the Pcs7HaAI / Pcs7HaAO blocks.

Messaging

Not available

6.16.2 I/Os of MHA_CO

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
MUL_HART	1 = 1 Multi HART, 4 = 4 Multi HART	INT	0
HV1ADDR	HART variable 1 address	INT	0
HV1ADDR_CMD	HART variable 1 command address	INT	0
HV2ADDR	HART variable 2 address	INT	0
HV2ADDR_CMD	HART variable 2 command address	INT	0
HV3ADDR	HART variable 3 address	INT	0
HV3ADDR_CMD	HART variable 3 command address	INT	0
HV4ADDR	HART variable 4 cddress	INT	0
HV4ADDR_CMD	HART variable 4 command address	INT	0
RACKF	1= Higher level error	BOOL	0
MODF	1 = Module 1 removed / Out of Order	BOOL	0
FEATURE	Reserve	DWORD	0
MODE_xx	Channel mode xx (xx = 00 - 15)	DWORD	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
MULTI_HART_xx	Bidirectional information exchange channel (xx = 00 – 15)	STRUCT	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = Accept new settings	BOOL	0
CPU_DIAG_PN	System structure: CPU-Diagnose	STRUCT	

6.17 MOD_1: Monitoring up to 16 channels on S7-300/400 SM modules without diagnostic capability

6.17.1 Description of MOD_1

Object name (type + number)

FB 91

- I/Os of MOD_1/MOD_2 (Page 106)

Area of application

The MOD_1 block monitors up to 16 channels on S7-300/400 SM modules without diagnostic capability (no mixed modules). H systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_1 block is installed in its runtime group downstream of the RACK block runtime group in the above-mentioned OBs.
- The MODE_xx inputs (mode of module channels xx) are configured.
- The logical base address of the LADDR module is configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_1.
- The EN input is interconnected with the output of an AND block.
  Its inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block and EN_Mxx (xx = module number) of the RACK block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function

The MOD_1 block analyzes all events that affect a module and its channels acyclically. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P reports the events.

The block is enabled by the higher-level RACK block at runtime. The event to be evaluated can be found in the CPU_DIAG start information of the OB_DIAG block. There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QRACKF = TRUE)
- Events that are evaluated by the MOD block:
  - Program execution error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)

"Module removed" and "I/O access error" events are reported to the OS by ALARM_8P. The diagnostics interrupt function distinguishes between module and channel errors, whereby each channel is assigned a message ID.

The system verifies during startup that the module is available (plugged in). The module status information that is read here is then available in the form of service output parameters (MOD_INF).

You will find additional information about faults in the *System Software for S7-300/400 System and Standard Functions* reference manual.

Redundancy

The higher-level RACK block monitors the redundancy of DP master systems operating in an H system.

MODE setting

You will find additional information about this in the "MODE settings (Page 517)" section.

Note

If you make changes to the MODE_xx input configurations at runtime, they are not accepted at the outputs until you set the ACC_MODE input to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Valid channel display

The available channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You will find additional information about this in the "Addressing (Page 530)" section.

Error handling

The plausibility of input parameters is not checked.

You will find additional information about error handling in the "Error information of output parameter MSG_STAT (Page 530)" section.

Service Information

To analyze faults, the module status information entered during startup is read via the MOD_INF structured output parameter. You will find additional information in the *System Software for S7-300/400 System and Standard Functions; System Status List, Module Status Information* reference manual.

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

MOD_1 uses ALARM_8P to report module errors. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. The message is output only under the condition that no higher-priority error is reported within this delay time. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default.
The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_1 (Page 108)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.17.2 I/Os of MOD_1/MOD_2

The MOD_1 and MOD_2 block I/Os are identical with the exception of the number of MODE_xx and OMODE_xx. The number of monitored channels determines the corresponding number of I/O parameters (xx).

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID	Message number	DWORD	0
LADDR	Logical address of the module	INT	0
MODE_xx	Channel mode (xx = 00 - 15/00 - 31)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel mode (xx = 00 - 15/00 - 31)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_1/MOD_2/MOD_3/MOD_64 (Page 108)

Maintenance status MS (Page 533)

6.17.3 Message texts and associated values of MOD_1/MOD_2/MOD_3/MOD_64

Assignment of message text and message class to the block parameters of MOD_1/MOD_2/MOD_3/MOD_64

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID	1	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	No message	No message
	3	Module @1%d@/@2%d@/@3%d@: @4W %t#MOD_n_TXT@ (n = 1, 2, 3 or 64)	PLC Process Control Message - Failure
	4		No message
	5		No message
	6		No message
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Assignment of associated values to the block parameters of MOD_1/MOD_2/MOD_3

Message block ALARM_8P	Associated value	Block parameters	Meaning
EV_ID	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number from MOD_n_TXT (n = 1, 2, 3 or 64) (Message 1)

You will find the message texts and their text numbers in the "Text library for MOD_1, MOD_2, MOD_3, MOD_64 (Page 537)" section.

See also

Message Classes (Page 531)

6.18 MOD_2: Monitoring 32 channels on S7-300/400 SM modules without diagnostic capability

6.18.1 Description of MOD_2

Object name (type + number)

FB 92

- MOD_2 block I/Os (Page 113)

Area of application

The MOD_2 block monitors 32 channels on S7-300/400 SM modules without diagnostic capability (no mixed modules). H systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_2 block is installed in its runtime group downstream of the RACK block runtime group in the above-mentioned OBs.
- The MODE_xx inputs (mode of module channels xx) are configured.
- The logical base address of the LADDR module is configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_2.
- The EN input is interconnected with the output of an AND block.
  Its inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block and EN_Mxx (xx = module number) of the RACK block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function

Block MOD_2 analyzes all events affecting a module and its channels in non-cyclic mode. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P reports the events.

The block is enabled to run by the higher-level RACK block. The event to be evaluated can be found in the CPU_DIAG start information of the OB_DIAG block. There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QRACKF = TRUE)
- Events that are evaluated by the MOD block:
  - Program execution error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)

"Module removed" and "I/O access error" events are reported to the OS by ALARM_8P. The diagnostics interrupt function distinguishes between module and channel errors, whereby each channel is assigned a message ID.

The system verifies during startup that the module is available (plugged in). The module status information that is read here is then available in the form of service output parameters (MOD_INF).

You will find additional information about errors in the *System Software for S7-300/400; System and Standard Functions* reference manual.

Redundancy

The higher-level RACK block monitors the redundancy of DP master systems operating in an H system.

MODE setting

You will find additional information about this in the "MODE settings (Page 517)" section.

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Valid channel display

The available channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You will find additional information about this in the "Addressing (Page 530)" section.

Error handling

The plausibility of input parameters is not checked.

You will find additional information about error handling in the "Error information of output parameter MSG_STAT (Page 530)" section.

Service Information

To analyze faults, the module status information entered during startup is read via the MOD_INF structured output parameter. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; System Status List, Module Status Information*.

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

MOD_2 uses ALARM_8P to report module errors. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. The message is output only under the condition that no higher-priority error is reported within this delay time. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default.
The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_2 (Page 114)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.18.2 I/Os of MOD_1/MOD_2

The MOD_1 and MOD_2 block I/Os are identical with the exception of the number of MODE_xx and OMODE_xx. The number of monitored channels determines the corresponding number of I/O parameters (xx).

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID	Message number	DWORD	0
LADDR	Logical address of the module	INT	0
MODE_xx	Channel mode (xx = 00 - 15/00 - 31)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0

I/O (parameter)	Meaning	Data type	Default
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel mode (xx = 00 - 15/00 - 31)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_1/MOD_2/MOD_3/MOD_64 (Page 114)

Maintenance status MS (Page 533)

6.18.3 Message texts and associated values of MOD_1/MOD_2/MOD_3/MOD_64

Assignment of message text and message class to the block parameters of MOD_1/MOD_2/MOD_3/MOD_64

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID	1	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	No message	No message
	3	Module @1%d@/@2%d@/@3%d@: @4W %t#MOD_n_TXT@ (n = 1, 2, 3 or 64)	PLC Process Control Message - Failure
	4		No message
	5		No message

Message block ALARM_8P	Message number	Default message text	Message class
	6		No message
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Assignment of associated values to the block parameters of MOD_1/MOD_2/MOD_3

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
EV_ID	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number from MOD_n_TXT (n = 1, 2, 3 or 64) (Message 1)

You will find the message texts and their text numbers in the "Text library for MOD_1, MOD_2, MOD_3, MOD_64 (Page 537)" section.

See also

Message Classes (Page 531)

6.19 MOD_3: Monitoring up to 16 channels on S7-200/300/400 SM modules without diagnostic capability

6.19.1 Description of MOD_3

Object name (type + number)

FB 95

- MOD_3 block I/Os (Page 119)

Area of application

The MOD_3 block monitors up to 16 channels on S7-300/400 SM mixed modules without diagnostic capability (I/O modules). H-Systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_3 block is installed in its runtime group downstream of the RACK block runtime group in the above-mentioned OBs.
- The MODE_xx inputs are configured.
- The logical addresses LADDR and LADDR1 are configured.
- The structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the MOD_3 structures of the same name.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function

The MOD_3 block cyclically analyzes all events that affect a module. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P reports the events. The message function can be disabled.

The block is enabled to run by the higher-level RACK block. The diagnostic event is entered in the CPU_DIAG start information of the OB_BEGIN block.

There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. MODE_00 to MODE_15 inputs are available for encoding up to 16 input channels, and MODE_16 ... MODE_31 for encoding up to 16 output channels.
The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QRACKF = TRUE)
  - Program execution error (OB 85) (output parameter QRACKF = TRUE)
- Events that are evaluated by the MOD block:
  - I/O access error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)

"Module removed" and "I/O access error" events are reported to the OS by ALARM_8P. The diagnostics interrupt function distinguishes between module and channel errors, whereby each channel is assigned a message ID.

The system verifies during startup that the module is available (plugged in). The module status information read here makes this data available in the form of service output parameters (MOD_INF).

You can find additional information about faults in the *System Software for S7-300/400 System and Standard Functions* reference manual.

Redundancy

Block MOD_3 supports segment redundancy of H systems operating with distributed I/Os. If you want to use this function, you must configure the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs of the SUBNET block with the numbers of the redundant segments. If there is no segment redundancy, the remaining input must be set to the (default) value 16#FF.

MODE setting

You can find additional information about this in the "MODE settings (Page 517)" section.

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You can find additional information in the "OMODE (Page 527)" section.

Valid channel display

The available channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You can find additional information about this in the "Addressing (Page 530)" section.

Error handling

The plausibility of input parameters is not checked.

You can find additional information about error handling in the "Error information of output parameter MSG_STAT (Page 530)" section.

Service Information

To analyze faults, the module status information entered during startup is read via the MOD_INF structured output parameter. You can find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; System Status List, Module Status Information*.

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

Block MOD_3 uses ALARM_8P to report module errors. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default. The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_3 (Page 121)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.19.2 I/Os of MOD_3

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID	Message number	DWORD	0
LADDR	Logical address of the input channels	INT	0
LADDR1	Logical address of the output channels	INT	0
MODE_xx	Channel xx mode	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel xx mode	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	De-fault
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_1/MOD_2/MOD_3/MOD_64 (Page 121)

Maintenance status MS (Page 533)

6.19.3 Message texts and associated values of MOD_1/MOD_2/MOD_3/MOD_64

Assignment of message text and message class to the block parameters of MOD_1/MOD_2/MOD_3/MOD_64

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID	1	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	No message	No message
	3	Module @1%d@/@2%d@/@3%d@: @4W %t#MOD_n_TXT@ (n = 1, 2, 3 or 64)	PLC Process Control Message - Failure
	4		No message
	5		No message
	6		No message
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Assignment of associated values to the block parameters of MOD_1/MOD_2/MOD_3

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
EV_ID	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number from MOD_n_TXT (n = 1, 2, 3 or 64) (Message 1)

You will find the message texts and their text numbers in the "Text library for MOD_1, MOD_2, MOD_3, MOD_64 (Page 537)" section.

See also

Message Classes (Page 531)

6.20 MOD_4: Monitoring ET 200S modules downstream of a Y-Link

6.20.1 Description of MOD_4

Object name (type + number)

FB 119

- MOD_4 block I/Os (Page 125)

Area of application

Block MOD_4 monitors modules (up to 16 channels) of an ET 200S acting as a DPV0 slave (IM 151 High Feature) downstream of a Y link.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- Block MOD_4 is installed in its runtime group downstream of the OB_DIAG1 block, which is used for the ET 200S downstream of a Y link, in the above-mentioned OBs.
- The MODE_xx inputs (mode of module channels xx) are configured.
- The logical base address of the LADDR module is configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the OB_DIAG1 blocks (for DP slave downstream of a Y link, and an OB_DIAG1 for each Y link) are interconnected with the IN_OUT structures RAC_DIAG (DP slave) and RAC_DIAG_L (Y link) of MOD_4.
- The EN input is interconnected with the output of an AND block.
  whose inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block, EN_F of the OB_DIAG1 block for the Y link, EN_F of the OB_DIAG1 block for the ET 200S downstream of the Y link, and EN_Mxx (xx = module slot number in the ET 200S) of the DPDIAGV0 block.

- The DPA_M input is interconnected with the DPA_Mxx (xx= module slot number in the ET 200S) output of the DPDIAGV0 block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function

Block MOD_4 analyzes all events related to an ET 200S module acyclically. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P reports events separately for each module.

The block enabled to run by the higher-level DPDIAGV0 block. The event to be evaluated is available at input DPA_M. Possible byte assignments:

0000000 = Module OK

0000001 = Module error

0000010 = Wrong module

0000011 = Module missing

00001xx = ET 200S failure; x = irrelevant

There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This only occurs if the module status changes during startup, or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the OB_DIAG1 block:
  - Rack failure (OB 86,OB 83) (output parameter QRACKF = TRUE)
- Events that are evaluated by the MOD block:
  - Module diagnostics (OB 82) (output parameter QMODF = TRUE)

ALARM_8P is used to report "Module error ", "Wrong module " or "Module missing " events to the OS.

Redundancy

You can not use redundant DP slaves downstream of a Y link.

MODE setting

You will find additional information about this in the "MODE settings (Page 517)" section.

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Valid channel display

The available channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You will find additional information about this in the "Addressing (Page 530)" section.

Error handling

The plausibility of input parameters is not checked.

You will find additional information about error handling in

"Error Information of Output Parameter MSG_STAT" (Page 530) section.

Startup characteristics

A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

MOD_4 uses ALARM_8P to report module errors. The message function can be disabled by setting EN_MSG = FALSE.

The block generates the maintenance status MS.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_4 (Page 127)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.20.2 I/Os of MOD_4

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DPA_M	Module status	BYTE	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID	Message number	DWORD	1
LADDR	Logical address of the module	INT	0
MODE_xx	Mode channel (xx = 00 - 15)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
PADP_ADR	DP address of ET 200S	BYTE	255
RACK_NO	Rack number (Y-Link)	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 15)	DWORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Mode channel (xx = 00 - 15)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	De-fault
ACC_MODE	1 = accept new MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics of the DP slave down-stream of Y link	STRUCT	
RAC_DIAG_L	System structure: Rack diagnostics for the Y link	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_4 (Page 127)

Maintenance status MS (Page 533)

6.20.3 Message texts and associated values of MOD_4

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID	1	Module @1%d@/@2%d@/@3%d@/@4%d@: Error	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/@4%d@: Wrong	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/@4%d@: Missing	PLC Process Control Message - Failure
	4	No message	No message
	5	No message	No message
	6	No message	No message
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Assignment of associated values

Message block ALARM_8P	Associ-ated value	Block parameter	Meaning
EV_ID	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte) (Y link)
	3	PADP_ADR	DP address of ET 200S
	4	SLOT_NO	Slot number (byte)

See also

Message Classes (Page 531)

6.21 MOD_64: Monitoring 64 channels on S7-300 SM modules without diagnostic capability

6.21.1 Description of MOD_64

Object name (type + number)

FB 137

- MOD_64 block I/Os (Page 131)

Area of application

The MOD_64 block monitors 64 channels on S7-300 SM modules without diagnostic capability (no mixed modules). H systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_64 block is installed in its runtime group downstream of the RACK block runtime group in the above-mentioned OBs.
- The MODE_xx inputs (mode of module channels xx) are configured.
- The logical base address of the LADDR module is configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_2.
- The EN input is interconnected with the output of an AND block.
  Its inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block and EN_Mxx (xx = module number) of the RACK block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function

The MOD_64 block analyzes all events that affect a module and its channels acyclically. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P reports the events.

The block is enabled to run by the higher-level RACK block. The event to be evaluated can be found in the CPU_DIAG start information of the OB_DIAG block. There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QRACKF = TRUE)
- Events that are evaluated by the MOD block:
  - Program execution error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)

"Module removed" and "I/O access error" events are reported to the OS by ALARM_8P. The diagnostics interrupt function distinguishes between module and channel errors, whereby each channel is assigned a message ID.

The system verifies during startup that the module is available (plugged in). The module status information that is read here is then available in the form of service output parameters (MOD_INF).

You will find additional information about errors in the *System Software for S7-300/400; System and Standard Functions* reference manual.

Redundancy

The higher-level RACK block monitors the redundancy of DP master systems operating in an H system.

MODE setting

You will find additional information about this in the "MODE settings (Page 517)" section.

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Valid channel display

The available channels on a module are displayed in the CH_EXIST or CH_EXIST_2 output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK or CH_OK_2 displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You will find additional information about this in the "Addressing (Page 530)" section.

Error handling

The plausibility of input parameters is not checked.

You will find additional information about error handling in the "Error information of output parameter MSG_STAT (Page 530)" section.

Service Information

To analyze faults, the module status information entered during startup is read via the MOD_INF structured output parameter. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; System Status List, Module Status Information*.

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

MOD_64 uses ALARM_8P to report module errors. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. The message is output only under the condition that no higher-priority error is reported within this delay time. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default.
The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_64 (Page 133)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.21.2 I/Os of MOD_64

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1

I/O (parameter)	Meaning	Data type	Default
EV_ID	Message number	DWORD	0
LADDR	Logical address of the module	INT	0
MODE_xx	Mode channel (xx = 00 - 63)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_ACTIVE_2	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists (0 to 31)	DWORD	0
CH_EXIST_2	Channel exists (32 to 63)	DWORD	0
CH_OK	Channel OK (0 to 31)	DWORD	0
CH_OK_2	Channel OK (32 to 63)	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_2	Release for maintenance - extended status 2	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Mode channel (xx = 00 - 63)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_1/MOD_2/MOD_3/MOD_64 (Page 133)

Maintenance status MS (Page 533)

6.21.3 Message texts and associated values of MOD_1/MOD_2/MOD_3/MOD_64

Assignment of message text and message class to the block parameters of MOD_1/MOD_2/MOD_3/MOD_64

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID	1	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	No message	No message
	3	Module @1%d@/@2%d@/@3%d@: @4W %t#MOD_n_TXT@ (n = 1, 2, 3 or 64)	PLC Process Control Message - Failure
	4		No message
	5		No message
	6		No message
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Assignment of associated values to the block parameters of MOD_1/MOD_2/MOD_3

Message block ALARM_8P	Associated value	Block parameters	Meaning
EV_ID	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)

Message block ALARM_8P	Associated value	Block parameters	Meaning
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number from MOD_n_TXT (n = 1, 2, 3 or 64) (Message 1)

You will find the message texts and their text numbers in the "Text library for MOD_1, MOD_2, MOD_3, MOD_64 (Page 537)" section.

See also

Message Classes (Page 531)

6.22 MOD_CENTRAL: Monitoring external CP and IM

6.22.1 Description of MOD_CENTRAL

Object name (type + number)

FB 206

- I/Os of MOD_CENTRAL (Page 135)

Area of application

The block monitors external CP 443-1 PROFINET, external CP 443-5 PROFIBUS and IM 460 / IM 461 from version PCS7 V8.0 SP1.

MODE Configuration

Input parameters	PROFIBUS (DP-CP-IO nodes)	PROFINET (IE-CP-Network nodes)	PROFINET (IE-CP-IO nodes)	Central IM-46x-x / CP(Gateway)
MODE	16#00000001	16#00000002	16#00000004	16#00000003

Additional information

For additional information, refer to the following sections:

Message texts and associated values of MOD_CENTRAL (Page 136)

Maintenance status MS (Page 533)

See also

OMODE settings for SM modules (Page 527)

6.22.2 I/Os of MOD_CENTRAL

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number	DWORD	0
LADDR	Logical address of the module	INT	0
MODE	Operating mode	DWORD	0
MS	Maintenance status	DWORD	0
GBIT_ADR	Diagnostics address GBIT interface	INT	0
GBIT_PORT1_ADR	Diagnostics address GBIT PORT 1	INT	0
PNIO_ADR	Diagnostic address PN-IO interface	INT	0
PORT1_ADR	Diagnostic address PORT 1	INT	0
PORT1_CONNECT	1=Port 1 connected	BYTE	0
PORT2_ADR	Diagnostic address PORT 2	INT	0
PORT2_CONNECT	1=Port 2 connected	BYTE	0
PORT3_ADR	Diagnostic address PORT 3	INT	0
PORT3_CONNECT	1=Port 3 connected	BYTE	0
PORT4_ADR	Diagnostic address PORT 4	INT	0
PORT4_CONNECT	1=Port 4 connected	BYTE	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	0 = central / 1 = external	BOOL	0
SUBN1_ID	CP: ID of subnet, if available. Otherwise, default value IM 46x-x: always 0	BYTE	16#FF

Output parameters

I/O (parameter)	Meaning	Data type	Default
EXT_STAT	Maintenance Release - Extended Status	DWORD	0
MOD_INF	System structure: Module parameter	STRUCT	
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
OMODE	Operating mode	DWORD	0
O_MS	Maintenance status	DWORD	0

I/O (parameter)	Meaning	Data type	Default
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_CENTRAL (Page 136)

Maintenance status MS (Page 533)

6.22.3 Message texts and associated values of MOD_CENTRAL

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID	1	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
	5		No message
	6		No message
	7		No message
	8		No message

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameters	Meaning
EV_ID	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)

You can find additional information in the section: Message Classes (Page 531).

6.23 MOD_CP: CP 341 diagnostics

6.23.1 Description of MOD_CP

Object name (type + number)

FB 98

- MOD_CP block I/Os (Page 140)

Area of application

The MOD_CP block monitors a serial communication module CP 341. H systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_CP block is installed in its runtime group downstream of the RACK block runtime group in the above-mentioned OBs.
- The SUBN1_ID, SUBN2_ID, SUBN_TYP, RACK_NO, and SLOT_NO inputs are configured.
- The logical base address LADDR of the module is configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_CP.
- The EN input is interconnected with the output of an AND block.
  Its inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block and EN_Mxx (xx = module number) of the RACK block.

Function and method of operation

Block MOD_CP analyzes all events that affect a module and its channels acyclically. and generates a value status for the serial communication blocks (such as RCV_341). ALARM_8P is used to report these events.

The higher-level RACK block enables the MOD_CP block to run. The event to be evaluated is stored in the CPU_DIAG start and diagnostic information of the OB_BEGIN block. A (MODE_00) is assigned to the communication channel of the module. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output. This occurs only during startup or if you set ACC_MODE = TRUE. The current value status of the communication channel is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QRACKF = TRUE)
- Events that are evaluated by the MOD block:
  - Program execution error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)
  - Diagnostic interrupt (OB 82) Distinguishing between module errors and channel errors

The following events are module errors (QMODF = TRUE output parameter):

ALARM_8P is used to report "Module removed", "I/O access error" and "Diagnostic interrupt" events to WinCC.

Redundancy

The higher-level RACK block monitors the redundancy of DP master systems operating in an H system.

Valid channel display

The existing channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Overload behavior

The MOD_CP block counts the OB 82 calls. The counter is reset in OB1. If more than five OB 82 events occur in succession before the cycle control point is reached (OB 1), these events are rejected and the message "OB 82 DP master failure: x Rack: y Slot: z" is output.

Time response

Not available

Message response

MOD_CP uses ALARM_8P to report module errors. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. The message is output only under the condition that no higher-priority error is reported within this delay time. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default.
The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_CP (Page 142)

Maintenance status MS (Page 533)

See also

MODE settings for SM modules (Page 517)

6.23.2 I/Os of MOD_CP

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number	DWORD	0
LADDR	Logical address of the module	INT	0
MODE_00	Channel 1 mode 1: CP341 1: if the operating mode <> none 2: if the operating mode = none	WORD	0
MODE_01	Channel 2 mode 0: for CP341 1: if the operating mode <> none 2: if the operating mode = none	WORD	0
MS	Maintenance status	DWORD	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
MOD_INF	System structure: Module parameter	STRUCT	
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_00	Value status/channel 1 mode	DWORD	0
OMODE_01	Value status/channel 2 mode	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_CP (Page 142)

Maintenance status MS (Page 533)

6.23.3 Message texts and associated values of MOD_CP

Assignment of message text and message class

Message block ALARM_8P	Message number	Block parameter	Default message text	Message class
EV_ID	1	QMODF	CP @1%d@/@2%d@/@3%d@: Removed	PLC Process Control Message - Failure
	2	QPERAF	CP @1%d@/@2%d@/@3%d@: Access error	PLC Process Control Message - Failure
	3		CP @1%d@/@2%d@/@3%d@: @4W %t#MOD_CP_TXT@	PLC Process Control Message - Failure
	4		CP @1%d@/@2%d@/@3%d@: Wrong parameter	PLC Process Control Message - Failure
	5		CP @1%d@/@2%d@/@3%d@: Wire break	PLC Process Control Message - Failure
	6		CP @1%d@/@2%d@/@3%d@/2: Wrong parameter	PLC Process Control Message - Failure
	7		CP @1%d@/@2%d@/@3%d@/2: Wire break	PLC Process Control Message - Failure
	8		CP @1%d@/@2%d@/@3%d@: Multiple diagnostic interrupt	PLC Process Control Message - Failure

You will find the message texts and their text numbers in the "Text library for MOD_CP (Page 537)" section.

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameters	Meaning
EV_ID	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)

SUBN_ID = SUBN1_ID. If SUBN1_ID = 16#FF, the associated value is substituted with SUBN2_ID.

See also

Message Classes (Page 531)

6.24 MOD_CP_PN: Monitoring of serial communication modules

6.24.1 Description of MOD_CP_PN

Object name (type + number)

FB 201

- I/Os of MOD_CP_PN (Page 143)

Area of application

The MOD_CP_PN block monitors a serial communication module CP 341.

6.24.2 I/Os of MOD_CP_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number ALARM_8P (assigned by the ES)	DWORD	0
LADDR	Logical address of the module	INT	0
MODE_00	Channel 1 mode	WORD	0
MODE_01	Channel 2 mode (CP 441 only)	WORD	0
MS	Maintenance status	DWORD	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBSL_NO	Subslot number	BYTE	0
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 2 ID (100 - 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#000 00000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
MOD_INF	System structure: Module parameter	STRUCT	
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_00	Value status/channel 1 mode	DWORD	0
OMODE_01	Value status/channel 2 mode (CP 441 only)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_CP_PN (Page 145)

Maintenance status MS (Page 533)

6.24.3 Message texts and associated values of MOD_CP_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	CP @1%d@/@2%d@/@3%d@: Withdrawn	PLC Process Control Message - Failure
	2	CP @1%d@/@2%d@/@3%d@: Access error	PLC Process Control Message - Failure
	3	CP @1%d@/@2%d@/@3%d@: @4W %t#MOD_CP_TXT@	PLC Process Control Message - Failure
	4	CP @1%d@/@2%d@/@3%d@: Wrong parameter	PLC Process Control Message - Failure
	5	CP @1%d@/@2%d@/@3%d@: Wire break	PLC Process Control Message - Failure
	6	CP @1%d@/@2%d@/@3%d@/2: Wrong parameter	SPLC Process Control Message - Failure
	7	CP @1%d@/@2%d@/@3%d@/2: Wire break	PLC Process Control Message - Failure
	8	CP @1%d@/@2%d@/@3%d@: Multiple diagnostic interrupt	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Meaning
1	SUBN_ID	ID of the PN IO system (bytes)
2	RACK_NO	Rack/station number (byte)
3	SLOT_NO	Slot number (byte)

You can find the message texts and their text numbers in the section "Text library for MOD_CP_PN (FB201) (Page 546)".

You can find additional information in the section: AUTOHOTSPOT.

See also

Message Classes (Page 531)

6.25 MOD_D1: Monitoring up to 16 channels on S7-300/400 SM modules with diagnostic functions

6.25.1 Description of MOD_D1

Object name (type + number)

FB 93

- MOD_D1 block I/Os (Page 152)

Area of application

The MOD_D1 block can monitor the following modules:

- Power modules
- ET200S counter modules
- FM350 counter modules
- up to 16 channels on S7-300/400 SM modules with diagnostic functions (no mixed modules)
- and the power supplies of an ET 200iSP in a redundant configuration.

H systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_D1 block is installed in its runtime group downstream of the RACK block runtime group in the above-mentioned OBs.
- The MODE_xx (mode of the channels xx of the module), SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The logical base address LADDR of the module is configured.

- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_D1.
- The EN input is interconnected with the output of an AND block.
  Its inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block and EN_Mxx (xx = module number) of the RACK block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function and method of operation

Block MOD_D1 analyzes all events that affect a module and its channels acyclically. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P is used to report these events.

MOD_D1 monitors the redundant power supplies for ET 200iSP and reports the failure of a power supply via the slot number of the interface module. If the power supply fails, the maintenance status (MS) of the module shows "Maintenance: Requirement Moderate".

Block MOD_D1 is enabled by the higher-level RACK block at runtime. The event to be evaluated is stored in the CPU_DIAG start and diagnostic information of the OB_BEGIN block. There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QPERAF = TRUE)
- Events that are evaluated by the MOD block:
  - Program execution error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)
  - Diagnostic interrupt (OB 82) Distinguishing between module errors and channel errors

The following events are module errors (QMODF = TRUE output parameter):

- External auxiliary voltage missing
- Front connector missing
- Module not configured
- Wrong parameter in module
- Wrong/missing module
- Communication error at a CPU module

- Timeout (watchdog)
- Loss of internal power at a module
- Rack failure
- CPU failure
- EPROM error
- RAM error
- ADC/DAC error
- Fuse tripped
- Power supply 1: Error
- Power supply 2: Error

The following events are channel errors (value status "invalid value", OMODE_xx = 16#00xxxx):

- Configuration/parameter assignment error
- Common-mode errors (analog I/Os only)
- Short-circuit to P
- Short circuit to M
- Interruption at the output transistor
- Wire break
- Reference channel error (analog inputs only)
- Measuring range underflow (analog inputs only)
- Measuring range overflow (analog inputs only)
- Missing load voltage (analog and digital outputs only)
- Missing sensor power supply (digital outputs only)
- Fuse tripped (digital outputs only)
- Mass error (digital I/Os only)
- Excess temperature (digital outputs only)

ALARM_8P is used to report "Module removed", "I/O access error", and "Diagnostic interrupt" events to WinCC.

The diagnostics interrupt function distinguishes between module and channel errors, whereby each channel is assigned a message ID. Only one incoming/outgoing event can be reported for each channel. As long as an incoming message is queued at a channel, further messages on new events at this channel will be lost.

If the event is defined uniquely in the diagnostic information, the corresponding text will be entered in the message. If ambiguous entries exist, the text of the first set bit in the error byte of the diagnostic information will be displayed. When using modules assigned diagnostic functions and more than one error byte for diagnostic information, only the channel xx error text will be output if the error information is not displayed in the first error byte.

The system verifies during startup that the module is available (plugged in). The module status information that is read here is then available in the form of service output parameters (MOD_INF).

Detailed information about the errors is entered in the DIAG_INF output parameter of data type STRUCT. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; Diagnostic Data, Byte 0 to Byte 8, Structure of Channel-Specific Diagnostic Data*.

Note

If you run a HART module in HART MODE (Page 517) =16#070C, any HART protocol errors/ configuration changes will be masked by the MOD_D1 driver block, and will not be signaled as channel errors.

Redundancy

The higher-level RACK block monitors the redundancy of DP master systems operating in an H system.

MODE setting

You will find additional information about this in the "MODE settings (Page 517)" section.

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Valid channel display

The available channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You will find additional information about this in "Addressing (Page 530)".

HART modules with read/write access to the process image are configured in the same way as input modules. The set I/O range must always be identical.

Example: SM 332 AO 2x0/4..20mA HART 332-5TB00-0AB0:

Address input range (HW Config)	Address output range (HW Config)	LADDR (decimal/hex)
544	544	544 / 16#0220

Error handling

The plausibility of input parameters is not checked.
You will find additional information about error handling in the "Error information of output parameter MSG_STAT (Page 530)" section.

Service Information

To analyze faults, the module status information entered during startup is read via the MOD_INF structured output parameter. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; System Status List, Module Status Information*.

Following a diagnostic interrupt, you will also find detailed module diagnostic information in the MODDIAG0 to MODDIAG8 output parameters. You will find additional information in the reference manual *System Software for S7-300/400 System and Standard Functions; Diagnostic Data, Byte 0 to Byte 8*.

The CHDIAG00 to CHDIAG15 output parameters contain detailed channel-status information. You will find additional information in the reference manual *System Software for S7-300/400 System and Standard Functions; Structure of Channel-Specific Diagnostic Data*.

The system resets this diagnostic information after a diagnostic interrupt has been reported outgoing (no further channel or module errors are queued).

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Overload behavior

The MOD_D1 block counts the OB82 calls. The counter is reset in OB1. If more than two OB82 events occur in succession before the cycle control point is reached (OB1), these events are rejected and the message "OB82 DP master failure: x Rack: y Slot: z" is output.

Time response

Not available

Message response

MOD_D1 uses ALARM_8P_1 to report module errors. The function also calls ALARM_8P_2 and ALARM_8P_3 which are intended for channel errors. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. The message is output only under the condition that no higher-priority error is reported within this delay time. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default.
The message function can be disabled by setting EN_MSG = FALSE.

Flutter suppression

The "Flutter suppression" function is used to delay the outgoing of a message by a configurable period.

The flutter time is entered at the channel block at the FlutTmIn parameter. The high byte of the DXCHG parameter of the channel blocks contains the flutter time.

Flutter suppression comes into effect when FlutEN = 1 or FlutTmIn > 0 is set at the channel block.

There is only one flutter message per module. The delay times and fault messages are channel-specific. The fault messages are extended by at least the delay time. Flutter exists if the fault messages "Outgoing" and then "Incoming" are present within the delay time.

The last fluttering channel and its set delay time deactivates the flutter message.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D1 (Page 154)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.25.2 I/Os of MOD_D1/MOD_D2

The MOD_D1 and MOD_D2 block I/Os are identical, with the exception of the number of MODE_xx and OMODE_xx. The number of monitored channels determines the corresponding number of I/O parameters (xx).

The factory setting of the block display in the CFC is identified in the "I/O" column: I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number (x = 1 - 3)	DWORD	0
LADDR	Logical address of the module	INT	0
MODE_xx	Operating mode channel xx (xx = 00 - 15 / 00 - 31)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#000 00000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	0
DM_ACTIVE	Fault delay	DWORD	16#0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0

I/O (parameter)	Meaning	Data type	Default
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	16#000 00000
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment (x = 1 - 3)	WORD	0
MSGSTATx	Message error information (x = 1 - 3)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel mode (xx = 00 - 15/00 - 31)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D1 (Page 154)

Message texts and associated values of MOD_D2 (Page 174)

Maintenance status MS (Page 533)

6.25.3 Message texts and associated values of MOD_D1

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: @5W%t#MOD_D1_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Multiple diagnostic interrupt	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: @4W%t#MOD_D1_TXT@	PLC Process Control Message - Failure
	6		No message
	7	Module @1%d@/@2%d@/@3%d@: @5W%t#MOD_D1_TXT@	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Error channel 00 @4W %t#MOD_D1_TXT@	PLC Process Control Message - Failure
	... ...	... ...	... ...
	8	Module @1%d@/@2%d@/@3%d@: Error channel 07 @4W %t#MOD_D1_TXT@	PLC Process Control Message - Failure
EV_ID3	1	Module @1%d@/@2%d@/@3%d@: Error channel 08 @4W %t#MOD_D1_TXT@	PLC Process Control Message - Failure
	... ...	... ...	... ...
	8	Module @1%d@/@2%d@/@3%d@: Error channel 15 @4W %t#MOD_D1_TXT@	PLC Process Control Message - Failure

You will find the message texts and their text numbers in "Text library for MOD_D1 (Page 539)".

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameters	Meaning
EV_ID1	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number (message 5) from MOD_D1_TXT
	5		Text number (message 3) from MOD_D1_TXT
EV_ID2	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number (messages 1 - 8) from MOD_D1_TXT
EV_ID3	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number (messages 1 - 8) from MOD_D1_TXT

See also

Message Classes (Page 531)

6.26 MOD_D16_PN: Monitoring S7-300 SM modules with up to 16 channels and with diagnostics functions

6.26.1 Description of MOD_D16_PN

Object name (type + number)

FB 198

- I/Os of MOD_D16_PN/MOD_D24_PN (Page 156)

Area of application

Block MOD_D16_PN monitors S7-300 SM modules with a maximum of 16 channels and with diagnostics functions.

6.26.2 I/Os of MOD_D16_PN/MOD_D24_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number ALARM_8P_x (x = 1 - 2/1 - 3/1 - 4, assigned by the ES)	DWORD	0
FEATURE_xx	Feature parameter (xx = 01 - 04)	WORD	0
FEATURE_yy	Feature parameter (yy = 05 - 10)	DWORD	0
LADDR	Logic input address of the module	INT	0
LADDR1	Logical output address of the module (if output address is not the same as input address).	INT	0
MODE_xx	Operating mode channel xx (xx = 00 - 07/00 - 15/00 - 23)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBSL_NO	Subslot number	BYTE	0
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 2 ID (100 - 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INFx	System structure: Diagnostic information	STRUCT	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0

I/O (parameter)	Meaning	Data type	Default
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STATx	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression active	DWORD	16#00000000
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment (x = 1 - 2/1 - 3/1 - 4)	WORD	0
MSGSTATx	Message error information (x = 1 - 2/1 - 3/1 - 4)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Operating mode channel xx (xx = 00 - 07/00 - 15/00 - 23)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D16_PN/MOD_D24_PN (Page 158)

Maintenance status MS (Page 533)

6.26.3 Message texts and associated values of MOD_D16_PN/MOD_D24_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@/ @6%d@: Failure	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/ @6%d@:@5W%t#MOD_n_TXT@	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@/ @6%d@: @5W%t#MOD_n_TXT@ (n=16, 24)	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/ @6%d@: Multiple diagnostics interrupt	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@/ @6%d@: @4W%t#MOD_n_TXT@ (n=16, 24)	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/ @6%d@: maintenance required	Preventative Maintenance - Standard
	7	Module @1%d@/@2%d@/@3%d@/ @6%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	No message module @1%d@/@2%d@/ @3%d@/@6%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number (message 5) from MOD_D16_PN_TXT / MOD_D24_PN_TXT	BYTE
5	Text number (message 3) from MOD_D16_PN_TXT / MOD_D24_PN_TXT	BYTE
6	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID2	1	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 00 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 01 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 02 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 03 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 04 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 05 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 06 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 07 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID2

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D16_PN_TXT /MOD_D24_PN_TXT	BYTE
5	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID3	1	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 08 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 09 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 10 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 11 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 12 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 13 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 14 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 15 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID3

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D16_PN_TXT /MOD_D24_PN_TXT	BYTE
5	Subslot number	BYTE

Process control messages for ALARM_8P with EV_ID4 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID_4	1	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 16 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 17 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 18 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 19 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 20 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 21 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 22 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 23 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID4

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D24_PN_TXT	BYTE
5	Subslot number	BYTE

You can find the message texts and their text numbers in the section Text library for MOD_D8_PN (FB197) / MOD_D16_PN (FB198) / MOD_D24_PN (FB199) / MOD_ENME (FB 419) (Page 542).

You can find additional information in the section: Message Classes (Page 531).

6.27 MOD_D16_S7P: Diagnostic module check (<=16 channels)

6.27.1 Description of MOD_D16_S7P

Object name (type + number)

FB 434

- I/Os of MOD_D16_S7P (Page 162)

Area of application

The MOD_D16_S7P block creates the device specific DP S7+ diagnostics information for modules with ≤ 16 channels.

Calling OBs

The cyclic OB 1 and OB 82, OB 83, OB 85, OB 86 and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- If a module with > 8 and ≤ 16 channels is available in HW Configuration, an instance of the diagnostic function block MOD_D16_S7P is added to the system charts of the project.
- Information from HW configuration is read and the input parameters of MOD_D16_S7P are parameterized correspondingly.

The MOD_D16_S7P gets connected with the corresponding channel blocks of the IO module.

Startup characteristics

Initialization of the ALARM_8P blocks.

6.27.2 I/Os of MOD_D16_S7P

I/Os of MOD_D8_S7P

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Interrupt delay 1 (s)	INT	2
DELAY2	Interrupt delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID1	Message number 1	DWORD	16#0
EV_ID2	Message number 2	DWORD	16#0
FEATURE	Feature parameter	DWORD	0
LADDR	Logical address of the module	INT	-1
LADDR1	Reserve	INT	-1
MODE_xx	Channel xx mode (xx = 00...15)	DWORD	0
MS	Maintenance status	DWORD	16#0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = External DP interface	BOOL	0
SUBN1_ID	DP master system 1 ID	BYTE	255
SUBN2_ID	DP master system 2 ID	BYTE	255

Out parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
DM_ACTIVE	Fault delay	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block (xx = 00...15)	DWORD	16#0
DXCHG1_xx	2nd internal data exchange channel for channel block (xx = 00...15)	DWORD	16#0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended Status – Application	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	0
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00...07)	DWORD	0
MSGSTAT1	Message failure 1	WORD	0
MSGSTAT2	Message failure 2	WORD	0
MSG_ACK1	Message acknowledged 1	WORD	0

I/O (parameter)	Meaning	Type	Default
MSG_ACK2	Message acknowledged 2	WORD	0
OMODE_xx	Channel xx mode (xx = 00...15)	DWORD	0
O_MS	Maintenance status	DWORD	0
QREC_VAL	1 = Received new data record	BOOL	0
QREC_ERR	1 = Error read data record	BOOL	0
QSTATUS	Status read data record	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = Module pulled/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = Apply MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: RACK diagnostics	STRUCT	0

6.27.3 Message texts and associated values of MOD_D16_S7P

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: @5W %t#MOD_D16_S7P_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: @4W %t#MOD_D16_S7P_TXT@	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
	7	Module @1%d@/@2%d@/@3%d@: @5W %t#MOD_D16_S7P_TXT@	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	DP master system number	BYTE
2	Rack number/Station number	BYTE
3	Slot number	BYTE

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Error channel 00 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Error channel 01 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Error channel 02 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Error channel 03 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Error channel04 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Error channel05 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Error channel06 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Error channel 07 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID2

Associated value	Block parameters	Data type
1	DP master system number	BYTE
2	Rack number/Station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_ D16_S7P_TXT	BYTE

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID3	1	Module @1%d@/@2%d@/@3%d@: Error Channel 08 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Error Channel 09 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Error Channel 10 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Error Channel 11 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Error Channel 12 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Error Channel13 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Error Channel14 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Error Channel15 @4W%t#MOD_ D16_S7P_TXT@	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID3

Associated value	Block parameters	Data type
1	DP master system number	BYTE
2	Rack number/Station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_ D16_S7P_TXT	BYTE

You can find the message texts and their text numbers in the section: Text library for MOD_ D8_S7P, MOD_ D16_S7P (Page 545).

You can find additional information in the section: Message Classes (Page 531).

6.28 MOD_D2: Monitoring up to 32 channels of S7-300/400 SM modules with diagnostic functions

6.28.1 Description of MOD_D2

Object name (type + number)

FB 94

- MOD_D2 block I/Os (Page 172)

Area of application

Block MOD_D2 monitors up to 32 channels on S7-300/400 SM modules with diagnostic capability (no mixed modules). H systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_D2 block is installed in its runtime group downstream of the RACK block runtime group in the above-mentioned OBs.
- The MODE_xx (mode of the channels xx of the module), SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The logical base address LADDR of the module is configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_D2.
- The EN input is interconnected with the output of an AND block.
  Its inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block and EN_Mxx (xx = module number) of the RACK block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function and method of operation

Block MOD_D2 analyzes all events that affect a module and its channels acyclically. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P is used to report these events. The message function can be disabled.

The block is enabled by the higher-level RACK block at runtime. The event to be evaluated is stored in the CPU_DIAG start and diagnostic information of the OB_BEGIN block. There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set

ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QRACKF = TRUE)
- Events that are evaluated by the MOD block:
  - Program execution error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)
  - Diagnostic interrupt (OB 82) Distinguishing between module errors and channel errors

The following events are module errors (QMODF = TRUE output parameter):

- External auxiliary voltage missing
- Front connector missing
- Module not configured
- Wrong parameter in module
- Wrong/missing module
- Communication error at a CPU module
- Timeout (watchdog)
- Loss of internal power at a module
- Rack failure
- CPU failure
- EPROM error
- RAM error
- ADC/DAC error
- Fuse tripped

The following events are channel errors (value status "invalid value", OMODE_xx = 16#00xxxx):

- Configuration/parameter assignment error
- Common-mode errors (analog I/Os only)
- Short-circuit to P
- Short circuit to M
- Interruption at the output transistor
- Wire break
- Reference channel error (analog inputs only)
- Measuring range underflow (analog inputs only)

- Measuring range overflow (analog inputs only)
- Missing load voltage (analog and digital outputs only)
- Missing sensor power supply (digital outputs only)
- Fuse tripped (digital outputs only)
- Mass error (digital I/Os only)
- Excess temperature (digital outputs only)

ALARM_8P is used to report "Module removed", "I/O access error", and "Diagnostic interrupt" events to WinCC.

The diagnostics interrupt function distinguishes between module and channel errors, whereby each channel is assigned a message ID. Only one incoming or outgoing event can be reported for each channel. As long as an incoming message is queued at a channel, further messages on new events at this channel will be lost.

If the event is defined uniquely in the diagnostic information, the corresponding text will be entered in the message. If ambiguous entries exist, the text of the first set bit in the error byte of the diagnostic information will be displayed. When using modules assigned diagnostic functions and more than one error byte for diagnostic information, only the channel xx error text will be output if the error information is not displayed in the first error byte.

The system verifies during startup that the module is available (plugged in). The module status information read here makes this data available in the form of service output parameters (MOD_INF).

Detailed information about the errors is entered in the DIAG_INF output parameter of data type STRUCT. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; Diagnostic Data, Byte 0 to Byte 8, Structure of Channel-Specific Diagnostic Data*.

Redundancy

The block supports segment redundancy of CPU 417H for distributed I/Os. The SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs are configured with the numbers of the redundant segments. If there is no segment redundancy, the remaining input must be set to the (default) value 16#FF.

MODE setting

You will find additional information about this in the "MODE settings (Page 517)" section.

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Valid channel display

The available channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You will find additional information about this in the "Addressing (Page 530)" section.

Error handling

The plausibility of input parameters is not checked.
You will find additional information about error handling in the "Error information of output parameter MSG_STAT (Page 530)" section.

Service Information

To analyze faults, the module status information entered during startup is read via the MOD_INF structured output parameter. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; System Status List, Module Status Information*.

Following a diagnostic interrupt, you will also find detailed module diagnostic information in the MODDIAG0 to MODDIAG10 output parameters. You will find additional information in the reference manual *System Software for S7-300/400 System and Standard Functions; Diagnostic Data, Byte 0 to Byte 10*.

The CHDIAG00 to CHDIAG31 output parameters contain detailed channel status information. You will find additional information in the reference manual *System Software for S7-300/400 System and Standard Functions; Structure of Channel-Specific Diagnostic Data*.

The system resets this diagnostic information after a diagnostic interrupt has been reported outgoing (no further channel or module errors are queued).

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

MOD_D2 uses ALARM_8P_1 to report module errors. In addition, the error blocks ALARM_8P_2, ALARM_8P_3, ALARM_8P_4 and ALARM_8P_5 intended for channel errors are called. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. The message is output only under the condition that no higher-priority error is reported within this delay time. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default.
The message function can be disabled by setting EN_MSG = FALSE.

Flutter suppression

The "Flutter suppression" function is used to delay the outgoing of a message by a configurable period.

The flutter time is entered at the channel block at the FlutTmIn parameter. The high byte of the DXCHG parameter of the channel blocks contains the flutter time.

Flutter suppression comes into effect when FlutEN = 1 or FlutTmIn > 0 is set at the channel block.

There is only one flutter message per module. The delay times and fault messages are channel-specific. The fault messages are extended by at least the delay time. Flutter exists if the fault messages "Outgoing" and then "Incoming" are present within the delay time.

The last fluttering channel and its set delay time deactivates the flutter message.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D2 (Page 174)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.28.2 I/Os of MOD_D1/MOD_D2

The MOD_D1 and MOD_D2 block I/Os are identical, with the exception of the number of MODE_xx and OMODE_xx. The number of monitored channels determines the corresponding number of I/O parameters (xx).

The factory setting of the block display in the CFC is identified in the "I/O" column: I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number (x = 1 - 3)	DWORD	0
LADDR	Logical address of the module	INT	0
MODE_xx	Operating mode channel xx (xx = 00 - 15 / 00 - 31)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#000 00000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	0
DM_ACTIVE	Fault delay	DWORD	16#0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0

I/O (parameter)	Meaning	Data type	Default
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	16#000 00000
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment (x = 1 - 3)	WORD	0
MSGSTATx	Message error information (x = 1 - 3)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel mode (xx = 00 - 15/00 - 31)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D1 (Page 154)

Message texts and associated values of MOD_D2 (Page 174)

Maintenance status MS (Page 533)

See also

MODE settings for SM modules (Page 517)

OMODE settings for SM modules (Page 527)

6.28.3 Message texts and associated values of MOD_D2

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2		No message
	3	Module @1%d@/@2%d@/@3%d @: @5W%t#MOD_D2_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Multiple diagnostic interrupt	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure
	6		No message
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Error channel 00 @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure
	...	...	
	8	Module @1%d@/@2%d@/@3%d@: Error channel 07 @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure
EV_ID3	1	Module @1%d@/@2%d@/@3%d@: Error channel 08 @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure
	...	...	
	8	Module @1%d@/@2%d@/@3%d@: Error channel 15 @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure
EV_ID4	1	Module @1%d@/@2%d@/@3%d@: Error channel 16 @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure
	...	...	
	8	Module @1%d@/@2%d@/@3%d@: Error channel 23 @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure
EV_ID5	1	Module @1%d@/@2%d@/@3%d@: Error channel 24 @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure

Message block ALARM_8P	Message number	Default message text	Message class
	...	...	
	8	Module @1%d@/@2%d@/@3%d@: Error channel 31 @4W%t#MOD_D2_TXT@	PLC Process Control Message - Failure

You will find the message texts and their text numbers in "Text library for MOD_D2 (Page 537)".

Assignment of associated values

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
EV_ID1	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4	-	Text number (messages 1 - 3) of MOD_D2_TXT
EV_ID2	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4	-	Text number (message 5) of MOD_D2_TXT
	5	-	Text number (message 3) of MOD_D2_TXT
EV_ID3	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4	-	Text number (messages 1 - 8) of MOD_D2_TXT
EV_ID4	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4	-	Text number (messages 1 - 8) of MOD_D2_TXT
EV_ID5	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4	-	Text number (messages 1 - 8) of MOD_D2_TXT

See also

Message Classes (Page 531)

6.29 MOD_D24_PN: Monitoring S7-300 SM modules with up to 24 channels and with diagnostics functions

6.29.1 Description of MOD_D24_PN

Object name (type + number)

FB 199

- I/Os of MOD_D16_PN/MOD_D24_PN (Page 176)

Area of application

Block MOD_D24_PN monitors S7-300 SM modules with a maximum of 24 channels and with diagnostics functions.

6.29.2 I/Os of MOD_D16_PN/MOD_D24_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number ALARM_8P_x (x = 1 - 2/1 - 3/1 - 4, assigned by the ES)	DWORD	0
FEATURE_xx	Feature parameter (xx = 01 - 04)	WORD	0
FEATURE_yy	Feature parameter (yy = 05 - 10)	DWORD	0
LADDR	Logic input address of the module	INT	0
LADDR1	Logical output address of the module (if output address is not the same as input address).	INT	0
MODE_xx	Operating mode channel xx (xx = 00 - 07/00 - 15/00 - 23)	DWORD	0

I/O (parameter)	Meaning	Data type	Default
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBSL_NO	Subslot number	BYTE	0
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 2 ID (100 - 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INFx	System structure: Diagnostic information	STRUCT	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STATx	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression active	DWORD	16#00000000
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment (x = 1 - 2/1 - 3/1 - 4)	WORD	0
MSGSTATx	Message error information (x = 1 - 2/1 - 3/1 - 4)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Operating mode channel xx (xx = 00 - 07/00 - 15/00 - 23)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D16_PN/MOD_D24_PN (Page 178)

Maintenance status MS (Page 533)

6.29.3 Message texts and associated values of MOD_D16_PN/MOD_D24_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@/ @6%d@: Failure	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/ @6%d@:@5W%t#MOD_n_TXT@	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@/ @6%d@: @5W%t#MOD_n_TXT@ (n=16, 24)	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/ @6%d@: Multiple diagnostics interrupt	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@/ @6%d@: @4W%t#MOD_n_TXT@ (n=16, 24)	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/ @6%d@: maintenance required	Preventative Maintenance - Standard
	7	Module @1%d@/@2%d@/@3%d@/ @6%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	No message module @1%d@/@2%d@/ @3%d@/@6%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number (message 5) from MOD_D16_PN_TXT / MOD_D24_PN_TXT	BYTE
5	Text number (message 3) from MOD_D16_PN_TXT / MOD_D24_PN_TXT	BYTE
6	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID2	1	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 00 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 01 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 02 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 03 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 04 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 05 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 06 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 07 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID2

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D16_PN_TXT /MOD_D24_PN_TXT	BYTE
5	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID3	1	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 08 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 09 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 10 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 11 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 12 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 13 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 14 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 15 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID3

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D16_PN_TXT /MOD_D24_PN_TXT	BYTE
5	Subslot number	BYTE

Process control messages for ALARM_8P with EV_ID4 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID_4	1	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 16 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 17 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 18 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 19 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 20 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 21 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 22 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 23 @4W%t# MOD_D24_PN_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID4

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D24_PN_TXT	BYTE
5	Subslot number	BYTE

You can find the message texts and their text numbers in the section Text library for MOD_D8_PN (FB197) / MOD_D16_PN (FB198) / MOD_D24_PN (FB199) / MOD_ENME (FB 419) (Page 542).

You can find additional information in the section: Message Classes (Page 531).

6.30 MOD_D3: Monitoring of hybrid modules with diagnostic capability

6.30.1 Description of MOD_D3

Object name (type + number)

FB 134

- MOD_D3 block I/Os (Page 188)

Area of application

Block MOD_D3 monitors a maximum of up to 16 channels on S7-300 SM modules with diagnostics functions. H systems support only the modules installed in switched racks.

MOD_D3 includes all the functionality of MOD_D1, plus additional functions for diagnostic evaluation of multiple channel types in a diagnostic data record. The block also fully supports 4-byte channel-specific diagnostics.
Note: MOD_D1 only evaluated 8 selected bits of the 4-byte channel-specific diagnosis.

The modules supported are the ET 200PRO modules:
6ES7 148 4FC00 0AB0 -> 8DI/4DO
6ES7 148 4FA00 0AB0 -> 8/16 DI

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_D3 block is installed in its runtime group downstream of the RACK-block runtime group in the above-mentioned OBs.
- The MODE_xx (mode of the channels xx of the module), SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The logical base address LADDR of the module is configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_D3.
- The EN input is interconnected with the output of an AND block.
  Its inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block and EN_Mxx (xx = module number) of the RACK block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function and method of operation

The MOD_D3 block analyzes all events affecting a module and its channels acyclically. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P is used to report these events.

Execution of the MOD_D3 block is enabled by the higher-level RACK block. The event to be evaluated is stored in the CPU_DIAG start and diagnostic information of the OB_BEGIN block. There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QPERAF = TRUE)
- Events that are evaluated by the MOD block:
  - Program execution error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)
  - Diagnostic interrupt (OB 82) Distinguishing between module errors and channel errors

The following events are module errors (QMODF = TRUE output parameter):

- External auxiliary voltage missing
- Front connector missing
- Module not configured
- Wrong parameter in module
- Wrong/missing module
- Communication error at a CPU module
- Timeout (watchdog)
- Loss of internal power at a module
- Rack failure
- CPU failure
- EPROM error
- RAM error
- ADC/DAC error
- Fuse tripped
- Power supply 1: Error
- Power supply 2: Error

The following events are channel errors (value status "invalid value", OMODE_xx = 16#00xxxx):

- Configuration/parameter assignment error
- Common-mode errors (analog I/Os only)
- Short-circuit to P
- Short circuit to M
- Interruption at the output transistor
- Wire break
- Reference channel error (analog inputs only)
- Measuring range underflow (analog inputs only)
- Measuring range overflow (analog inputs only)
- Missing load voltage (analog and digital outputs only)
- Missing sensor power supply (digital outputs only)
- Fuse tripped (digital outputs only)
- Mass error (digital I/Os only)
- Excess temperature (digital outputs only)
- Undervoltage
- Overvoltage

- Overload
- Hardware interrupt
- Actuator warning
- Safety shutdown
- Ambiguous error
- Error 1 in actuator/sensor
- Error 2 in actuator/sensor
- Channel temporarily not available

ALARM_8P is used to report "Module removed", "I/O access error" and "Diagnostics interrupt" events to the OS.

The diagnostics interrupt function distinguishes between module and channel errors, whereby each channel is assigned a message ID. Only one incoming/outgoing event can be reported for each channel. As long as an incoming message is queued at a channel, further messages on new events at this channel will be lost.

If the event is defined uniquely in the diagnostic information, the corresponding text will be entered in the message. If ambiguous entries exist, the text of the first set bit in the error byte of the diagnostic information will be displayed. When using modules assigned diagnostic functions and more than one error byte for diagnostic information, only the channel xx error text will be output if the error information is not displayed in the first error byte.

The system verifies during startup that the module is available (plugged in). The module status information that is read here is then available in the form of service output parameters (MOD_INF).

Detailed information about the errors is entered in the DIAG_INF output parameter of data type STRUCT. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; Diagnostic Data, Byte 0 to Byte 8, Structure of Channel-Specific Diagnostic Data*.

Several channel types can occur in one diagnostic data record. If the "further channel types exist" bit is set, MOD_D3 runs through the entire diagnostic evaluation and handles reporting for each further channel type.

The new diagnostic data ("channel being calibrated" and "channel temporarily not available") are considered as channel errors and output. The detailed texts are output via the system text library and a corresponding associated value.

Redundancy

The higher-level RACK block monitors the redundancy of DP master systems operating in an H system.

MODE Setting

You will find additional information about this in the "MODE settings (Page 517)" section.

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information about this in the "OMODE settings (Page 527)" section.

Valid channel display

The available channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You will find additional information about this in "Addressing (Page 530)".

HART modules with read/write access to the process image are configured in the same way as input modules. The set I/O range must always be identical.

Example: SM 332 AO 2x0/4..20mA HART 332-5TB00-0AB0:

Address input range (HW Config)	Address output range (HW Config)	LADDR (decimal/hex)
544	544	544 / 16#0220

Error handling

The plausibility of input parameters is not checked.
You will find additional information about error handling in the "Error information of output parameter MSG_STAT" (Page 530) section.

Service Information

To analyze faults, the module status information entered during startup is read via the MOD_INF structured output parameter. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; System Status List, Module Status Information*.

Following a diagnostic interrupt, you will also find detailed module diagnostic information in the MODDIAG0 to MODDIAG8 output parameters. You will find additional information in the

reference manual *System Software for S7-300/400 System and Standard Functions; Diagnostic Data, Byte 0 to Byte 8*.

The CHDIAG00 to CHDIAG15 output parameters contain detailed channel-status information. You will find additional information in the reference manual *System Software for S7-300/400 System and Standard Functions; Structure of Channel-Specific Diagnostic Data*.

The system resets this diagnostic information after a diagnostic interrupt has been reported outgoing (no further channel or module errors are queued).

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx outputs.

Overload Behavior

The MOD_D3 block counts the OB82 calls. The counter is reset in OB1. If more than two OB82 events occur in succession before the cycle control point is reached (OB1), these events are rejected and the message "OB82 DP master failure: x Rack: y Slot: z" is output.

Time response

Not available

Message response

MOD_D3 uses ALARM_8P_1 to report module errors. The function also calls ALARM_8P_2 and ALARM_8P_3 which are intended for channel errors. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. The message is output only under the condition that no higher-priority error is reported within this delay time. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default.
The message function can be disabled by setting EN_MSG = FALSE.

Flutter suppression

The "Flutter suppression" function is used to delay the outgoing of a message by a configurable period.

The flutter time is entered at the channel block at the FlutTmIn parameter. The high byte of the DXCHG parameter of the channel blocks contains the flutter time.

Flutter suppression comes into effect when FlutEN = 1 or FlutTmIn > 0 is set at the channel block.

There is only one flutter message per module. The delay times and fault messages are channel-specific. The fault messages are extended by at least the delay time. Flutter exists if the fault messages "Outgoing" and then "Incoming" are present within the delay time.

The last fluttering channel and its set delay time deactivates the flutter message.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D3 (Page 190)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.30.2 I/Os of MOD_D3

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number (x = 1 - 3)	DWORD	0
FEATURE_xx	Feature parameter (xx = 01 - 04)	WORD	0
FEATURE_yy	Feature parameter (yy = 05 - 10)	DWORD	0
LADDR	Logic input address of the module	INT	0
LADDR1	Logical output address of the module (if output address is not the same as input address).	INT	0
MODE_xx	Mode channel xx (xx = 00 - 15)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0

I/O (parameter)	Meaning	Data type	Default
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	0
DM_ACTIVE	Fault delay	DWORD	16#0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	16#00000000
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment (x = 1 - 3)	WORD	0
MSGSTATx	Message error information (x = 1 - 3)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Mode channel (xx = 00 - 15)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D3 (Page 190)

Maintenance status MS (Page 533)

6.30.3 Message texts and associated values of MOD_D3

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@/ @6%d@: Failure	PLC Process Control Message - Failure
	2		No message
	3	Module @1%d@/@2%d@/@3%d@/ @6%d@: @5W%t#MOD_D3_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/ @6%d@: Multiple diagnostics interrupt	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@/ @6%d@: @4W%t#MOD_D3_TXT@	PLC Process Control Message - Failure
	6		No message
	7	Module @1%d@/@2%d@/@3%d@/ @6%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@/ @6%d@: Maintenance required (external)	Preventative Maintenance - Standard
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Error channel 00 @4W %t#MOD_D3_TXT@	PLC Process Control Message - Failure
	... ...	... ...	... ...
	8	Module @1%d@/@2%d@/@3%d@: Error channel 07 @4W %t#MOD_D3_TXT@	PLC Process Control Message - Failure
EV_ID3	1	Module @1%d@/@2%d@/@3%d@: Error channel 08 @4W %t#MOD_D3_TXT@	PLC Process Control Message - Failure
	... ...	... ...	... ...
	8	Module @1%d@/@2%d@/@3%d@: Error channel 15 @4W %t#MOD_D3_TXT@	PLC Process Control Message - Failure

You will find the message texts and their text numbers in "Text library for MOD_D3" (Page 540).

Assignment of Associated Values

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
EV_ID1	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number (message 5) of MOD_D3_TXT
	5		Text number (message 3) of MOD_D3_TXT
EV_ID2	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number (messages 1 - 8) from MOD_D3_TXT
EV_ID3	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number (messages 1 - 8) from MOD_D3_TXT

See also

Message Classes (Page 531)

6.31 MOD_D32_PN: PN diagnostic block check (32 channels)

6.31.1 Description of MOD_D32_PN

Object name (type + number)

FB 421

- I/Os of MOD_D32_PN (Page 192)

Area of application

The block MOD_D32_PN monitors diagnostics-capable 32-channel modules.

Additional information

Additional information is available in the section:

Message texts and associated values of MOD_D32_PN (Page 193)

6.31.2 I/Os of MOD_D32_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
LADDR	Logical address of module	INT	0
LADDR1	Logical address of module	INT	0
SUBN_TYP	1=External PN interface	BOOL	
SUBN1_ID	ID of primary subnet	BYTE	16#FF
SUBN2_ID	ID of redundant subnet	BYTE	16#FF
RACK_NO	Rack/station number	BYTE	
SLOT_NO	Slot number	BYTE	0
SUBSL_NO	Subslot number	BYTE	0
CHAN_NUM	Total number of channels -1	INT	0
MODE_00 ... MODE_31	Mode channel 0 ... Mode channel 31	DWORD	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
FEATURE_01 ... FEATURE_10	Features of hardware parameter 01 ... Features of hardware parameter 10	WORD	0
EV_ID1 .. EV_ID5	Event ID 1 ... Event ID 5	DWORD	0
EN_MSG	1 = Enable message	BOOL	1
MS	Maintenance State	DWORD	0
MS_REQ	Maintenance release request	BOOL	0
DIAG_BUF	1=CPU diagnostic buffer entry on (relevant for service personnel)	BOOL	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN		STRUCT	
RAC_DIAG		STRUCT	
ACC_MODE	1=Accept new mode settings	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QRACKF	1=Rack failure	BOOL	0
QMODF	1=Module pulled / out of order	BOOL	0
QPERAF	1=Module I/O access failure	BOOL	0
O_MS	Maintenance State	DWORD	0
CH_EXIST	Channel exist	DWORD	0
CH_ACTIVE	Channel active	DWORD	0
CH_OK	Channel OK	DWORD	0
EXT_STAT	Maintenance release – Extended status	DWORD	0
EXT_STAT_A	Extended status – application	DWORD	0
FS_ACTIVE	Flutter suppression active	DWORD	0
OMODE_00 ... OMODE_31	Mode channel 0 ... Mode channel 31	DWORD	0
DXCHG_00 ... DXCHG_31	Bidirectional data exchange channel 0 ... Bidirectional data exchange channel 31	DWORD	0
DXCHG1_00 ... DXCHG1_31	Bidirectional data exchange channel 0 ... Bidirectional data exchange channel 31	DWORD	0
MS_XCHG_00 ... MS_XCHG_31	MS exchange channel 0 ... MS exchange channel 31	DWORD	0
MSGSTAT1 ... MSGSTAT5	Message failure 1 ... Message failure 5	WORD	0
MSG_ACK1 ... MSG_ACK5	Message acknowledged 1 ... Message acknowledged 5	WORD	0
MOD_INF	Module information structure	STRUCT	
DIAG_INF	Module diagnostic information structure	STRUCT	

6.31.3 Message texts and associated values of MOD_D32_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message number	Default message text	Message class
1	Module @1%d@/@2%d@/@3%d@/@6%d@: Failure	PLC Process Control Message - Failure
2		PLC Process Control Message - Error
3	BG @1%d@/@2%d@/@3%d@/@6%d@: @5W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure

Message number	Default message text	Message class
4	Module @1%d@/@2%d@/@3%d@/@6%d@: Multiple diagnostics interrupt	PLC Process Control Message - Error
5	BG @1%d@/@2%d@/@3%d@/@6%d@: @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
6		Preventative Maintenance - Standard
7	Module @1%d@/@2%d@/@3%d@/@6%d@: Maintenance demanded (external)	PLC Process Control Message - Error
8	Module @1%d@/@2%d@/@3%d@/@6%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1:

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number (message 5) from MOD_D8_PN_TXT / MOD_D16_PN_TXT /MOD_D24_PN_TXT/MOD_D32_TXT	BYTE
5	Text number (message 3) from MOD_D8_PN_TXT / MOD_D16_PN_TXT /MOD_D24_PN_TXT/MOD_D32_TXT	BYTE
6	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message number	Default message text	Message class
1	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 00 @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
2	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 01 @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
3	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 02 @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT /MOD_D32_TXT @	PLC Process Control Message - Failure
4	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 03 @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
5	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 04 @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT /MOD_D32_TXT @	PLC Process Control Message - Failure
6	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 05 @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure

Message number	Default message text	Message class
7	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 06 @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
8	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 07 @4W%t# MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID2:

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT	BYTE
5	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message number	Default message text	Message class
1	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 08 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT/ MOD_D32_TXT @	PLC Process Control Message - Failure
2	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 09 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT/ MOD_D32_TXT @	PLC Process Control Message - Failure
3	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 10 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT/ MOD_D32_TXT @	PLC Process Control Message - Failure
4	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 11 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT/ MOD_D32_TXT @	PLC Process Control Message - Failure
5	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 12 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT/ MOD_D32_TXT @	PLC Process Control Message - Failure
6	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 13 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT/ MOD_D32_TXT @	PLC Process Control Message - Failure
7	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 14 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT/ MOD_D32_TXT @	PLC Process Control Message - Failure
8	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 15 @4W%t# MOD_D16_PN_TXT /MOD_D24_PN_TXT/ MOD_D32_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID3:

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D8_PN_TXT /MOD_D16_PN_TXT / MOD_D24_PN_TXT/MOD_D32_TXT	BYTE
5	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID4 are assigned as follows:

Message number	Default message text	Message class
1	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 16 @4W%t# MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
2	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 17 @4W%t# MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
3	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 18 @4W%t# MOD_D24_PN_TXT /MOD_D32_TXT @	PLC Process Control Message - Failure
4	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 19 @4W%t# MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
5	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 20 @4W%t# MOD_D24_PN_TXT /MOD_D32_TXT @	PLC Process Control Message - Failure
6	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 21 @4W%t# MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
7	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 22 @4W%t# MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure
8	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 23 @4W%t# MOD_D24_PN_TXT/MOD_D32_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID4:

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D24_PN_TXT/MOD_D32_TXT	BYTE
5	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID5 are assigned as follows:

Message number	Default message text	Message class
1	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 24 @4W%t# MOD_D32_TXT @	PLC Process Control Message - Failure
2	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 25 @4W%t# MOD_D32_TXT @	PLC Process Control Message - Failure
3	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 26 @4W%t# MOD_D32_TXT @	PLC Process Control Message - Failure
4	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 27 @4W%t# MOD_D32_TXT @	PLC Process Control Message - Failure
5	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 28 @4W%t# MOD_D32_TXT @	PLC Process Control Message - Failure
6	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 29 @4W%t# MOD_D32_TXT @	PLC Process Control Message - Failure
7	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 30 @4W%t# MOD_D32_TXT @	PLC Process Control Message - Failure
8	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 31 @4W%t# MOD_D32_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID5:

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D32_TXT	BYTE
5	Subslot number	BYTE

You can find additional information in the section: Message Classes (Page 531)

6.32 MOD_D8: Monitoring up to 8 channels on S7-300/400 SM modules with diagnostic functions

6.32.1 Description of MOD_D8

Object name (type + number)

FB 424

- MOD_D8 block I/Os (Page 200)

Area of application

The MOD_D8 block monitors S7-300 and S7-400 SM modules with diagnostic capability and up to 8 channels.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The MOD_D8 block is implemented into its runtime group behind the runtime group of the RACK block in the OBs listed above.
- The MODE_xx (mode of the channels xx of the module), SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The logical start address LADDR of the module is configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_D8.
- The EN input is interconnected with the output of an AND block.
- The inputs of this block are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the OB_BEGIN_PN block and EN_Mxx (xx = module number) of the RACK block.

- The output parameter of the DXCHG_xx is interconnected with the subsequent channel block at the DataXchg parameter.
- The output parameter of the O_MS is interconnected with the subsequent channel block at the MS parameter.

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Troubleshooting

Troubleshooting of the block is limited to the error information of the ALARM_8P. In addition, the ALARM_8P_2 provided for channel faults are called. Signaling can be disabled with EN_MSG = FALSE.

Forming the maintenance status

The maintenance status MS of the data type DWORD is copied as is to the output O_MS.

Overload behavior

When more than two OB 82 events take place one after the other before the delay time (OB 1) is reached, the events are discarded and a flatter alarm "Failure OB 82 DP master system:x station:y slot: z" is generated.

The delay times and alarm messages are for specific channels; the alarm messages are extended by at least the delay time.

The last flattering channel and its set delay time de-activates the flatter alarm.

System text library

The block contains a system text library identical to MOD_D3.

Firmware update

The firmware update for the listed HART modules is started by a diagnostic event "OB83 entering state" (remove module) followed directly by diagnostic event "OB83 exiting state" (insert module). With "OB83 exiting state", byte 2 bit 2 is set in data record 0 (1 = STOP mode).

Once the firmware is completed, there is a repeated diagnostic event "OB83 entering state" (remove module) followed directly by diagnostic event "OB83 exiting state" (insert module). With "OB83 exiting state", byte 2 bit 2 is reset in data record 0 (0 = RUN mode).

In MOD_D8, after an "OB83 exiting state" (module removed) the data record 0 (DS0) is always read extra in OB1 using SFC51 and SZL 00B1 to establish whether bit (1 = STOP mode) is set. If this is the case, this is always recognized as a firmware update and the module continues to be indicated as removed and not available. Only when there is an OB83 (module inserted) with the

information in DS0 (0 = RUN mode), is the module indicated as being inserted and available again.

It is assumed that "Module change in run" is always set for the ET 200M head modules so that a firmware update of the HART module always calls an OB83. This means that a firmware update cannot trigger an OB86 diagnostic interrupt.

The "Generate module driver" function enters 16#0001 in the Feature01 parameter for both HART modules. This means that DS0 is read extra when there is an OB 83 exiting state only when Feature01 = 16#0001

The Feature parameters (FEATURE_01 .. FEATURE_10) are intended for future expansions of the MOD_D8 block and for parameter settings for special module situations.

Currently only FEATURE_01 is used as an ID for HART module with a firmware update in RUN.

See also

Message texts and associated values of MOD_D8 (Page 202)

Maintenance status MS (Page 533)

6.32.2 I/Os of MOD_D8

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	1= CPU Diagnostic Buffer entry on (relevant for service personnel)	BOOL	0
EN		BOOL	1
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number (x = 1 - 3)	DWORD	0
FEATURE_01 ... FEATURE_04	Features of hardware paramter	WORD	16#0000
FEATURE_05 ... FEATURE_10	Features of hardware paramter	DWORD	16#00000000

I/O (parameter)	Meaning	Data type	Default
LADDR	Logical address of the module	INT	0
LADDR1	Logical address of the module	INT	0
MODE_xx	Operating mode channel xx (xx = 00 - 15 / 00 - 07)	DWORD	16#00000000
MS	Maintenance status	DWORD	16#00000000
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	16#00
SLOT_NO	Slot number	BYTE	16#00
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	16#FF
SUBN2_ID	ID of the redundant DP master system	BYTE	16#FF

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
DM_ACTIVE	Delayed messaging active	DWORD	16#00000000
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
ENO		BOOL	0
EXT_STAT	Release for maintenance - extended status	DWORD	16#00000000
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	16#00000000
FS_ACTIVE	Flutter suppression	DWORD	16#00000000
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 07)	DWORD	0
MSG_ACKx	Message acknowledgment (x = 1 - 2)	WORD	16#0000
MSGSTATx	Message error information (x = 1 - 2)	WORD	16#0000
O_MS	Maintenance status	DWORD	16#00000000
OMODE_xx	Channel mode (xx = 00 - 07)	DWORD	16#00000000
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D8 (Page 202)

Maintenance status MS (Page 533)

6.32.3 Message texts and associated values of MOD_D8

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	3	BG @1%d@/@2%d@/@3%d@: @5W%t#MOD_D8_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Multiple diagnostic interrupt	PLC Process Control Message - Failure
	5	BG @1%d@/@2%d@/@3%d@: @4W%t#MOD_D8_TXT@	PLC Process Control Message - Failure
	6		No message
	7	BG @1%d@/@2%d@/@3%d@: @5W%t#MOD_D8_TXT@	PLC Process Control Message - Error
	8	BG @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard
EV_ID2	1	BG @1%d@/@2%d@/@3%d@: Error channel 00 @4W %t#MOD_D8_TXT@	PLC Process Control Message - Failure
	... ...	... ...	... ...
	8	BG @1%d@/@2%d@/@3%d@: Error channel 07 @4W %t#MOD_D8_TXT@	PLC Process Control Message - Failure

You can find the message texts and their text numbers in "Text library for MOD_D8 (Page 540)".

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameters	Meaning
EV_ID1	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number from MOD_D8_TXT
	5		Text number from MOD_D8_TXT
EV_ID2	1	MOD_INF.SUBN_ID	DP master system ID (byte)
	2	MOD_INF.RACK_NO	Rack/station number (byte)
	3	MOD_INF.SLOT_NO	Slot number (byte)
	4		Text number from MOD_D8_TXT

6.33 MOD_D8_PN: Monitoring S7-300 SM modules with up to 8 channels and with diagnostics functions

6.33.1 Description of MOD_D8_PN

Object name (type + number)

FB 197

- I/Os of MOD_D8_PN (Page 203)

Area of application

Block MOD_D8_PN monitors S7-300 SM modules with a maximum of 8 channels and with diagnostics functions.

6.33.2 I/Os of MOD_D8_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number ALARM_8P_x (x = 1 - 2/1 - 3/1 - 4, assigned by the ES)	DWORD	0
FEATURE_xx	Feature parameter (xx = 01 - 04)	WORD	0
FEATURE_yy	Feature parameter (yy = 05 - 10)	DWORD	0
LADDR	Logic input address of the module	INT	0
LADDR1	Logical output address of the module (if output address is not the same as input address).	INT	0
MODE_xx	Operating mode channel xx (xx = 00 - 07/00 - 15/00 - 23)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBSL_NO	Subslot number	BYTE	0
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 2 ID (100 - 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INFx	System structure: Diagnostic information	STRUCT	0
DM_ACTIVE	Fault delay	DWORD	16#0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STATx	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression active	DWORD	16#00000000

I/O (parameter)	Meaning	Data type	Default
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment (x = 1 - 2/1 - 3/1 - 4)	WORD	0
MSGSTATx	Message error information (x = 1 - 2/1 - 3/1 - 4)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Operating mode channel xx (xx = 00 - 07/00 - 15/00 - 23)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_D8_PN (Page 205)

Maintenance status MS (Page 533)

6.33.3 Message texts and associated values of MOD_D8_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@/@6%d@: Failure	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/@6%d@: @5W%t#MOD_D8_PN_TXT@	PLC Process Control Message - Error

Message block ALARM_8P	Message number	Default message text	Message class
	3	Module @1%d@/@2%d@/@3%d@/ @6%d@: @5W%t#MOD_D8_PN_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/ @6%d@: Multiple diagnostics interrupt	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@/ @6%d@: @4W%t#MOD_D8_PN_TXT@	PLC Process Control Message - Failure
	6	No message	Preventative Maintenance - Standard
	7	Module @1%d@/@2%d@/@3%d@/ @6%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@/ @6%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number (message 5) from MOD_D8_PN_TXT	BYTE
5	Text number (message 3) from MOD_D8_PN_TXT	BYTE
6	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID2	1	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 00 @4W%t# MOD_D8_PN_TXT @	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 01 @4W%t# MOD_D8_PN_TXT @	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 02 @4W%t# MOD_D8_PN_TXT @	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 03 @4W%t# MOD_D8_PN_TXT @	PLC Process Control Message - Failure

Message block ALARM_8P	Message number	Default message text	Message class
	5	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 04 @4W%t# MOD_D8_PN_TXT @	EPLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 05 @4W%t# MOD_D8_PN_TXT @	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 06 @4W%t# MOD_D8_PN_TXT @	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@/ @5%d@: Error channel 07 @4W%t# MOD_D8_PN_TXT @	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID2

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_D8_PN_TXT	BYTE
5	Subslot number	BYTE

You will find the message texts and their text numbers in the section Text library for MOD_D8_PN (FB197) / MOD_D16_PN (FB198) / MOD_D24_PN (FB199) / MOD_ENME (FB 419) (Page 542).

You can find additional information in the section: Message Classes (Page 531)

6.34 MOD_D8_S7P: Diagnostic module check (<=8 channels)

6.34.1 Description of MOD_D8_S7P

Object name (type + number)

FB 433

- I/Os of MOD_D8_S7P (Page 208)

Area of application

The MOD_D8_S7P block creates the device specific DP S7+ diagnostics information for modules with ≤ 8 channels.

Calling OBs

The cyclic OB 1 and OB 82, OB 83, OB 85, OB 86 and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- If a module with ≤ 8 channels is available in HW configuration, an instance of the diagnostic function block MOD_D8_S7P is added to the system charts of the project.
- Information from HW configuration is read and the input parameters of MOD_D8_S7P are parameterized correspondingly.

The MOD_D8_S7P gets connected with the corresponding channel blocks of the IO module.

Startup characteristics

Initialization of the ALARM_8P blocks.

6.34.2 I/Os of MOD_D8_S7P

I/Os of MOD_D8_S7P

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CHAN_NUM	Total number of channels - 1	INT	0
DELAY1	Interrupt delay 1 (s)	INT	2
DELAY2	Interrupt delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID1	Message number 1	DWORD	16#0
EV_ID2	Message number 2	DWORD	16#0
FEATURE	Feature parameter	DWORD	0
LADDR	Logical address of the module	INT	-1
LADDR1	Reserve	INT	-1
MODE_xx	Channel xx mode (xx = 00...07)	DWORD	0
MS	Maintenance status	DWORD	16#0

I/O (parameter)	Meaning	Type	Default
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = External DP interface	BOOL	0
SUBN1_ID	ID of Primary subnet	BYTE	255
SUBN2_ID	ID of Redundant subnet	BYTE	255

Out parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
DM_ACTIVE	Fault delay	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block (xx = 00...07)	DWORD	16#0
DXCHG1_xx	2nd internal data exchange channel for channel block (xx = 00...07)	DWORD	16#0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended Status – Application	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	0
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00...07)	DWORD	0
MSGSTAT1	Message failure 1	WORD	0
MSGSTAT2	Message failure 2	WORD	0
MSG_ACK1	Message acknowledged 1	WORD	0
MSG_ACK2	Message acknowledged 2	WORD	0
OMODE_xx	Channel xx mode (xx = 00...07)	DWORD	0
O_MS	Maintenance status	DWORD	0
QREC_VAL	1 = Received new data record	BOOL	0
QREC_ERR	1 = Error read data record	BOOL	0
QSTATUS	Status read data record	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = Module pulled/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = Apply MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: RACK diagnostics	STRUCT	0

6.34.3 Message texts and associated values of MOD_D8_S7P

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: @5W %t#MOD_D8_S7P_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: @4W %t#MOD_D8_S7P_TXT@	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
	7	Module @1%d@/@2%d@/@3%d@: @5W %t#MOD_D8_S7P_TXT@	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	DP master system number	BYTE
2	Rack number/Station number	BYTE
3	Slot number	BYTE

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Error channel 00 @4W%t#MOD_ D8_S7P_TXT@	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Error channel 01 @4W%t#MOD_ D8_S7P_TXT@	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Error channel 02 @4W%t#MOD_ D8_S7P_TXT@	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Error channel 03 @4W%t#MOD_ D8_S7P_TXT@	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Error channel 04 @4W%t#MOD_ D8_S7P_TXT@	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Error channel 05 @4W%t#MOD_ D8_S7P_TXT@	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Error channel 06 @4W%t#MOD_ D8_S7P_TXT@	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Error channel 07 @4W%t#MOD_ D8_S7P_TXT@	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID2

Associated value	Block parameters	Data type
1	DP Master system number	BYTE
2	Rack number/Station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_ D8_S7P_TXT	BYTE

You can find the message texts and their text numbers in the section: Text library for MOD_ D8_S7P, MOD_ D16_S7P (Page 545).

You can find additional information in the section: Message Classes (Page 531).

6.35 MOD_DRV: Monitoring of drive blocks with diagnostics functions

6.35.1 Description of MOD_DRV

Object name (type + number)

FB 148

- Block interfaces of MOD_DRV (Page 212)

Area of application

The MOD_DRV block creates a device-specific diagnostics function for devices of the Drive type.

Calling OBs

The cyclic OB 1 and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is installed when the corresponding SlaveFamily 1 object exists
- The corresponding inputs are interconnected and configured.
- The block is interconnected with the corresponding channel block.

Startup characteristics

Initialization of the ALARM_8P blocks and of the NOTIFY_8P blocks.

Message response

The block reports errors using ALARM_8P and NOTIFY_8P.

MODE response

The output `OMODE` shows the device type. A distinction is made between the device and type or profile respectively.

Only the Drive type is currently implemented. It has the value 16#XXXX0010.

6.35.2 I/Os of MOD_DRV

I/Os

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

Parameter	Description	Type	Default
EN_MSG	1 = Enable message	BOOL	1
EV_ID1	Message number 1	DWORD	16#00
EV_ID2	Message number 2	DWORD	16#00
LINK_ADR	Link address	BYTE	0
MS	Maintenance status	DWORD	16#00
MS_REQ	1 = Request maintenance release	BOOL	0
PADP_ADR	Address of the PA field device	BYTE	16#00
SUBN1_ID	ID of the primary DP master system	BYTE	16#FF
SUBN2_ID	ID of the redundant DP master system	BYTE	16#FF
PORT_ERR	Port error	STRUCT	

In/out parameters

Parameter	Description	Type
CPU_DIAG	System structure: CPU diagnostics	Struct (Siehe OB_BEGIN)
RAC_DIAG	System structure: RACK diagnostics	Struct (Siehe OB_DIAG1)

Output parameters

Parameter	Description	Type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	16#00000000
CH_OK	Channel OK	DWORD	16#00000000
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	16#00
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EN_RST_DIAG	Reset enable	BOOL	0
Error	Error message is active	BOOL	0
Error_Rst	Message error reset active	BOOL	0
EXT_STAT	Release for maintenance - extended status	DWORD	16#00
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
MS_XCHG_00	Maintenance Status - Data exchange channel	DWORD	0
MSG_ACK1	Message acknowledgment 1	WORD	16#00

Parameter	Description	Type	Default
MSG_ACK2	Message acknowledgment 2	WORD	16#00
MsgNamurAct	Namur message is active	BOOL	0
MSGSTAT1	Message error information 1	WORD	16#00
MSGSTAT2	Message error information 2	WORD	16#00
Namur1	Namur1 message is active	BOOL	0
Namur2	Namur2 message is active	BOOL	0
Namur3	Namur3 message is active	BOOL	0
Namur4	Namur4 message is active	BOOL	0
Namur5	Namur5 message is active	BOOL	0
Namur6	Namur6 message is active	BOOL	0
Namur7	Namur7 message is active	BOOL	0
Namur8	Namur8 message is active	BOOL	0
Namur9	Namur9 message is active	BOOL	0
Namur10	Namur10 message is active	BOOL	0
Namur11	Namur11 message is active	BOOL	0
Namur12	Namur12 message is active	BOOL	0
Namur13	Namur13 message is active	BOOL	0
Namur14	Namur14 message is active	BOOL	0
Namur15	Namur15 message is active	BOOL	0
Namur16	Namur16 message is active	BOOL	0
Namur1_Rst	Message Namur1 reset active	BOOL	0
Namur2_Rst	Message Namur2 reset active	BOOL	0
Namur3_Rst	Message Namur3 reset active	BOOL	0
Namur4_Rst	Message Namur4 reset active	BOOL	0
Namur5_Rst	Message Namur5 reset active	BOOL	0
Namur6_Rst	Message Namur6 reset active	BOOL	0
Namur7_Rst	Message Namur7 reset active	BOOL	0
Namur8_Rst	Message Namur8 reset active	BOOL	0
Namur9_Rst	Message Namur9 reset active	BOOL	0
Namur10_Rst	Message Namur10 reset active	BOOL	0
Namur11_Rst	Message Namur11 reset active	BOOL	0
Namur12_Rst	Message Namur12 reset active	BOOL	0
Namur13_Rst	Message Namur13 reset active	BOOL	0
Namur14_Rst	Message Namur14 reset active	BOOL	0
Namur15_Rst	Message Namur15 reset active	BOOL	0
Namur16_Rst	Message Namur16 reset active	BOOL	0
O_MS	Maintenance status	DWORD	16#00
OMODE_00	Value status of the PA field device	DWORD	16#00
QERR	1 = program error	BOOL	1
QRACKF	1 = higher-level error	BOOL	0
Warning	Warning message is active	BOOL	0
Warning_Rst	Message warning reset active	BOOL	0

6.35.3 Message texts and associated values of MOD_DRV

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID1	1	Device @1%d@/@2%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Device @1%d@/@2%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Device @1%d@/ @2%d@: Maintenance required	Preventative Maintenance - Standard
	4		No message
	5		No message
	6	Device @1%d@/ @2%d@: Failure	PLC Process Control Message - Failure
	7	Device @1%d@/ @2%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Device @1%d@/ @2%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameters	Data type
1	Subnet	BYTE
2	Address	BYTE

The process control messages of NOTIFY_8P with EV_ID2

Message block NOTIFY_8P	Message number	Event	Message class
EV_ID2	1		No message
	2	Device @1%d@/ @2%d@: Making configuration change	Status Message - PLC
	3	Device @1%d@/ @2%d@: Simulation	Status Message - PLC
	4	Device @1%d@/ @2%d@: ready to start	Status Message - PLC
	5	Device @1%d@/ @2%d@: ready to operate	Status Message - PLC
	6	Device @1%d@/@2%d@: Local operation/function check	Status Message - PLC
	7	Device @1%d@/@2%d@: Device disabled	Status Message - PLC
	8		No message

Associated values of NOTIFY_8P with EV_ID2

Associated value	Block parameter	Data type
1	Subnet	BYTE
2	Address	BYTE

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID3	1	Device 1%d@/@2%d@: Port 1 error	PLC Process Control Message - Error
	2	Device 1%d@/@2%d@: Port 2 error	PLC Process Control Message - Error
	3	Device 1%d@/@2%d@: Maintenance demanded	PLC Process Control Message - Error
	4	Device 1%d@/@2%d@: Maintenance required	Preventative Maintenance - Standard
	5		No message
	6		No message
	7		No message
	8		No message

Associated values of ALARM_8P with EV_ID3

Associated value	Block parameter	Data type
1	Subnet	BYTE
2	Address	BYTE

See also

Message Classes (Page 531)

6.36 MOD_HA: Monitoring device-specific diagnostics of HART field devices

6.36.1 Description of MOD_HA

Object name (type + number)

FB 97

- MOD_HA block I/Os (Page 222)

Area of application

The MOD_HA module reports diagnostic events of an HART field device that is connected to a channel of an ET 200M HART module or ET 200iSP HART module. HART modules of ET 200iS are not supported. H systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is installed downstream of the diagnostic block that is responsible for the HART module.
- LADDR (logical base address of the HART module) is configured.
- The geographic addresses SUBN1_ID, SUBN2_ID, RACK_NO, SLOT_NO, and CHAN_NO (channel number of the HART module to which the HART field device is connected) are configured.
- The CPU_DIAG structures of the OB_BEGIN block are interconnected
- The EN input is interconnected with the output of an AND block.
  The block inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block, and EN_Mxx (xx = module number) of the RACK block and MODE with OMODE_xx of the diagnostic block.
- The DXCHG output parameter is interconnected with the following channel block at the DataXchg parameter.
- The O_MS output parameter is interconnected with the following channel block at the MS parameter.

Function and method of operation

Block MOD_HA analyzes events relating to a HART field device acyclically. ALARM_8P is used to report these events. The message function can be disabled.

The block is enabled to run by the higher-level RACK block. By default, MOD_HA requires synchronous diagnostic data in OB 82 (additional alarm information with SFB 54 call by OB_BEGIN). With an ET 200iSP HART module, the channel type 16#65 is generated during diagnostics. Here, 2 bytes of diagnostic information are defined per channel of the module, and

the block reports the statuses of the 2nd bit of the 1st byte and the 2nd byte for the respective HART field device.

Structure of byte 1 (ET 200iSP HART):

Bit	Meaning
0	Parameter assignment error (HART module)
1	HART communications error (HART module)
2	Readback error (HART module)
3	Short circuit (HART module)
4	Wire break (HART module)
5	No load voltage (HART module)
6	Overflow (HART module)
7	Underflow (HART module)

Structure of byte 2 (ET 200iSP HART):

Bit	Meaning
0	Primary variable outside limits (field device)
1	Secondary variable outside limits (field device)
2	Analog output saturated (field device)
3	Analog output current specified (field device)
4	More statuses available (field device)
5	Reserved for maintenance alarm (field device)
6	Reassignment the field device parameters
7	Malfunction of the field device

For an ET 200M with two-channel HART modules, channel type 16#61 or 16#63 is generated during diagnostics. Bit 5 in byte 8 for channel 0 and byte 9 for channel 1 in the additional alarm information means "HART channel error". If bit 5 = TRUE, the additional diagnostic data is read with SFB 52 (RDREC) as follows:

- with data record 128 for channel 0
- with data record 129 for channel 1

Diagnostic data records 128 (for channel 0) and 129 (for channel 1) have the same structure. and return detailed HART diagnostic information on the previous transfer. The table below shows the individual error messages/warnings.

Byte/Bit No.	7	6	5	4	3	2	1	0
0: general	1= Mod. comm.	No. of (triggering) client, if module com No. =0			Polling address (of HART transducer), always 0 for monodrop			
1: fault groups = group error	Channel fault (L+, DrBr)	HART channel fault	HART slave communication	HART command error	device status <> 0 (e.g., configuration changed)	more status	Command rejected	0 = Not used
then → bytes	-	2	8	8	9	-	-	-

Byte/Bit No.	7	6	5	4	3	2	1	0
2: HART cf = "communication faults" Field device for module	HART access not possible	parity error in response	overrun error in response	framing error in response	wrong checksum in response	Wrong char timing	too many chars in response	wrong telegram timing
3 to 6: time stamp	Broadcast system time: Milliseconds (10s and 100s), seconds, minutes, and hours in two-digit BCD code. If the timestamp function is not used: Content = 0							
7: HART/ module	last HART or module command							
8: HART ce	1 0	"Communication error bits" of "slave", (first status byte) "Command response" list - no errors, but warnings						
9: HART ds	Device status bits (second status byte)							

Two HART status bytes are reserved in the HART protocol to display errors and warnings. These are entered in diagnostic data records 128 and 129 unchanged. The meaning of the HART status bytes is defined in the HART Standard.

- **First HART status byte** (meaning depends on bit 7):
  - Bit 7 = 1: Communication error during the transmission of a HART command to the field device
  - Bit 7 = 0: Only warnings that the field device sends in response to a command

Bit 7/Bit No.	7	6	5	4	3	2	1	0
Either Bit 7 = 1: HART "communication error" from module to field device	1	parity error in command	overrun error in command	framing error in command	wrong checksum in command	Reserved = 0	too many characters in command (rx buffer overflow)	(undefined)
or Bit 7 = 0: HART "response to a command"	0	The messages in bits 0 - 6 are coded as integers: 0: No command-specific error 1: Undefined 2: Invalid section 3: Transferred parameter too large 4: Transferred parameter too small 5: Too few data bytes received 6: Device-specific command error (rarely used) 7: In write-protected mode 8-15: Various meanings (see code commands) 16: Restricted access 28: Various meanings (see code commands) 32: Device is busy 64: Command not implemented						

Code	Commands	Alternative meanings
8 *)	1,2,3,33,60,61,62, 110,34,55,64,48	"Update" error set to nearest possible value, "Update" being executed
9	35,65,36,37,43,52,45,46,67,68	Lower range limit too high, "applied process" too high, not in correct current mode (fixed at 4 mA or 20 mA)
10	6,35,65,36,37,43,52	Multidrop is not supported Lower range limit too low, "applied process" too low,
11	35,65,40,45,46,66,67,68,53	Upper range limit too high, In multidrop mode, bad transmitter variable code
12	35,65,53,66,67,68	Upper range limit too low, bad units code
13	35,65,69	Both range limits outside the limit value, bad transfer function code
14 *)	35,36,65,37	Span too limited, "pushed" upper range limit outside the limit
15	65,66,67,68,69	Faulty code for the number of the analog output
28	65	bad code for the range unit ("range units code")

- **Second HART status byte**: Device status of the HART field device in the event of a communication error
  (otherwise, byte = 0)

Bit No.	7	6	5	4	3	2	1	0
HART device status: "field device status"	Malfunction of the field device	Reassignment of parameters: "configuration changed (CC)"	Cold restart	Further status available "more status"	Analog output current specified ("fixed)"	Analog output saturated	Non-primary variable outside limits	Primary variable outside limits

Process control messages are generated when "communication errors" and HART field device errors (byte 9 <> 0) occur. Operating messages with acknowledgment are generated if bit 7 = 0 (byte 8) and the remaining bits <> 0. The last read data record 128 or 129 (depending on the channel number) is written to the output structure DIAG_H.

Bytes 8 and 9 are evaluated and event messages generated in OB 1.
You can find additional information about this in the section "Message texts and associated values of MOD_HA (Page 224)".

The MODE input is interconnected with the corresponding OMODE_xx output of the diagnostic block. The module channel configurations set in HW Config are reported at these locations.

MODE (Page 517) is written to the low word of theOMODE (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If valid, OMODE = 16#80xxxxxx. The diagnostic block contains the events that lead to a value status "invalid value due to higher-priority error" (OMODE = 16#40xxxxxx), or to channel error (OMODE = 16#00xxxxxx).

Redundancy

The higher-level RACK block evaluates the redundancy of DP master systems operating in an H system. Redundant HART field devices are not supported.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

A restart (OB 100) is reported via the LSB in byte 2 of the OMODE (Page 527) output.

ALARM_8P will be initialized.

Overload behavior

The MOD_HA block counts the OB 82 calls. The counter is reset in OB1. A diagnostic message will not be generated if more than five OB 82 events occur before the cycle control point is reached (OB 1). A "multiple diagnostic interrupt" message will not be generated, because the diagnostic block performs this action.

Time response

Not available

Message response

MOD_HA reports diagnostic information from a HART field device by means of ALARM_8P or NOTIFY_8P.

The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_HA (Page 224)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.36.2 I/Os of MOD_HA

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CHAN_NO	Channel number	BYTE	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID	Message number	DWORD	0
LADDR	Logical address of the channel	INT	0
MODE	Channel operating mode	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	16#00000000
CH_OK	Channel OK	DWORD	16#00000000
DIAG_H	Diagnostic information of HART communication channel	STRUCT	
DM_ACTIVE	Fault delay	DWORD	16#0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0

I/O (parameter)	Meaning	Type	Default
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	16#00000000
MS_XCHG	Maintenance Status - Data exchange channel	DWORD	0
MSG_ACK	Message acknowledgment	WORD	0
MSGSTAT	Message error information	WORD	0
QERR	1 = program error	BOOL	1
O_MS	Maintenance status	DWORD	0
OMODE	Channel operating mode	DWORD	0
QPERAF	1 = I/O access error	BOOL	0
QREC_ERR	1 = Read diagnostic data error	BOOL	0
QREC_VAL	1 = Read diagnostic data	BOOL	0
STATUS	Read diagnostics status	DWORD	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics	STRUCT	
DXCHG_IN	Bidirectional data exchange channel	DWORD	0
DXCHG1_IN	Bidirectional data exchange channel - HART channel	DWORD	0
MS_XCHG_IN	Maintenance Status - Data exchange channel	DWORD	0

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_HA (Page 224)

Maintenance status MS (Page 533)

6.36.3 Message texts and associated values of MOD_HA

Assignment of message text and message class

Message block	Message no.	Default message text	Message class
EV_ID (ALARM_8P)	1	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance demanded	PLC Process Control Message - Error
	3	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance required	Preventative Maintenance - Standard
	4		No message
	5		No message
	6		No message
	7	HART field device @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	HART field device @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard
EV_ID1 (NOTIFY_8P)	1	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Re-parameterization	Status Message - PLC
	2	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Cold restart	Status Message - PLC
	3	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Additional status available	Status Message - PLC
	4		No message
	5		No message
	6		No message
	7		No message
	8		No message

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameter	Meaning
EV_ID	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)
	4	CHAN_NO	Channel error text number

Message block ALARM_8P	Associated value	Block parameter	Meaning
EV_ID1	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number
	3	SLOT_NO	
	4	CHAN_NO	

If SUBN1_ID = 16#FF, the associated value is substituted with SUBN2_ID.

See also

Message Classes (Page 531)

6.37 MOD_HA_PN: Monitoring Device-Specific Diagnostics of HART Field Devices

6.37.1 Description of MOD_HA_PN

Object name (type + number)

FB 200

- I/Os of MOD_HA_PN (Page 225)

Area of application

The MOD_HA_PN module reports diagnostic events of an HART field device.

6.37.2 I/Os of MOD_HA_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CHAN_NO	Channel number	BYTE	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number ALARM_8P_x (x = 1 - 2, assigned by the ES)	DWORD	0
LADDR	Logical address of the channel	INT	0
LADDR1	Logical address of the redundant channel	INT	0
MODE	Channel operating mode	WORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 1 ID (100 - 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	16#00000000
CH_OK	Channel OK	DWORD	16#00000000
DIAG_H	Diagnostic information of HART communication channel	STRUCT	
DM_ACTIVE	Fault delay	DWORD	16#0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	16#00000000
MS_XCHG	Maintenance Status - Data exchange channel	DWORD	0
MSG_ACK	Message acknowledgment	WORD	0
MSGSTAT	Status output of ALARM_8P_x (x = 1-2)	WORD	0
QERR	1 = program error	BOOL	1
O_MS	Maintenance status	DWORD	0
OMODE	Channel operating mode	DWORD	0

I/O (parameter)	Meaning	Type	Default
QPERAF	1 = I/O access error	BOOL	0
QREC_ERR	1 = Read diagnostic data error	BOOL	0
QREC_VAL	1 = Read diagnostic data	BOOL	0
STATUS	Read diagnostics status	DWORD	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	CPU diagnostics	STRUCT	
DXCHG_IN	Bidirectional data exchange channel	DWORD	0
DXCHG1_IN	Bidirectional data exchange channel - HART channel	DWORD	0
MS_XCHG_IN	Maintenance Status - Data exchange channel	DWORD	0

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_HA_PN (Page 227)

Maintenance status MS (Page 533)

6.37.3 Message texts and associated values of MOD_HA_PN

Assignment of message text and message class

Process control messages of ALARM_8P with EV_ID are assigned as follows:

Message block	Message number	Default message text	Message class
EV_ID (ALARM_8P)	1	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance demanded	PLC Process Control Message - Error
	3	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance required	Preventative Maintenance - Standard
	4		No message
	5		No message
	6		No message

Message block	Message number	Default message text	Message class
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID

Associated value	Block parameter	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Channel number	BYTE

The process control messages of NOTIFY_8P with EV_ID1 are assigned as follows:

Message block	Message no.	Default message text	Message class
EV_ID1 (NOTIFY_8P)	1	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Reassignment of parameters	Status Message - PLC
	2	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Cold restart	Status Message - PLC
	3	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Additional status available	Status Message - PLC
	4		No message
	7		No message
	8		No message

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	ID of the primary PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Channel number	BYTE

You can find additional information in the section: Message Classes (Page 531).

6.38 MOD_HA_PN1: Monitoring Device-Specific Diagnostics of HART Field Devices

6.38.1 Description of MOD_HA_PN1

Object name (type + number)

FB 417

- I/Os of MOD_HA_PN1 (Page 229)

Area of application

The MOD_HA_PN1 block reports diagnostic events of an HART field device.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Plug/pull module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

6.38.2 I/Os of MOD_HA_PN1

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CHAN_NO	Channel number	BYTE	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number ALARM_8P_x (x = 1 - 2, assigned by the ES)	DWORD	0
LADDR	Logical address of the channel	INT	0
LADDR1	Logical address of the redundant channel	INT	0
MODE	Channel operating mode	WORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 1 ID (100 - 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	16#00000000
CH_OK	Channel OK	DWORD	16#00000000
DIAG_H	Diagnostic information of HART communication channel	STRUCT	
DM_ACTIVE	Fault delay	DWORD	16#0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	16#00000000
MS_XCHG	Maintenance Status - Data exchange channel	DWORD	0
MSG_ACK	Message acknowledgment	WORD	0
MSGSTAT	Status output of ALARM_8P_x (x = 1-2)	WORD	0
QERR	1 = program error	BOOL	1
O_MS	Maintenance status	DWORD	0
OMODE	Channel operating mode	DWORD	0

I/O (parameter)	Meaning	Type	Default
QPERAF	1 = I/O access error	BOOL	0
QREC_ERR	1 = Read diagnostic data error	BOOL	0
QREC_VAL	1 = Read diagnostic data	BOOL	0
STATUS	Read diagnostics status	DWORD	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	CPU diagnostics	STRUCT	
DXCHG_IN	Bidirectional data exchange channel	DWORD	0
DXCHG1_IN	Bidirectional data exchange channel - HART channel	DWORD	0
MS_XCHG_IN	Maintenance Status - Data exchange channel	DWORD	0

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_HA_PN1 (Page 231)

Maintenance status MS (Page 533)

6.38.3 Message texts and associated values of MOD_HA_PN1

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message block	Message number	Default message text	Message class
EV_ID (ALARM_8P)	1	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance demanded	PLC Process Control Message - Error
	3	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Maintenance required	Preventative Maintenance - Standard
	4		No message
	5		No message
	6		No message

Message block	Message number	Default message text	Message class
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID

Associated value	Block parameter	Data type
1	PN IO system number (SUBN1_ID)	BYTE
2	Rack/station number (RACK_NO)	BYTE
3	Slot number (SLOT_NO)	BYTE
4	Channel number (CHAN_NO)	BYTE

The process control messages of NOTIFY_8P with EV_ID1 are assigned as follows:

Message block	Message no.	Default message text	Message class
EV_ID1	1	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Reassignment of parameters	Status Message - PLC
	2	HART field device@1%d@/@2%d@/@3%d@/@4%d@: Cold restart	Status Message - PLC
	3	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Additional status available	Status Message - PLC
	4		No message
	7		No message
	8		No message

Associated values of NOTIFY_8P with EV_ID1

Associated value	Block parameter	Data type
1	PN IO system number (SUBN1_ID)	BYTE
2	Rack/station number (RACK_NO)	BYTE
3	Slot number (SLOT_NO)	BYTE
4	Channel number (CHAN_NO)	BYTE

You can find additional information in the section: Message Classes (Page 531).

6.39 MOD_HA_S7P: Diagnostic module check (<=16 channels)

6.39.1 Description of MOD_HA_S7P

Object name (type + number)

FB 435

- I/Os of MOD_HA_S7P (Page 233)

Area of application

Function block MOD_HA_S7P creates diagnostics information for a HART field device.

Calling OBs

The cyclic OB 1 and OB 82, OB 83, OB 85, OB 86 and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- If a module with ≤ 16 channels is available in HW Configuration, an instance of the diagnostic function block MOD_HA_S7P is added to the system charts of the project.
- Information from HW Config is read and the input parameters of MOD_HA_S7P are parameterized correspondingly.

The MOD_HA_S7P gets connected with the corresponding channel block of the module.

Startup characteristics

Initialization of the ALARM_8P blocks.

6.39.2 I/Os of MOD_HA_S7P

I/Os of MOD_HA_S7P

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CHAN_NO	HART channel number	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID1	Message number 1	DWORD	16#0
EV_ID2	Message number 2	DWORD	16#0
FEATURE	Feature parameter	DWORD	0
LADDR	Logical address of the channel	INT	-1
LADDR1	Reserve	INT	-1
MODE	Channel mode	DWORD	0
MS	Maintenance status	DWORD	16#0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = External DP interface	BOOL	0
SUBN1_ID	ID of Primary subnet	BYTE	255
SUBN2_ID	ID of Redundant subnet	BYTE	255

Out parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
DIAG_H	HART Diagnostic Information Structure	STRUCT	
DM_ACTIVE	Fault delay	DWORD	0
DXCHG	1st internal data exchange channel for channel block	DWORD	16#0
DXCHG1	2nd internal data exchange channel for channel block	DWORD	16#0
EXT_STAT	Release for maintenance - Extended status	DWORD	0
EXT_STAT_A	Extended Status – Application	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	0
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG	Maintenance Status - Data exchange channel	DWORD	0
MSGSTAT	Message failure	WORD	0
MSG_ACK	Message acknowledged	WORD	0
OMODE	Channel mode	DWORD	0
O_MS	Maintenance status	DWORD	0

I/O (parameter)	Meaning	Type	Default
QREC_VAL	1 = Received new data record	BOOL	0
QREC_ERR	1 = Error read data record	BOOL	0
QSTATUS	Status read data record	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = Module pulled/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Type	De-fault
ACC_MODE	1 = Apply MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
DXCHG_IN	Bidirectional data exchange HART channel	DWORD	0
DXCHG1_IN	Bidirectional data exchange HART channel	DWORD	0
MS_XCHG_IN	MS exchange channel	DWORD	0

6.39.3 Message texts and associated values of MOD_HA_S7P

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message block ALARM_8P	Mes-sage number	Event	Message class
EV_ID	1	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Maintenance demanded	PLC Process Control Message - Error
	3	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Maintenance required	Preventative Mainte-nance - Standard
	4		No message
	5		No message
	6		No message
	7	HART field device @1%d@/@2%d@/@3%d@: Main-tenance demanded (external)	PLC Process Control Message - Error
	8	HART field device @1%d@/@2%d@/@3%d@: Main-tenance required (external)	Preventative Mainte-nance - Standard

Associated values of ALARM_8P with EV_ID

Associated value	Block parameter	Data type
1	DP-Master-System number	BYTE
2	Rack number- / Station number	BYTE
3	Slot number	BYTE
4	Channel number	BYTE

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID1 (NOTIFY_8P)	1	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Re-parameterization	Status Message - PLC
	2	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Cold restart	Status Message - PLC
	3	HART field device @1%d@/@2%d@/@3%d@/@4%d@: Additional status available	Status Message - PLC
	4		No message
	5		No message
	6		No message
	7		No message
	8		No message

Associated values of NOTIFY_ 8P with EV_ID1

Associated value	Block parameters	Data type
1	DP-Master-System number	BYTE
2	Rack number- / Station number	BYTE
3	Slot number	BYTE
4	Channel number	BYTE

6.40 MOD_MS: Monitoring up to 16 channels on ET200S/X motor starter modules with diagnostic functions

6.40.1 Description of MOD_MS

Object name (type + number)

FB 96

- MOD_MS block I/Os (Page 241)

Area of application

The MOD_MS block the up to 16-channel motor starter modules with diagnostic capability (ET 200S). H systems support only the modules installed in switched racks.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The MOD_MS block is installed in its runtime group downstream of the RACK block runtime group in the above-mentioned OBs.
- The MODE_xx, SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The logical addresses LADDR and LADDR1 are configured.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of MOD_MS.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function and method of operation

Block MOD_MS analyzes all events that affect a module and its channels acyclically. It generates a channel-specific MODE (Page 517) and value status for the signal processing blocks. ALARM_8P is used to report these events. The message function can be disabled.

The block is enabled to run by the higher-level RACK block. The event to be evaluated is stored in the CPU_DIAG start and diagnostic information of the OB_BEGIN block. There is a MODE_xx input for each signal channel of the module. The module channel configuration data created in HW Config is reported here. The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current channel value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx.

The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Events that are evaluated by the RACK block:
  - Rack failure (OB 86) (output parameter QRACKF = TRUE)
  - Program execution error (OB 85) (output parameter QRACKF = TRUE)
- Events that are evaluated by the MOD block:
  - Program execution error (OB 85) (output parameter QPERAF = TRUE)
  - Module removed (OB 83) (output parameter QMODF = TRUE)
  - Diagnostic interrupt (OB 82)

The following events in OB 82 will lead to a module error, and are indicated with 16#40xxxxxx ("higher-priority error") in OMODE. At the same time, output parameter QMODF = TRUE:

- Configuration/parameter assignment error
- Overload
- Short circuit
- Error
- Actuator OFF
- Wire break
- Safety-related shutdown
- High limit exceeded
- Low limit undershot
- Missing supply voltage
- Switching element overload
- External error

ALARM_8P is used to report "module removed", "I/O access error", and the above "OB 82 error" events to WinCC.

The system verifies during startup that the module is available (plugged in). The module status information that is read here is then available in the form of service output parameters (MOD_INF).

Detailed information about the errors is entered in the DIAG_INF output parameter of data type STRUCT.
You will find additional information in the "Service Information" section, and in the *System Software for S7-300/400 System and Standard Functions; Diagnostic Data, Byte 0 to Byte 8, Structure of Channel-Specific Diagnostic Data* reference manual.

Redundancy

The block supports segment redundancy of CPU 417H for distributed I/Os. To use this function, you must configure the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs with the numbers of the redundant segments. If there is no segment redundancy, the remaining input must be set to the (default) value 16#FF.

MODE setting

You will find additional information about this in the "MODE settings (Page 517)" section.

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Valid channel display

The existing channels on a module are displayed in the CH_EXIST output by setting a bit in the DWORD, starting at bit 0, for every existing channel. If the bit assigned to a channel = 0, the channel is not available.

Output CH_OK displays the valid channels on a module by setting a bit to TRUE for every valid channel, where bit 0 is assigned to channel 0, etc. If the bit assigned to a channel is 0, the channel is faulty. If a module error occurs, all channels are disrupted.

Addressing

You will find additional information about this in the "Addressing (Page 530)" section.

Error handling

The plausibility of input parameters is not checked.
You will find additional information about this in the "Error information of output parameter MSG_STAT (Page 530)" section.

Service Information

To analyze faults, the module status information entered during startup is read via the MOD_INF structured output parameter. You will find additional information about this in the reference manual *System Software for S7-300/400 System and Standard Functions; System Status List, Module Status Information*.

Following a diagnostic interrupt, you will also find detailed module diagnostic information in the MODDIAG0 to MODDIAG8 output parameters. You will find additional information in the reference manual *System Software for S7-300/400 System and Standard Functions; Diagnostic Data, Byte 0 to Byte 10*.

The CHDIAG00 to CHDIAG15 output parameters contain detailed channel-status information. You will find additional information in the reference manual *System Software for S7-300/400 System and Standard Functions; Structure of Channel-Specific Diagnostic Data*.

Of the motor starter module channels, only channel 0 is assigned the diagnostic function. The error code is stored in CHDIAG00 to CHDIAG03. You will find additional information about this in the *ET 200S, Motor Starter Safety Technology SIGUARD; Diagnostics and Monitoring via the User Program* reference manual.

The system resets this diagnostic information after a diagnostic interrupt has been reported outgoing (no further channel or module errors are queued).

Startup characteristics

After a restart/initial startup, the system verifies that the module is available under its logical base address. A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

MOD_MS reports module and motor-starter errors by means of ALARM_8P_1 and ALARM_8P_2. The inputs DELAY1 and DELAY2 are used to delay the output of I/O access error messages. DELAY1 allows you to enter a time in seconds for which the block will wait for a higher-priority error (rack failure or removal/insertion) following a program execution error (OB 85) before it outputs the message. DELAY2 determines the number of seconds the block waits after the higher-priority error has been reported outgoing until it outputs the queued I/O access error as well. Both values are set to 2 seconds by default.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_MS (Page 243)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.40.2 I/Os of MOD_MS

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DELAY1	Alarm delay 1 (s)	INT	2
DELAY2	Alarm delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_IDx	Message number x	DWORD	0
LADDR	Logical address of the input channels	INT	0
LADDR1	Logical address of the output channels	INT	0
MODE_xx	Mode channel xx (xx = 00 - 31)	WORD	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0

I/O (parameter)	Meaning	Data type	Default
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
MOD_INF	System structure: Module parameter	STRUCT	
MSG_ACKx	Message acknowledgment x	WORD	0
MSGSTATx	Message error information x	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Mode channel xx (xx = 00 - 31)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
RAC_DIAG	System structure: Rack diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_MS (Page 243)

Maintenance status MS (Page 533)

6.40.3 Message texts and associated values of MOD_MS

Assignment of message text and message class

Message block ALARM_8P	Message number	Block parameter	Default message text	Message class
EV_ID1	1	QMODF	Module @1%d@/@2%d@/@3%d@: Withdrawn	PLC Process Control Message - Failure
	2	QPERAF	Module @1%d@/@2%d@/@3%d@: Access error	PLC Process Control Message - Failure
	3		Module @1%d@/@2%d@/@3%d@: @4W%t#MOD_MS_TXT@	PLC Process Control Message - Failure
	4	-	Module @1%d@/@2%d@/@3%d@: Multiple diagnostic alarm	PLC Process Control Message - Failure
	5	-	Module @1%d@/@2%d@/@3%d@: @4W%t#MOD_MS_TXT@	PLC Process Control Message - Failure
	6	-	Module @1%d@/@2%d@/@3%d@: Short-circuit	PLC Process Control Message - Failure
	7	-	Module @1%d@/@2%d@/@3%d@: Overload	PLC Process Control Message - Failure
	8	-	Module @1%d@/@2%d@/@3%d@: Error	PLC Process Control Message - Failure
EV_ID2	1		Module @1%d@/@2%d@/@3%d@: High limit violated	PLC Process Control Message - Failure
	2		Module @1%d@/@2%d@/@3%d@: Low limit violated	PLC Process Control Message - Failure
	3		Module @1%d@/@2%d@/@3%d@: Parameter assignment error	PLC Process Control Message - Failure
	4	-	Module @1%d@/@2%d@/@3%d@: Actuator shutoff	PLC Process Control Message - Failure
	5	-	Module @1%d@/@2%d@/@3%d@: Fail-safe shutoff	PLC Process Control Message - Failure
	6	-	Module @1%d@/@2%d@/@3%d@: External error	PLC Process Control Message - Failure
	7	-	Module @1%d@/@2%d@/@3%d@: Overload contact block	PLC Process Control Message - Failure
	8	-	Module @1%d@/@2%d@/@3%d@: Missing supply voltage	PLC Process Control Message - Failure

You will find the message texts and their text numbers in "Text library for MOD_MS (Page 547)".

Assignment of associated values

Message block ALARM_8P	Associ-ated value	Block parameter	Meaning
EV_ID1	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)
	4	-	Text number (message 5) of MOD_MS_TXT
EV_ID2	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)

See also

Message Classes (Page 531)

6.41 MOD_SWT: Monitoring of Switch blocks with diagnostics functions

6.41.1 Description of MOD_SWT

Object name (type + number)

FB 149

- MOD_SWT block I/Os (Page 245)

Area of application

The MOD_SWT block creates the device-specific diagnostics function for devices of the Switch type.

Calling OBs

The cyclic OB 1 and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is installed when the corresponding SlaveFamily 2 object exists
- The corresponding inputs are interconnected and configured.
- The block is interconnected with the corresponding channel block.

Startup characteristics

Initialization of the ALARM_8P blocks and of the NOTIFY_8P blocks.

Message response

The block reports errors using ALARM_8P and NOTIFY_8P.

MODE response

The output `OMODE` shows the device type. A distinction is made between the device and type or profile respectively.

Only the "Motor Management Starter" type is currently implemented. It has the value 16#XXXX0030.

6.41.2 I/Os of MOD_SWT

I/Os

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
EN_MSG	1 = Enable message	BOOL	1
EV_ID1	Message number 1	DWORD	16#00
EV_ID2	Message number 2	DWORD	16#00
MS	Maintenance status	DWORD	16#00
MS_REQ	1 = Request maintenance release	BOOL	0
LINK_ADR	Link address	BYTE	0

I/O (parameter)	Meaning	Type	Default
PADP_ADR	Address of the PA field device	BYTE	16#00
SUBN1_ID	ID of the primary DP master system	BYTE	16#FF
SUBN2_ID	ID of the redundant DP master system	BYTE	16#FF
PORT_ERR	Port error	STRUCT	

In/out parameters

I/O (parameter)	Meaning	Type
CPU_DIAG	System structure: CPU diagnostics	Struct (Siehe OB_BEGIN)
DIAG_RST	Reset of DIAG values	BOOL
RAC_DIAG	System structure: RACK diagnostics	Struct (Siehe OB_DIAG1)

Output parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	16#00000000
CH_OK	Channel OK	DWORD	16#00000000
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	16#00
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EN_RST_DIAG	Reset enable	BOOL	0
Error	Error message is active	BOOL	0
Error_Rst	Message error reset active	BOOL	0
EXT_STAT	Release for maintenance - extended status	DWORD	16#00
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
MS_XCHG_00	Maintenance Status - Data exchange channel	DWORD	0
MSGSTAT1	Message error information 1	WORD	16#00
MSGSTAT2	Message error information 2	WORD	16#00
MSG_ACK1	Message acknowledgment 1	WORD	16#00
MSG_ACK2	Message acknowledgment 2	WORD	16#00
OMODE_00	Value status of the PA field device	DWORD	16#00
O_MS	Maintenance status	DWORD	16#00
Overload	Overload message is active	BOOL	0
Overload_Rst	Message overload warning reset active	BOOL	0
QERR	1 = program error	BOOL	1
QRACKF	1 = higher-level error	BOOL	0

I/O (parameter)	Meaning	Type	Default
Warning	Warning message is active	BOOL	0
Warning_Rst	Message warning reset active	BOOL	0

6.41.3 Message texts and associated values of MOD_SWT

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID1	1	Device @1%d@/ @2%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Device @1%d@/ @2%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Device @1%d@/ @2%d@: Maintenance required	Preventative Maintenance - Standard
	4		No message
	5		No message
	6	Device @1%d@/ @2%d@: Failure	PLC Process Control Message - Failure
	7	Device @1%d@/@2%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Device @1%d@/@2%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameters	Data type
1	Subnet	BYTE
2	Address	BYTE

The process control messages of NOTIFY_8P with EV_ID2 are assigned as follows:

Message block NOTIFY_8P	Message number	Event	Message class
EV_ID2	1		No message
	2	Device @1%d@/ @2%d@: Making configuration change	Status Message - PLC
	3	Device @1%d@/ @2%d@: Simulation	Status Message - PLC
	4		No message

Message block NOTIFY_8P	Message number	Event	Message class
	5		No message
	6	Device @1%d@/@2%d@: local operation/functional check	SStatus Message - PLC
	7	Device @1%d@/@2%d@: Device passivated	Status Message - PLC
	8	Device @1%d@/@2%d@ @4W%t#MOD_SWT_TXT@	Status Message - PLC

Associated values of NOTIFY_8P with EV_ID2

Associated value	Block parameter	Data type
1	Subnet	BYTE
2	Address	BYTE

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID3	1	Device 1%d@/@2%d@: Port 1 error	PLC Process Control Message - Error
	2	Device 1%d@/@2%d@: Port 2 error	PLC Process Control Message - Error
	3	Device 1%d@/@2%d@: Maintenance demanded	PLC Process Control Message - Error
	4	Device 1%d@/@2%d@: Maintenance required	Preventative Maintenance - Standard
	5		No message
	6		No message
	7		No message
	8		No message

Associated values of ALARM_8P with EV_ID3

Associated value	Block parameter	Data type
1	Subnet	BYTE
2	Address	BYTE

You can find the message texts and their text numbers in the section "Text library for MOD_SWT (Page 536)".

You can find additional information in the section: Message Classes (Page 531).

6.42 MOD_PAL0: Diagnosing a DPV0 PA slave (via DP/PA coupler downstream of a DP/PA link DPV1)

6.42.1 Description of MOD_PAL0

Object name (type + number)

FB 99

- MOD_PAL0 block I/Os (Page 251)

Area of application

Block MOD_PAL0 reports the maintenance status of a PA field device that is used as a DPV0 slave downstream of a DP/PA link DPV1. The PA field devices must conform to the PROFIBUS V3.0 profile.

Calling OBs

The cyclic OB and OB 100.

In addition, the block is installed in the cyclic interrupt OB OB3x in which the following signal processing driver block is installed.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is integrated in the run sequence upstream of block PA_x
- The SUBN1_ID, SUBN2_ID, RACK_NO, SLOT_NO, PADP_ADR, PROF_V30 inputs are configured.
- The block inputs are interconnected with the following outputs:
  - Output PA_DIAG of block PADP_L10
  - OMODEx outputs of block PADP_L10
  - QMODF and QPERAF outputs of block PADP_L10
  - with output structure RAC_DIAG of block OB_DIAG1
  - input QC_x with PA field device icon
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.

- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Note

The CFC function "**Generate module drivers**" can only be used if the PA field device belongs to slave family 12.

- In the case of Compact Field Unit (CFU)
  - The parameters DXCHG_IN, DXCHG1_IN, MS_XCHG_IN are connected with the corresponding parameters of RACK_CFU block. The block is installed in the run sequence downstream of the SUBNET_PN block.

Function and method of operation

Block MOD_PAL0 analyzes all events that affect the status of a PA field-device slot cyclically. With modular PA field devices, the statuses of the slots are combined to form one status. The acyclic diagnostic events of a PA field device are acquired by the PADP_L10 block. It then stores them in the PA_DIAG parameter. The PA field-device status and the diagnostic information are evaluated, and entered in the MS parameter.

For additional information on this, refer to the section:
"PA field device status and diagnostic information (Page 533)".

The statuses are generated with ALARM_8P for messages requiring acknowledgment, and with NOTIFY_8P for those not requiring acknowledgment. The message function can be disabled.

Input PROF_V30 must be set to zero if the PA field device used does not conform to profile 3.0 (this is done by the "Generate module drivers" CFC function).

For a diagnostic event, the block reports "Device xx: uncertain diagnosis".

The failure of a PA field device is identified in the upstream block OB_DIAG1, and is reported via the RAC_DIAG structure. A message "Device xx: Failure" is also generated.

Redundancy

The higher-level block evaluates the redundancy of DP master systems operating in an H system.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

Initialization of ALARM_8P and NOTIFY_8P.

Time response

Not available

Message response

The block reports by means of ALARM_8P and NOTIFY_8P.

The block generates the following messages in the OBs listed below:

OB no.	Start Event	Message
x	Cyclic processing	Have the ALARM_8P/NOTIFY_8P outputs/messages updated, if necessary
100	Restart	Initialization of ALARM_8P

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_PAL0 (Page 253)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.42.2 I/Os of MOD_PAL0

I/Os

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
EN_DIAG	1 = Queued diagnostic event	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number x	DWORD	0
MODE_xx	Value status PA field device (xx = channel 16 to 31)	DWORD	0
MODF	1 = PA slave error	BOOL	0

I/O (parameter)	Meaning	Type	Default
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
NUM_CHN	Number of channels of the PA device	INT	0
PA_DIAG	PA field device diagnostic information	DWORD	0
PADP_ADR	Address of the PA field device	BYTE	0
PERAF	1 = I/O access error	BOOL	0
PROF_V30	1 = PA slave profile V3.0	BOOL	0
QC_xx	Status of PA field device (xx = channel 16 to 31)	BYTE	0
RACK_NO	Number of the DP link	BYTE	0
SLOT_NO	Slot number of the PA field device in the DP link	BYTE	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O	Meaning	Type	Default
B_QC	Bit-granular Σ status (channel 0 to 31) of the PA field device	STRUCT	
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block		0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status Bit 0=1: ConditionMonitoring On	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	16#00000000
MS_XCHG_00	Maintenance Status - Data exchange channel	DWORD	0
MSG_ACKx	Message acknowledgment x	WORD	0
MSGSTATx	Message error information x	WORD	0
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 31)	DWORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Operating mode slot (xx = Slot 16 to 31)	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = PA slave error	BOOL	0

I/O	Meaning	Type	Default
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O	Meaning	Type	Default
RAC_DIAG	System structure: RACK diagnostics	STRUCT	
CPU_DIAG	CPU diagnostics	STRUCT	
DXCHG_IN	Data exchange	DWORD	0
DXCHG1_IN	Data exchange	DWORD	0
MS_XCHG_IN	MS exchange	DWORD	0

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_PAL0 (Page 253)

Maintenance status MS (Page 533)

PA field device status and diagnostics information (Page 533)

6.42.3 Message texts and associated values of MOD_PAL0

Assignment of message text and message class

Message block	Message no.	Default message text	Message class
EV_ID1 (ALARM_8P)	1	Device @1%d@/ @2%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Device @1%d@/ @2%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Device @1%d@/ @2%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
	4		No message
	5	Device @1%d@/@2%d@/@3%d@: Uncertain diagnostics	PLC Process Control Message - Failure
	6		No message
	7	Device @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Device @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Message block	Message no.	Default message text	Message class
EV_ID2 (NOTIFY_8P)	1	Device @1%d@/ @2%d@/@3%d@: Goes to fail-safe position	Status Message - PLC
	2	Device @1%d@/ @2%d@/@3%d@: Making configuration change	Status Message - PLC
	3	Device @1%d@/ @2%d@/@3%d@: Simulation	Status Message - PLC
	4	Device @1%d@/ @2%d@/@3%d@: Process-related, no maintenance	Status Message - PLC
	5	Device @1%d@/ @2%d@/@3%d@: Process-related, no maintenance	Status Message - PLC
	6	Device @1%d@/ @2%d@/@3%d@: Local operation/functional check	Status Message - PLC
	7	Device @1%d@/ @2%d@/@3%d@: Device passivated	Status Message - PLC
	8	Device @1%d@/ @2%d@/ @3%d@: @4W %t#MOD_PAL0_TXT@	Status Message - PLC

Assignment of associated values

Message block	Associated value	Block parameter	Meaning
EV_ID1 (ALARM_8P)	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADPADR	PA field device address (byte)
EV_ID2 (NOTIFY_8P)	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADPADR	PA field device address (byte)
	4		Text number MOD_PAL0

If the PA field device is connected downstream from an inactive DP/PA-Link V1and SUBN1_ID = 16#FF, the associated variable is substituted by SUBN2_ID.

You will find the message texts and their text numbers in
"Text library for MOD_PAL0 (Page 537)".

See also

Message Classes (Page 531)

6.43 MOD_PAX0: Diagnosing a DPV0 PA slave (via DP/PA coupler with connection to a DP master system)

6.43.1 Description of MOD_PAX0

Object name (type + number)

FB 112

- MOD_PAX0 block I/Os (Page 257)

Area of application

Block MOD_PAX0 reports the maintenance status of a PA field device that is used as a DPV0 slave in a DP master system. The PA field devices must conform to the PROFIBUS V3.0 profile.

Calling OBs

The cyclic OB and OB 100.

In addition, the block is installed in the cyclic interrupt OB OB3x in which the following signal processing driver block is installed.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is integrated in the run sequence upstream of the PA_x block.
- The inputs SUBN1_ID, SUBN2_ID, PADP_ADR and PROF_V30 have parameters assigned.
- The inputs are interconnected with the following outputs:
  - Output PA_DIAG of block PADP_L10
  - OMODEx outputs of block PADP_L10
  - QMODF and QPERAF outputs of block PADP_L10
  - with output structure RAC_DIAG of block OB_DIAG1
- Input QC_x is interconnected with the PA field device status icon.
- Output OMODExx is interconnected with the MODE input of the PA_x block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Note

The CFC function "**Generate module drivers**" can only be used if the PA field device belongs to slave family 12.

Function and method of operation

Block MOD_PAX0 analyzes all events relating to the status of a PA field device slot cyclically. With modular PA field devices, the statuses of the slots are combined to form one status. The acyclic diagnostic events of a PA field device are acquired by the PADP_L10 block. It then stores them in the PA_DIAG parameter. The PA field-device status and the diagnostic information are evaluated, and entered in the MS parameter.

You will find additional information in the "PA field device status and diagnostic information (Page 533)" section.

Input PROF_V30 must be set to zero if the PA field device used does not conform to profile 3.0 (this is done by the "Generate module drivers" CFC function).

In the event of a diagnostic event, the block reports "PA field device diagnostics".

There is an input (MODE_xx (Page 517)) for each slot (module) on the PA field device that is used to read in configuration settings made for the PA field device slots (module) in HW Config.

The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current slot value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx. The following events lead to the value status "Invalid value due to higher-priority error" (OMODE_xx = 16#40xxxxxx):

MODE setting for PA profiles

You will find additional information in "PA_MODE settings (Page 528)".

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Redundancy

The higher-level block evaluates the redundancy of DP master systems operating in an H system.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

Initialization of ALARM_8P and NOTIFY_8P

Time response

Not available

Message response

The block uses ALARM_8P and NOTIFY_8P

The block generates the following messages in the OBs listed below:

OB no.	Start Event	Message
x	Cyclic processing	Repeat the update of ALARM_8P outputs/messages, if necessary
100	Restart	Initialization of ALARM_8P

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_PAX0 (Page 259)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.43.2 I/Os of MOD_PAX0

I/Os

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number x	DWORD	0
MODE_xx	Value status PA field device (xx = channel 16 to 31)	DWORD	0
MODF	1 = PA slave error	BOOL	0
MS	Maintenance status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
NUM_CHN	Number of channels of the PA device	INT	0
PA_DIAG	PA field device diagnostic information	DWORD	0
PADP_ADR	Address of the PA field device	BYTE	0
PERAF	1 = I/O access error	BOOL	0
PROF_V30	1 = PA slave profile V3.0	BOOL	0
QC_xx	Status of PA field device (xx = channel 16 to 31)	BYTE	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Type	Default
B_QC	Bit-granular Σ status (channel 0 to 31) of the PA field device	STRUCT	
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status - Application Application data transfer active	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	16#00000000
MS_XCHG_00	Maintenance Status - Data exchange channel	DWORD	0
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 31)	DWORD	0
MSG_ACKx	Message acknowledgment x	WORD	0
MSGSTATx	Message error information x	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Operating mode slot (xx = Slot 16 to 31)	DWORD	0

I/O (parameter)	Meaning	Type	Default
QERR	1 = program error	BOOL	1
QMODF	1 = PA slave error	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
RAC_DIAG	System structure: RACK diagnostics	STRUCT	
CPU_DIAG	CPU diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of MOD_PAX0 (Page 259)

Maintenance status MS (Page 533)

PA field device status and diagnostics information (Page 533)

6.43.3 Message texts and associated values of MOD_PAX0

Assignment of message text and message class

Message block	Message no.	Default message text	Message class
EV_ID1 (ALARM_8P)	1	Device @1%d@/@2%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Device @1%d@/@2%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Device @1%d@/@2%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
	4	Device @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	5	Device @1%d@/@2%d@/@3%d@: Uncertain diagnostics	PLC Process Control Message - Failure
	6		No message
	7	Device @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Device @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Message block	Message no.	Default message text	Message class
EV_ID2 (NOTIFY_8P)	1	Device @1%d@/ @2%d@: Goes to fail-safe position	Status Message - PLC
	2	Device @1%d@/ @2%d@: Making configuration change	Status Message - PLC
	3	Device @1%d@/ @2%d@: Simulation	Status Message - PLC
	4	Device @1%d@/ @2%d@: Process-related, no maintenance	Status Message - PLC
	5	Device @1%d@/ @2%d@: Process-related, no maintenance	Status Message - PLC
	6	Device @1%d@/ @2%d@: Local operation/functional check	Status Message - PLC
	7	Device @1%d@/@2%d@: Device passivated	Status Message - PLC
	8	Device @1%d@/ @2%d@:@3W %t#MOD_PAX0_TXT@	Status Message - PLC

Assignment of associated values

Message block	Associated value	Block parameter	Meaning
EV_ID1 (ALARM_8P)	1	SUBN_ID	DP master system ID (byte)
	2	PADPADR	PA field device address (byte)
EV_ID2 (NOTIFY_8P)	1	SUBN_ID	DP master system ID (byte)
	2	PADPADR	PA field device address (byte)
	3		Text number MOD_PAXL0

If SUBN1_ID = 16#FF, the associated value is substituted with SUBN2_ID.

You will find the message texts and their text numbers in the section:

Text library for MOD_PAX0 (Page 537)" section.

See also

Message Classes (Page 531)

6.44 MOD_ENME: Diagnostics for modules of the Energy Meter type

6.44.1 Description of MOD_ENME

Object name (type + number)

FB 419

- I/Os of MOD_ENME (Page 261)

Area of application

The MOD_ENME block creates device-specific diagnostics for the ET 200 SP module of the type Energy Meter ST.

Calling OBs

The cyclic OB 1 and OB 82, OB 83, OB 85, OB 86 and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is installed when an ET200SP Energy Meter is present.
- The corresponding inputs are read out of HW Config and configured.
- The block is interconnected with the corresponding channel module for the ET200 SP Energy Meter.

Startup characteristics

Initialization of the ALARM_8P blocks.

6.44.2 I/Os of MOD_ENME

I/Os

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Interrupt delay 1 (s)	INT	2
DELAY2	Interrupt delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID1	Message number 1	DWORD	16#00
EV_ID2	Message number 2	DWORD	16#00
FEATURE_XX	Feature parameter (xx= 01 - 10)	WORD	0
LADDR	Logical input address of the module	INT	0
LADDR1	Logical output address of the module	INT	0
MODE_00	Channel 00 mode	DWORD	0
MODE_01	Channel 01 mode	DWORD	0
MODE_02	Channel 02 mode	DWORD	0
MS	Maintenance status	DWORD	16#00
MS_REQ	1 = Request maintenance release	BOOL	0
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN-IO System 2 ID (100 - 115)	BYTE	255
SUBSL_NO	Subslot number	BYTE	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = Apply MODE settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	
DIAG_RST	Reset diagnostic values	BOOL	0
RAC_DIAG	System structure: RACK diagnostics	STRUCT	

Output parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
DM_ACTIVE	Fault delay	DWORD	0

I/O (parameter)	Meaning	Type	Default
DXCHG_00	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_00	2nd internal data exchange channel for channel block	DWORD	0
EN_RST_DIAG	Activate reset	BOOL	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended Status – Application	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	0
IL1_Rst	Reset of message IL1 is active	BOOL	0
IL1_St	Message IL1 is OK	BOOL	0
IL2_Rst	Reset of message IL2 is active	BOOL	0
IL2_St	Message IL2 is OK	BOOL	0
IL3_Rst	Reset of message IL3 is active	BOOL	0
IL3_St	Message IL3 is OK	BOOL	0
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_00	Maintenance Status - Data exchange channel	DWORD	0
MSGSTAT1	Message failure 1	WORD	16#0000
MSG_ACK1	Message acknowledged 1	WORD	16#0000
MSGSTAT2	Message failure 2	WORD	16#0000
MSG_ACK2	Message acknowledged 2	WORD	16#0000
OMODE_00	Channel 0 mode	DWORD	0
OMODE_01	Channel 1 mode	DWORD	0
OMODE_02	Channel 2 mode	DWORD	0
O_MS	Maintenance status	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = Module pulled/defective	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0
Quadrant	Current quadrant information	INT	0
UL1_Rst	Reset of message UL1 is active	BOOL	0
UL1_St	Message UL1 is OK	BOOL	0
UL2_Rst	Reset of message UL2 is active	BOOL	0
UL2_St	Message UL2 is OK	BOOL	0
UL3_Rst	Reset of message UL3 is active	BOOL	0
UL3_St	Message UL3 is OK	BOOL	0

6.44.3 Message texts and associated values of MOD_ENME

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@/@4%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/@4%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@/@4%d@: Maintenance required	Preventative Maintenance - Standard
	4		No message
	5		No message
	6	Module @1%d@/@2%d@/@3%d@/@4%d@: Failure	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@/@4%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@/@4%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	Subnet	BYTE
2	Address	BYTE
3	Slot number	BYTE
4	Subslot number	BYTE

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID2	1	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 00 @4W%t#MOD_EN_ME_TXT@	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@/@5%d@: Error channel 01 @4W%t#MOD_EN_ME_TXT@	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@/@4%d@: Error channel 02 @4W%t#MOD_EN_ME_TXT@	PLC Process Control Message - Failure
	4		No message
	5		No message
	6		No message

Message block ALARM_8P	Message number	Event	Message class
	7		No message
	8		No message

Associated values of ALARM_8P with EV_ID2

Associated value	Block parameters	Data type
1	ID of the PN IO system	BYTE
2	Rack/station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_EN_ME_TXT	BYTE
5	Subslot number	BYTE

You can find the message texts and their text numbers in the section: Text library for MOD_D8_PN (FB197) / MOD_D16_PN (FB198) / MOD_D24_PN (FB199) / MOD_ENME (FB 419) (Page 542).

You can find additional information in the section: Message Classes (Page 531).

6.45 MOD_ENME_S7P: Diagnostic function block for energy meter

6.45.1 Description of MOD_ENME_S7P

Object name (type + number)

FB 449

- I/Os of MOD_ENME_S7P (Page 266)

Area of application

The MOD_ENME_S7P block creates the device specific diagnostics information for ET200 SP modules of type Energy Meter ST, V4.0 with IM 155-6DP HF ≥ V3.1.

Calling OBs

The cyclic OB 1 and OB 82, OB 83, OB 85, OB 86 and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function if the energy meter module V4.0 is configured in the HW:

- If an ET200 SP Energy Meter module is available in HW Config, an instance of the diagnostic function block MOD_ENME_S7P is added to the system charts of the project.
- Information from HW configuration is read and the input parameters of MOD_ENME_S7P are parameterized correspondingly.

The MOD_ENME_S7P gets connected with the corresponding channel block of the ET200 SP Energy Meter module.

Startup characteristics

Initialization of the ALARM_8P blocks.

6.45.2 I/Os of MOD_ENME_S7P

I/Os

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CHAN_NUM	Total number of channels -1	INT	0
DELAY1	Interrupt delay 1 (s)	INT	2
DELAY2	Interrupt delay 2 (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EV_ID1	Message number 1	DWORD	16#0
EV_ID2	Message number 2	DWORD	16#0
FEATURE_XX	Feature parameter (xx = 01...10)	WORD	0
LADDR	Logical input address of the module	INT	-1
LADDR1	Logical output address of the module	INT	-1
MODE_00	Channel 00 mode	DWORD	0
MODE_01	Channel 01 mode	DWORD	0
MODE_02	Channel 02 mode	DWORD	0
MS	Maintenance status	DWORD	16#0
MS_REQ	1 = Request maintenance release	BOOL	0

I/O (parameter)	Meaning	Type	Default
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number	BYTE	0
SUBN_TYP	1 = External DP interface	BOOL	0
SUBN1_ID	DP master System 1 ID	BYTE	255
SUBN2_ID	DP master System 2 ID	BYTE	255

Out parameters

I/O (parameter)	Meaning	Type	Default
CH_ACTIVE	Channel active	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	System structure: Diagnostic information	STRUCT	
DM_ACTIVE	Fault delay	DWORD	0
DXCHG_00	1st internal data exchange channel for channel block	DWORD	16#0
DXCHG1_00	2nd internal data exchange channel for channel block	DWORD	16#0
EN_RST_DIAG	Activate reset	BOOL	0
EXT_STAT	Release for maintenance - Extended status	DWORD	0
EXT_STAT_A	Extended Status – Application	DWORD	0
FS_ACTIVE	Flutter suppression	DWORD	0
IL1_Rst	Reset of message IL1 is active	BOOL	0
IL1_St	Message IL1 is OK	BOOL	0
IL2_Rst	Reset of message IL2 is active	BOOL	0
IL2_St	Message IL2 is OK	BOOL	0
IL3_Rst	Reset of message IL3 is active	BOOL	0
IL3_St	Message IL3 is OK	BOOL	0
MOD_INF	System structure: Module parameter	STRUCT	
MS_XCHG_00	Maintenance Status - Data exchange channel	DWORD	0
MSGSTAT1	Message failure 1	WORD	0
MSG_ACK1	Message acknowledged 1	WORD	0
OMODE_00	Channel 0 mode	DWORD	0
OMODE_01	Channel 1 mode	DWORD	0
OMODE_02	Channel 2 mode	DWORD	0
O_MS	Maintenance status	DWORD	0
QREC_VAL	1 = Received new data record	BOOL	0
QREC_ERR	1 = Error read data record	BOOL	0
QSTATUS	Status read data record	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = Module pulled/defective	BOOL	0

I/O (parameter)	Meaning	Type	Default
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher level error	BOOL	0
Quadrant	Current quadrant information	INT	0
UL1_Rst	Reset of message UL1 is active	BOOL	0
UL1_St	Message UL1 is OK	BOOL	0
UL2_Rst	Reset of message UL2 is active	BOOL	0
UL2_St	Message UL2 is OK	BOOL	0
UL3_Rst	Reset of message UL3 is active	BOOL	0
UL3_St	Message UL3 is OK	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
ACC_MODE	1 = Apply MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
DIAG_RST	Reset diagnostic values	BOOL	0
RAC_DIAG	System structure: RACK diagnostics	STRUCT	

6.45.3 Message texts and associated values of MOD_ENME_S7P

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
	4		No message
	5		No message
	6	Module @1%d@/@2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Maintenance demanded (external)	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Maintenance required (external)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	DP master system number	BYTE
2	Rack number/Station number	BYTE
3	Slot number	BYTE

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	Event	Message class
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Error channel 00 @4W%t#MOD_ ENME_S7P _TXT@	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Error channel 01 @4W%t#MOD_ ENME_S7P _TXT@	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Error channel 02 @4W%t#MOD_ENME_S7P_TXT@	PLC Process Control Message - Failure
	4		No message
	5		No message
	6		No message
	7		No message
	8		No message

Associated values of ALARM_8P with EV_ID2

Associated value	Block parameters	Data type
1	DP master system number	BYTE
2	Rack number/Station number	BYTE
3	Slot number	BYTE
4	Text number from MOD_ENME_S7P_TXT	BYTE

You can find the message texts and their text numbers in the section: Text library for MOD_ENME_S7P (Page 549).

You can find additional information in the section: Message Classes (Page 531).

6.46 OB_BEGIN: CPU Diagnostics and AS Connection Diagnostics

6.46.1 Description of OB_BEGIN

Object name (type + number)

FB100

- OB_BEGIN block I/Os (Page 274)

Area of application

Block OB_BEGIN is used for CPU diagnostics of the automation system (AS). By installing the block in CFC, the system creates all acyclic tasks (OBs) in which the driver blocks of PCS 7 Basis Library are executed.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic processing
OB 55	Status interrupt (only if a DP/PA slave is required)
OB 56	Update interrupt (only if a DP/PA slave is required)
OB 57	Vendor-specific alarm (only if a DP/PA slave is required)
OB 70	I/O redundancy error
OB 72	CPU redundancy error
OB 80	Timeout error
OB 81	Power supply error
OB 82	Diagnostic interrupt
OB 83	Remove/insert interrupt
OB 84	CPU hardware error (only for CPU with this function)
OB 85	Program execution error
OB 86	Rack failure
OB 88	Stop avoidance
OB 100	Restart
OB 121	Programming error
OB 122	I/O access error

Use in CFC

With the "**Generate module drivers**" CFC function, the OB_BEGIN block is automatically installed in the OBs listed above.

Function and method of operation

Block OB_BEGIN is used to report and display CPU events and statuses. It reads the start information of the tasks (OBs), diagnostic data of the I/O and enables the relevant blocks for processing on the basis of the start events.

OB_BEGIN reads the start information of SFC 6 (RD_SINFO) or SFB 54 (RALRM) to identify the OB in which it is currently running.

If this information is not available, the block reads the logical basic address from the start information and converts it into the geographic address. This is available at the relevant OBs of the output structure CPU_DIAG the lower-level blocks can also access. On the basis of the geographic address, OB_BEGIN enables the relevant SUBNET blocks for further evaluation of the start information.

In the case of a diagnostic event (OB 82), the diagnostic data are simultaneously written to the CPU_DIAG.OB 82 structure along with the start information, using SFB54. Diagnostic (alarm) information of a length exceeding 59 bytes must contain the call of the relevant driver blocks.

In H systems, the current status of the two H CPUs is read from the system status list 71 (SSL71) in OB 100. A detailed description of the SSL71 appears in the reference manual titled *System Software for S7-300/400 System and Standard Functions*. The statuses of SSL_71.MASTER_0/1 and SSL_71.CPU_ERR_0/1 are updated in OB 72.

OB_BEGIN provides the diagnostic information of OB 55, OB 56 and OB 57 to the downstream blocks in its output structure CPU_OB_5X.

The block reports diagnostic events of an OB 88 block.

All OB 88 events are incoming events. OB 1 generates the relevant event message exiting state after a delay of approximately 10 seconds in order to allow the reporting of a new OB 88 event.

Error handling

Block OB_BEGIN evaluates error information from ALARM_8P and writes it to the relevant output parameters.

You will find additional information about this in the "Error information of output parameter MSG_STAT (Page 530)" section.

If the block installation sequence OB_BEGIN, xx blocks, ..., OB_END is not observed in an OB, the message "OB_END installation error, no OB 8x processing" will be output and QERR = TRUE set. In this case, the acyclic OBs do not evaluate the data. The downstream blocks will not be enabled.

Error information at output parameter STATUS of SFB 54 (RALRM) is handled as follows:

- The values 16#8096, 16#80A7, 16#80C0, 16#80C2, 16#80C3 or 16#80C4 at STATUS[2] and STATUS[3] indicate temporary errors. STATUS[3] of the corresponding OB will be set in the structure CPU_DIAG = 16#C4. Downstream blocks can read access the diagnostic data asynchronously.
- After any other error event, SFC 6 (RD_SINFO) reads the startup information once again and the message "OB_BEGIN diagnostic error RALRM STATUS = xxxxxxxx" is output. OB 1 generates the message exiting state once a delay of approximately 10 seconds has expired.

Startup characteristics

Block OB_BEGIN initializes the messages of ALARM_8P. In H systems (CPU_DIAG.H_MODE = TRUE), the current status of the two H CPUs is determined by reading SSL71 (see "Function and method of operation").

Overload Behavior

Messages exiting state associated with OB 121, OB 122 and OB 88 are generated subject to a delay of approx. 10 seconds. This on the one hand prevents blocking of the WinCC connection due to a high message transfer volume of these OBs. On the other hand, OB events may be due to the delay.

Time response

Not available

Message response

ALARM_8P multiple instances are only called if OB_BEGIN is to output a message. It is only at this point that previously acknowledged messages are updated by the corresponding ALARM block. If the connection to WinCC is down, each ALARM_8P can hold up to two message statuses of its event ID.

The CPU generates a programming error (OB 121) only as an incoming event. OB 1 resets the relevant message to status exiting state. In order to avoid an excessive number of programming error messages, these will not be reported as outgoing until a delay time of 10 seconds has expired. The same applies to I/O access errors (OB 122) and OB 88 events.

The block generates the following messages in the OBs listed below:

OB	Start Event	Message
OB 1	Cyclic processing	• Outgoing message with 10 s delay: Timeout (OB 80/OB 84) • Program execution error (OB 80) • Programming error (OB 121) • Write I/O access error (OB 122) • Read I/O access error (OB 122) • Error code B#16#71: Nested stack error (OB 88) • Error code B#16#72: Master control relay stack error (OB 88) • Error code B#16#73: Synchronous error nesting depth exceeded (OB 88) • Error code B#16#74: U stack nesting depth exceeded in priority class stack (OB 88) • Error code B#16#75: B stack nesting depth exceeded in priority class stack (OB 88) • Error code B#16#76: Local data allocation error (OB 88) • Error code B#16#78: Unknown opcode (OB 88) • Error code B#16#7A: Code length error (OB 88)
OB 72	CPU redundancy loss	CPU redundancy loss/return

OB	Start Event	Message
OB 80	Timeout error	Incoming message on timeout: • Cycle time exceeded • OB request: OBxx is busy • OB request: Overflow PRIOxx • TOD interrupt xx expired
OB 84	CPU hardware error	Interface error entering/exiting state; • Memory error detected and corrected by operating system. • Accumulation of detected and corrected memory errors. • Error in PC operating system. • Performance of an H-Sync coupling impaired. • Multiple-bit memory error detected and corrected.
OB 85	Program execution error	Incoming message on program-execution error: • OBxx not loaded • Access error - error xx: ...
OB 88	Stop avoidance	Incoming message on OB 88 events: • Error code B#16#71: Nested stack error • Error code B#16#72: Master control relay stack error • Error code B#16#73: Nesting depth exceeded on synchronization errors • Error code B#16#74: U-stack nesting depth exceeded in the priority class stack • Error code B#16#75: B-stack nesting depth exceeded in the priority class stack • Error code B#16#76: Local data allocation error • Error code B#16#78: Unknown opcode • Error code B#16#7A: Code length error
OB 100	Restart	Initialization of ALARM_8P
OB 121	Programming error	Programming error incoming
OB 122	I/O access error	• Read I/O access, incoming • Write I/O access, entering state

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

- OB_BEGIN faceplate

If no asset management is used in the project, the "OB-BEGIN" block icon is used to display avoidance of stop.

Additional information

For additional information, refer to the sections:

Message texts and associated values of OB_BEGIN (Page 275)

Maintenance status MS (Page 533)

6.46.2 I/Os of OB_BEGIN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	Reserve	BOOL	1
EV_IDx	Message number ALARM_8P_x (x = 1 - 4, assigned by the ES)	DWORD	0
MS	Maintenance status	DWORD	0
SUB0IDxx	DP master system 1 IDxx (xx = 00 - 15)	BYTE	255
SUB1IDxx	DP master system 2 IDxx (xx = 00 - 15)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
CPU_OB_4X	Start information OB 40 - OB 47	STRUCT	
CPU_OB_5X	Start information OB 55, OB 56, OB 57	STRUCT	
CPU_OB_6X	Start information OB 60 - OB 64	STRUCT	
CPUERR_0	1 = CPU error in rack 0 *)	BOOL	0
CPUERR_1	1 = CPU error in rack 1 *)	BOOL	0
EN_SUBx	Enable SUBNET x (x = 0 - 15)	BOOL	0
MASTER_0	1 = Master CPU in rack 0	BOOL	0
MASTER_1	1 = Master CPU in rack 1	BOOL	0
MSGSTATx	STATUS output of ALARM_8P_x (x = 1 - 4)	WORD	0
O_MS	Maintenance status	DWORD	0
QERR	1 = processing error	BOOL	1
QMSGERx	Error output of ALARM_8P_x (x = 1 - 4)	BOOL	0
SZL_71	System structure: SZL71	STRUCT	

The structure of the CPU_DIAG is integrated as OUT in the OB_BEGIN block, and as IN_OUT in all other blocks with this I/O.

*) You will find additional information about CPU errors in the CPU Manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of OB_BEGIN (Page 275)

Maintenance status MS (Page 533)

6.46.3 Message texts and associated values of OB_BEGIN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID1	1	OB 85	OB @7%d@ not loaded	PLC Process Control Message - Failure
	2			No message
	3	OB 84	Interface error	PLC Process Control Message - Failure
	4	-	Error installing OB_BEGIN/OB_END: No OB@2%d@ processing of stack @1%d@	PLC Process Control Message - Failure
	5	OB 85	Access error-Error @7%d@: @10%2s@@8%d@/@9%d@	PLC Process Control Message - Failure
	6	OB 122	Read error I/O: @4%2s@@5%d@ Addr: @6%d@	PLC Process Control Message - Failure
	7	OB 122	Write error I/O: @4%2s@@5%d@ Addr: @6%d@	PLC Process Control Message - Failure
	8	OB 84	Performance of an H-Sync link negatively affected	PLC Process Control Message - Failure

Messages 1, 4, 5, 6, 7 and 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Associated Values of ALARM_8P with EV_ID1

Process control messages are generated with EV_ID1 and associated values via ALARM_8P. The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameters	Data type
EV_ID1	1	CPU_DIAG.OB_S_NUM_CNT	BYTE
	2	TINFO_TOP_SI_NUM	BYTE
	3	OB 72_supp_info 1	WORD
	4	OB 122_BLK_TYP	WORD

Message block ALARM_8P	Associated value	Block parameters	Data type
	5	OB 122_BLK_NUM	WORD
	6	OB 122_MEM_ADDR	WORD
	7	OB 85_supp_info 1	WORD
	8	OB 85_HW_supp_info 2_3	WORD
	9	OB 85_LW_supp_info 2_3	WORD
	10	OB 85_DKZ2_3	WORD

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID2	1	OB 80	Net consumption of all OBs exceeds max. limit	Preventative Maintenance - Standard
	2	OB 80	Emergency operation, cyclic OBs are used	PLC Process Control Message - Failure
	3	OB 80	Priorities of the cyclic OBs not PCS 7 conform	Preventative Maintenance - Standard
	4	OB 84	Memory error detected and corrected by operating system.	PLC Process Control Message - Failure
	5	OB 84	Accumulation of detected and corrected memory errors	PLC Process Control Message - Failure
	6	OB 84	Error in PC operating system	PLC Process Control Message - Failure
	7	OB 121	Programming error @1%d@: @2%2s@@5%d@ /@6%d@/@4%d@/ @3%d@	PLC Process Control Message - Failure
	8	OB 84	Multiple-bit memory error detected and corrected	PLC Process Control Message - Failure

Messages 1 to 3 are generated in CPU_RT (Page 31) and forwarded to OB_BEGIN.

Messages 4, 5, 7 and 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Message 7 is to be interpreted as follows, in accordance with the error code number before the colon:

OB 121_BLK_TYP/OB 121_BLK_NUM/OB 121_PRG_ADDR/OB 121_FLT_REG/
OB 121_RESERVED_1.

This is described in the reference manual titled *System Software for S7-300/400 System and Standard Functions*.
Example: 10.05.00 10:30:45 Programming error 35: FB44/1234/5/9

Associated Values of ALARM_8P with EV_ID2

Process control messages are generated with EV_ID2 and associated values via ALARM_8P. The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameters	Data type
EV_ID2	1	OB 121_SW_FLT	BYTE
	2	OB 121_BLK_TYP	WORD
	3	OB 121_RESERVED_1	BYTE
	4	OB 121_FLT_REG	WORD
	5	OB 121_BLK_NUM	WORD
	6	OB 121_PRG_ADDR	WORD

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID3	1	OB 80	Cycle time exceeded: @1%d@ms OB@2%d@	PLC Process Control Message - Failure
	2	OB 80	OB request: OB3x still being processed	PLC Process Control Message - Error
	3	OB 80	TOD interrupt OB @3%d@ expired (TOD jump)	PLC Process Control Message - Failure
	4	OB 80	TOD interrupt OB @4%d@ expired (Stop/Run)	PLC Process Control Message - Failure
	5	OB 80	OB request: Overflow PRIO @5%d@	PLC Process Control Message - Failure
	6	OB 80	Synchronous cycle interrupt-Timing error: OB@6%d@ PRIO @7%d@	PLC Process Control Message - Failure
	7	OB 80	Interrupt loss: OB@8%d@ PRIO @9%d@	PLC Process Control Message - Failure
	8			No message

Message 2 is generated in CPU_RT (Page 31) and forwarded to OB_BEGIN.

Messages 1 to 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Associated Values of ALARM_8P with EV_ID3

Process control messages are generated with EV_ID3 and associated values via ALARM_8P. The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameters	Data type
EV_ID3	1	Cycle time (OB 80_supp_info 1)	WORD
	2	Cause OB (OB 80_1st byte supplementary info 2_3)	BYTE
	3	Cycle time (OB 80_supp_info 1)	WORD
	4	Cycle time (OB 80_supp_info 1)	WORD
	5	Priority class (OB 80_2nd byte supplementary info 2_3)	BYTE
	6	Cause OB (OB 80_1st byte supplementary info 2_3)	BYTE
	7	Priority class (OB 80_2nd byte supplementary info 2_3)	BYTE
	8	Cause OB (OB 80_1st byte supplementary info 2_3)	BYTE
	9	Priority class (OB 80_2nd byte supplementary info 2_3)	BYTE
	10	Cycle time (OB 80_supp_info 1)	WORD

Process control messages for ALARM_8P with EV_ID4 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID_4	1	OB 88(@6W%t#OB_BEGIN_TXT@): OB@1%d@ PRIO@2%d@ @3%2s@@4%d@ /@5%d@	PLC Process Control Message - Failure
	2	Diagnostic error RALRM STATUS = @7%8X@	PLC Process Control Message - Failure
	3	CPU loss of redundancy in rack @8%d@	PLC Process Control Message - Error
	4		No message
	5		No message
	6		No message
	7		No message
	8		No message

Associated Values of ALARM_8P with EV_ID4

Message block ALARM_8P	Associated value	Meaning
EV_ID4	1	Cause OB (M_OB 88.FLT_OB)
	2	Priority class (M_OB 88.FLT_OB_PRIO)
	3	Block type (M_OB 88.BLK_TYP)
	4	Block number (M_OB 88.FLT_NUM)
	5	MC7 command causing error Relative address (M_OB 88.FLT_ADDR)
	6	Error number in OB_BEGIN_TXT (M_OB 88.T_OB 88)
	7	Status RALRM

You will find the message texts and their text numbers in "Text library for OB_BEGIN (Page 549)".

See also

Message Classes (Page 531)

6.47 OB_BEGIN_PN: CPU diagnostics

6.47.1 Description of OB_BEGIN_PN

Object name (type + number)

FB 130

- I/Os of OB_BEGIN_PN (Page 279)

Area of application

Block OB_BEGIN_PN is used for CPU diagnostics of the automation system (AS). By installing the block in CFC, the system creates all acyclic tasks (OBs) in which the driver blocks of PCS 7 Basis Library are executed.

6.47.2 I/Os of OB_BEGIN_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	Reserve	BOOL	1
EV_IDx	Message number ALARM_8P_x (x = 1 - 4, assigned by the ES)	DWORD	0
MS	Maintenance status	DWORD	0
SUB0IDxx	DP master system 1 IDxx (xx = 00 - 15)/PN IO system 1 (100-115)	BYTE	255
SUB1IDxx	DP master system 2 IDxx (xx = 00 - 15)/PN IO system 2 (100-115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
CPU_DIAG_PN	System structure: CPU diagnostics (PN)	STRUCT	
CPU_OB_4X	Start information OB 40 - OB 47	STRUCT	
CPU_OB_5X	Start information OB 55, OB 56, OB 57	STRUCT	
CPU_OB_5X_PN	Start information OB 55, OB 56, OB 57	STRUCT	
CPU_OB_6X	Start information OB 60 - OB 64	STRUCT	
CPUERR_0	1 = CPU error in rack 0 *)	BOOL	0
CPUERR_1	1 = CPU error in rack 1 *)	BOOL	0
EN_SUBx	Enable SUBNET x (DP: x = 0 - 15/PN: x = 100-115))	BOOL	0
MASTER_0	1 = Master CPU in rack 0	BOOL	0
MASTER_1	1 = Master CPU in rack 1	BOOL	0
MSGSTATx	STATUS output of ALARM_8P_x (x = 1 - 4)	WORD	0
O_MS	Maintenance status	DWORD	0
QERR	1 = processing error	BOOL	1
QMSGERx	Error output of ALARM_8P_x (x = 1 - 4)	BOOL	0
SZL_71	System structure: SZL71	STRUCT	

The structure of the CPU_DIAG is integrated as OUT in the OB_BEGIN block, and as IN_OUT in all other blocks with this I/O.

*) You will find additional information about CPU errors in the CPU Manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of OB_BEGIN_PN (Page 281)

Maintenance status MS (Page 533)

6.47.3 Message texts and associated values of OB_BEGIN_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID1	1	OB 85	OB @7%d@ not loaded	PLC Process Control Message - Failure
	2	-	Time-of-day synchronization not synchronized on higher-level	PLC Process Control Message - Failure
	3	OB 84	Interface error	PLC Process Control Message - Failure
	4	-	Assembly error OB_BEGIN_PN/OB_END: No OB@2%d@ processing stack @1%d@	PLC Process Control Message - Failure
	5	OB 85	Access error: @7%d@: @10%2s@@8%d@/@9%d@	PLC Process Control Message - Failure
	6	OB 122	I/O read access error: @4%2s@@5%d@ Addr: @6%d@	PLC Process Control Message - Failure
	7	OB 122	Write error I/O: @4%2s@@5%d@ Adr: @6%d@	PLC Process Control Message - Failure
	8			No message

Messages 1, 4, 5, 6, 7 and 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Associated values of ALARM_8P with EV_ID1

Process control messages are generated with EV_ID1 and associated values via ALARM_8P. The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameter	Data type
EV_ID1	1	CPU_DIAG_PN.OB_S_NUM_CNT	BYTE
	2	TINFO_TOP_SI_NUM	BYTE
	3	OB 72_supp_info 1	WORD
	4	OB 122_BLK_TYP	WORD
	5	OB 122_BLK_NUM	WORD
	6	OB 122_MEM_ADDR	WORD
	7	OB 85_supp_info 1	WORD
	8	OB 85_HW_supp_info 2_3	WORD

Message block ALARM_8P	Associated value	Block parameter	Data type
	9	OB 85_LW_supp_info 2_3	WORD
	10	OB 85_DKZ2_3	WORD

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID2	1	OB 80	Net consumption of all OBs exceeds max. limit	Preventative Maintenance - Standard
	2	OB 80	Emergency operation, cyclic OBs are used	PLC Process Control Message - Failure
	3	OB 80	Priorities of the cyclic OBs not PCS 7 conform	Preventative Maintenance - Standard
	4	OB 84	Memory error detected and corrected by operating system.	PLC Process Control Message - Failure
	5	OB 84	Accumulation of detected and corrected memory errors	PLC Process Control Message - Failure
	6	OB 84	Error in PC operating system	PLC Process Control Message - Failure
	7	OB 121	Programming error @1%d@: @2%2s@@5%d@ /@6%d@/@4%d@/ @3%d@	PLC Process Control Message - Failure
	8	OB 84	Multiple-bit memory error detected and corrected	PLC Process Control Message - Failure

Messages 1 to 3 are generated in CPU_RT (Page 31) and forwarded to OB_BEGIN_PN.

Messages 4, 5, 7 and 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Message 7 is to be interpreted as follows, in accordance with the error code number before the colon:

OB 121_BLK_TYP/OB 121_BLK_NUM/OB 121_PRG_ADDR/OB 121_FLT_REG/
OB 121_RESERVED_1.

Associated Values of ALARM_8P with EV_ID2

Process control messages are generated with EV_ID2 and associated values via ALARM_8P. The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameter	Data type
EV_ID2	1	OB 121_SW_FLT	BYTE
	2	OB 121_BLK_TYP	WORD
	3	OB 121_RESERVED_1	BYTE
	4	OB 121_FLT_REG	WORD

Message block ALARM_8P	Associated value	Block parameter	Data type
	5	OB 121_BLK_NUM	WORD
	6	OB 121_PRG_ADDR	WORD

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID3	1	OB 80	Cycle time exceeded: @1%d@ms OB@2%d@	PLC Process Control Message - Failure
	2	OB 80	OB request: OB3x still being processed	PLC Process Control Message - Error
	3	OB 80	TOD interrupt OB @3%d@ expired (TOD jump)	PLC Process Control Message - Failure
	4	OB 80	TOD interrupt OB @4%d@ expired (Stop/Run)	PLC Process Control Message - Failure
	5	OB 80	OB request: Overflow PRIO @5%d@	PLC Process Control Message - Failure
	6	OB 80	Synchronous cycle interrupt-Timing error: OB@6%d@ PRIO @7%d@	PLC Process Control Message - Failure
	7	OB 80	Interrupt loss: OB@8%d@ PRIO @9%d@	PLC Process Control Message - Failure
	8	-	Time-of-day interrupt: External time-of-day synchronization failed	PLC Process Control Message - Failure

Message 2 is generated in CPU_RT (Page 31) and forwarded to OB_BEGIN_PN.

Messages 1 to 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Associated Values of ALARM_8P with EV_ID3

Process control messages are generated with EV_ID3 and associated values via ALARM_8P. The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameter	Data type
EV_ID3	1	OB 121_SW_FLT	BYTE
	2	OB 121_BLK_TYP	WORD
	3	OB 121_RESERVED_1	BYTE
	4	OB 121_FLT_REG	WORD
	5	OB 122_BLK_NUM	WORD
	6	OB 121_PRG_ADDR	WORD

Process control messages for ALARM_8P with EV_ID4 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID4	1	OB 88(@6W%t#OB_BEGIN_PN_TXT@): OB@1%d@ PRIO@2%d@ @3%2s@@4%d@ /@5%d@	PLC Process Control Message - Failure
	2	OB_BEGIN_PN: Diagnostics error ALARM STATUS = @7%8X@	PLC Process Control Message - Failure
	3		No message
	4	Time-of-day interrupt: The control deviation is out of tolerance range	PLC Process Control Message - Failure
	5		No message
	6		No message
	7		No message
	8		No message

Associated values of ALARM_8P with EV_ID4

Message block ALARM_8P	Associated value	Meaning
EV_ID4	1	Cause OB (M_OB 88.FLT_OB)
	2	Priority class (M_OB 88.FLT_OB_PRIO)
	3	Block type (M_OB 88.BLK_TYP)
	4	Block number (M_OB 88.FLT_NUM)
	5	MC7 command causing error Relative address (M_OB 88.FLT_ADDR)
	6	Error number in OB_BEGIN_TXT (M_OB 88.T_OB 88)
	7	Status RALRM

You can find the message texts and their text numbers in the section "Text library for OB_BEGIN_PN (FB130) / OB_BEGIN_HPN (FB205) (Page 549)"

You can find additional information in the section: Message Classes (Page 531).

6.48 OB_BEGIN_HPN: H-CPU diagnostics

6.48.1 Description of OB_BEGIN_HPN

Object name (type + number)

FB 205

- I/Os of OB_BEGIN_HPN (Page 285)

Area of application

Block OB_BEGIN_HPN is used for H-CPU diagnostics of the automation system (AS). By installing the block in CFC, the system creates all acyclic tasks (OBs) in which the driver blocks of PCS 7 Basis Library are executed.

Additional information

For additional information, refer to the following sections:

Message texts and associated values of OB_BEGIN_HPN (Page 287)

Maintenance status MS (Page 533)

6.48.2 I/Os of OB_BEGIN_HPN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15) ".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CPU_RT_DATA	CPU_RT Performance data	STRUCT	-
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	Reserve	BOOL	1
EV_IDx	Message number ALARM_8P_x (x = 1 - 5, assigned by the ES)	DWORD	0
MS	Maintenance status	DWORD	0
R0_PLUG_TRANS_0_ADDR	Address of Rack 0 Pluggable Transceiver 0	INT	0
R0_PLUG_TRANS_1_ADDR	Address of Rack 0 Pluggable Transceiver 1	INT	0
R1_PLUG_TRANS_0_ADDR	Address of Rack 1 Pluggable Transceiver 0	INT	0

I/O (parameter)	Meaning	Data type	De-fault
R1_PLUG_TRANS_1_ADDR	Address of Rack 1 Pluggable Transceiver 1	INT	0
SUB0IDxx	DP master system 1 IDxx (xx = 00 - 15)/PN IO system 1 (100 - 115)	BYTE	255
SUB1IDxx	DP master system 2 IDxx (xx = 00 - 15)/PN IO system 2 (100 - 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	De-fault
CPU_DIAG	System structure: CPU diagnostics	STRUCT	-
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	-
CPU_OB_4X	Start information OB 40 - OB 47	STRUCT	-
CPU_OB_5X	Start information OB 55, OB 56, OB 57	STRUCT	-
CPU_OB_5X_PN	Start information OB 55, OB 56, OB 57	STRUCT	-
CPU_OB_6X	Start information OB 60 - OB 64	STRUCT	-
CPUERR_0	1 = CPU error in rack 0	BOOL	0
CPUERR_1	1 = CPU error in rack 1	BOOL	0
DIAG_INF	Module Diagnostic Information Structure	STRUCT	0
EN_SUBx	Enable SUBNET x (DP: x = 0 – 15 / PN: x = 100 - 115)	BOOL	0
EXT_STAT	Extended Status	DWORD	0
EXT_STAT_1	Extended Status	DWORD	0
MASTER_0	1 = Master CPU in rack 0	BOOL	0
MASTER_1	1 = Master CPU in rack 1	BOOL	0
MSGSTATx	STATUS-output of the ALARM_8P_x (x = 1 - 5)	WORD	0
O_MS	Maintenance status	DWORD	0
QERR	1 = processing error	BOOL	1
QMSGERx	Output error of the ALARM_8P_x (x = 1 - 5)	BOOL	0
SZL_71	System structure: SZL71	STRUCT	-
TIME_STATUS	Time synchronization status	STRUCT	-

The structures of the CPU_DIAG and CPU_DIAG_PN are integrated in the block OB_BEGIN_HPN as OUT, and in all other blocks with this connection as IN_OUT .

Additional information

For additional information, refer to the sections:

Message texts and associated values of OB_BEGIN_HPN (Page 287)

Maintenance status MS (Page 533)

6.48.3 Message texts and associated values of OB_BEGIN_HPN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID1	1	OB 85	OB @7%d@not loaded	PLC Process Control Message - Failure
	2	-	Time-of-day synchronization not synchronized on higher-level	PLC Process Control Message - Failure
	3	OB 84	Interface error	PLC Process Control Message - Failure
	4	-	Error installation OB_BEGIN_HPN/ OB_END: No OB@2%d@ processing stack @1%d@	PLC Process Control Message - Failure
	5	OB 85	Program execution error: @7%d@: @10%2s@@8%d@/@9%d@	PLC Process Control Message - Failure
	6	OB 122	Read error I/O: @4%2s@@5%d@ Addr: @6%d@	PLC Process Control Message - Failure
	7	OB 122	Write error I/O: @4%2s@@5%d@ Addr: @6%d@	PLC Process Control Message - Failure
	8			No message

Messages 1, 4, 5, 6, 7 and 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Associated Values of ALARM_8P with EV_ID1

Process control messages are generated with EV_ID1 and associated values via ALARM_8P. The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameters	Data type
EV_ID1	1	CPU_DIAG.OB_S_NUM_CNT	BYTE
	2	TINFO_TOP_SI_NUM	BYTE
	3	OB 72_supp_info 1	WORD
	4	OB 122_BLK_TYP	WORD
	5	OB 122_BLK_NUM	WORD
	6	OB 122_MEM_ADDR	WORD
	7	OB 85_supp_info 1	WORD
	8	OB 85_HW_supp_info 2_3	WORD
	9	OB 85_LW_supp_info 2_3	WORD
	10	OB 85_DKZ2_3	WORD

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID2	1	OB80	Net consumption of all OBs exceeds max. limit	Preventative Maintenance - Standard
	2	OB80	Emergency operation, cyclical OBs are reduced	PLC Process Control Message - Failure
	3	OB80	Priorities of cyclical OBs not conforming to PCS 7	Preventative Maintenance - Standard
	4	OB 84	Memory error in operating system detected and corrected	PLC Process Control Message - Failure
	5	OB 84	Accumulation of detected and corrected memory errors	PLC Process Control Message - Failure
	6	OB 84	Error in PC operating system	PLC Process Control Message - Failure
	7	OB 121	Programming error @1%d@: @2%2s@@5%d@ /@6%d@/@4%d@/ @3%d@	PLC Process Control Message - Failure
	8	OB 84	Multiple-bit memory error detected and corrected	PLC Process Control Message - Failure

Messages 1 to 3 are generated in CPU_RT (Page 31) and forwarded to OB_BEGIN_HPN .

Messages 4, 5, 7 and 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Message 7 is to be interpreted as follows, in accordance with the error code number before the colon:

OB 121_BLK_TYP/OB 121_BLK_NUM/OB 121_PRG_ADDR/OB 121_FLT_REG/
OB 121_RESERVED_1.

Associated values of ALARM_8P with EV_ID2

Process control messages are generated with EV_ID2 and associated values via ALARM_8P . The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Block parameters	Data type
EV_ID2	1	OB 121_SW_FLT	BYTE
	2	OB 121_BLK_TYP	WORD
	3	OB 121_RESERVED_1	BYTE
	4	OB 121_FLT_REG	WORD
	5	OB 121_BLK_NUM	WORD
	6	OB 121_PRG_ADDR	WORD

The process control messages of ALARM_8P with EV_ID3 are assigned as follows:

Message block ALARM_8P	Message number	OB no.	Default message text	Message class
EV_ID3	1	OB 80	Cycle time exceeded: @1%d@ms OB@2%d@	PLC Process Control Message - Failure
	2	OB 80	OB request: OB3x still in process	PLC Process Control Message - Failure
	3	OB 80	Time-of-day interrupt OB @3%d@ elapsed (time jump)	PLC Process Control Message - Failure
	4	OB 80	Time-of-day interrupt OB @4%d@ elapsed (Stop/Run)	PLC Process Control Message - Failure
	5	OB 80	OB request: Overflow PRIO @5%d@	PLC Process Control Message - Failure
	6	OB 80	Synchronous cycle interrupt-Timing error: OB@6%d@ PRIO @7%d@	PLC Process Control Message - Failure
	7	OB 80	Interrupt loss: OB@8%d@ PRIO @9%d@	PLC Process Control Message - Failure
	8	-	Time-of-day interrupt: External time-of-day synchronization failed	PLC Process Control Message - Failure

Message 2 is generated in CPU_RT (Page 31) and forwarded to OB_BEGIN_HPN.

Messages 1 to 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

Associated values of ALARM_8P with EV_ID3

Process control messages are generated with EV_ID3 and associated values via ALARM_8P . The table below shows how the associated values are assigned to the block parameters.

Message block ALARM_8P	Associated value	Meaning
EV_ID3	1	Cycle time
	2	Originator OB
	3	Cycle time
	4	Cycle time
	5	Priority class
	6	Originator OB
	7	Priority class
	8	Originator OB
	9	Priority class
	10	Cycle time

Message 2 is generated in CPU_RT (Page 31) and forwarded to OB_BEGIN_HPN.

Messages 1 to 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

The process control messages of ALARM_8P with EV_ID4 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID_4	1	OB 88(@6W%t#OB_BEGIN_HPN_TXT@): OB@1%d@ PRIO@2%d@ @3%2s@@4%d@ /@5%d@	PLC Process Control Message - Failure
	2	Diagnostics error RALRM STATUS = @7%8X@	PLC Process Control Message - Failure
	3	CPU loss of redundancy in rack @8%d@	PLC Process Control Message - Error
	4	Time-of-day interrupt: The control deviation is out of tolerance range	PLC Process Control Message - Failure
	5	UR0/Transceiver 0: Maintenance alarm	PLC Process Control Message - Failure
	6	UR0/Transceiver 1: Maintenance alarm	PLC Process Control Message - Failure
	7	UR1/Transceiver 0: Maintenance alarm	PLC Process Control Message - Failure
	8	UR1/Transceiver 1: Maintenance alarm	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID4

Message block ALARM_8P	Associated value	Meaning
EV_ID4	1	Cause OB (M_OB 88.FLT_OB)
	2	Priority class (M_OB 88.FLT_OB_PRIO)
	3	Block type (M_OB 88.BLK_TYP)
	4	Block number (M_OB 88.FLT_NUM)
	5	MC7 command causing error Relative address (M_OB 88.FLT_ADDR)
	6	Error number in OB_BEGIN_TXT (M_OB 88.T_OB 88)
	7	Status RALRM
	8	CPU rack number

Message 2 is generated in CPU_RT (Page 31) and forwarded to OB_BEGIN_HPN.

Messages 1 to 8 are only incoming events. They are reset to "outgoing" status during the normal run sequence (OB 1) of the block.

The process control messages of ALARM_8P with EV_ID5 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID_5	1	UR0/Transceiver 0: Maintenance required	Preventative Maintenance - Standard
	2	UR0/Transceiver 0: Maintenance demanded	PLC Process Control Message - Error
	3	UR0/Transceiver 1: Maintenance required	Preventative Maintenance - Standard
	4	UR0/Transceiver 1: Maintenance demanded	PLC Process Control Message - Error
	5	UR1/Transceiver 0: Maintenance required	Preventative Maintenance - Standard
	6	UR1/Transceiver 0: Maintenance demanded	PLC Process Control Message - Error
	7	UR1/Transceiver 1: Maintenance required	Preventative Maintenance - Standard
	8	UR1/Transceiver 1: Maintenance demanded	PLC Process Control Message - Error

Associated values of ALARM_8P with EV_ID5

Message block ALARM_8P	Associated value	Meaning
EV_ID5	1	Cause OB (M_OB 88.FLT_OB)
	2	Priority class (M_OB 88.FLT_OB_PRIO)
	3	Block type (M_OB 88.BLK_TYP)
	4	Block number (M_OB 88.FLT_NUM)
	5	MC7 command causing the error Relative address (M_OB 88.FLT_ADDR)
	6	Error number in OB_BEGIN_HPN_TXT (M_OB 88.T_OB 88)
	7	Status RALRM

You can find the message texts and their text numbers in the section "Text library for OB_BEGIN_PN (FB130) / OB_BEGIN_HPN (FB205) (Page 549)".

You can find additional information in the section: Message Classes (Page 531).

6.49 OB_DIAG1: OB diagnostics for avoiding stoppages in DPV1 master systems

6.49.1 Description of OB_DIAG1

Object name (type + number)

FB 118

- OB_DIAG1 block I/Os (Page 295)

Area of application

Block OB_DIAG1 monitors the failure and recovery of DP or PA slaves (referred to as “slaves” below). The slaves can be connected to a DPV0 or DPV1 master system, or to a DPV1 DP/PA link (Y link). OB_DIAG1 blocks further evaluation if a slave is defective (frequent producer) to prevent the CPU stopping. It indicates the preferred channel of the active slave in an H system. The indicated preferred channel 1 (SUBN1ACT) is always TRUE, if the slave is downstream of a DP/PA link (Y link) and is active.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 70	I/O redundancy error
OB 72	CPU redundancy error
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart
OB 55	Status interrupt (only as required)
OB 56	Update interrupt (only as required)
OB 57	Manufacturer-specific alarms (only as required)

The driver generator only installs the block in OB 55, OB 56 and OB 57 if diagnostic messages are to be expected from these locations; consequently OB 5x are not entered in this block's task list.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- Block OB_DIAG1 is installed downstream of the SUBNET/DPAY_V1 block (when used downstream of a DP/PA or Y link).
- The RACK_NO, LADDR, DADDR, EN_MSG_D, SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The EN input is interconnected with the output of an AND block.
  The block inputs will be interconnected with output EN_SUBx (x = DP master system ID) of the OB_BEGIN block and with output EN_Rxxx (xxx = rack/station number) of the SUBNET block.
- The CPU_DIAG OUT structure of the OB_BEGIN block and SUB_DIAG of the SUBNET block are interconnected with the IN_OUT structures of the same name of block OB_DIAG.
- RAC_DIAG_I is interconnected with its own RAC_DIAG OUT structure when used in a DP master system.
- RAC_DIAG_I is interconnected with the RAC_DIAG OUT structure of the DPAY_V1 block when used downstream of a Y link.

Function and method of operation

The DPA_LINK block input receives information on the operational status of the slave, in other words whether it is in use on a DP master system (DPA_LINK = FALSE) or downstream of a DP/PA link (Y link). If the slave is connected to a DP master system, a failure is reported in OB 86. If the slave is connected downstream of a DP/PA link (Y link), the failure is reported in OB 83.

The block counts the number of calls to an acyclic OB of a block instance before an OB 1 can be executed.

OB_DIAG1 indicates higher-level errors of the CPU, DP master/slave (QRACKF, SUBN1ERR, SUBN2ERR). It determines the preferred channel of connected DP slaves (SUBN1ACT, SUBN2ACT). The group error message QRACKF indicates failure of the DP master or slave. An active DP slave has lost redundancy if one of the output parameters SUBN1ERR or SUBN2ERR = TRUE.

Start and diagnostic information is read from the CPU_DIAG structure, which is interconnected with the CPU_DIAG structure of the OB_BEGIN block.

The block evaluates error events, and uses the diagnostic address DADDR of the slave (on the DP master system only) to determine the currently active preferred channel (SUBN1ACT, SUBN2ACT) of redundant PROFIBUS DP interface circuits.

The slaves downstream of a DP/PA link (Y link) are not always active. In this case, the diagnostic address DADDR is the diagnostic address of the link. The active preferred channel (SUBN1ACT, SUBN2ACT) is displayed here by the DP/PA link (Y link).

The DP master systems or DP/PA links (Y link) must be operated in DPV1 mode (V1-MODE = TRUE).

Failure and return of a DP slave are reported with ALARM_8P. The message function for all messages can be disabled with EN_MSG = FALSE.

The “Device failure” message can be disabled with EM_MSG_D = FALSE (see “Message Response”).

Overload behavior

Block OB_DIAG1 counts the frequency of the calls to the acyclic OB 55, OB 56, OB 57, OB 82, and OB 86 blocks (except in the case of a DP master system failure, see SUBNET block). If the block is downstream of a DP/PA or Y link, the calls will be counted in OB 83, rather than in OB 86. The following section deals only with OB 86.

Each OB is assigned a counter that is checked for the condition > 5. If this condition is fulfilled, the block sets EN_F = FALSE (disable function block). The counters are reset in OB 1. The output EN_F = TRUE (enable function block) is set in all other OBs.

OB_DIAG1 reports failure of the blocks mentioned above in OB 1, OB 82 or OB 86, including the geographic address of the slave.

OB 55, OB 56, OB 57 and OB 82 are locked in the event of an overload, however, so the event is not evaluated in the downstream blocks. The outputs cannot correspond to the current slave status. If an OB is locked and no more slave events have been reported after a delay of around 1 minute, if it is OB 86 that is disabled, the slave status is checked, and the outputs are updated. It may take several cycles to update the slave status.

If it is OB 82 that is disabled, rather than OB 86, the EN_DIAG variable is set to TRUE after around 1 minute. The interconnected DP slave block can then fetch the current diagnostic data for the slave, and update its own data. The same applies to OB 55, OB 56, and OB 57.

The “outgoing” message about the fault is generated when the OB lock is canceled, and either a new event has occurred for this OB or the wait time has elapsed.

Redundancy

The block supports redundant DP master systems in an H system (distributed I/Os only). The SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs of the OB_DIAG1 block are configured with the numbers of the redundant DP master systems. If the DP master systems are not redundant, the remaining input is set to 16#FF (default).

Startup characteristics

The availability of the slave is checked. In H systems the preferred channel of the slave is determined (active slaves only).

Error handling

The block evaluates the error information from ALARM_8P, and writes it to the relevant output parameter.

You will find additional information about this in the "Error information of output parameter MSG_STAT (Page 530)" section.

Message response

The multiple instances ALARM_8P are only called if a message is to be output by this instance. It is only at this point that previously acknowledged messages are updated by the corresponding ALARM block. If the connection to WinCC is down, each ALARM_8P instance can hold up to two message statuses of its event ID. (and generally no more than two messages). The block generates the messages listed below:

OB no.	Start Event	Message
1	Cyclic processing	Call of ALARM_8P due to incomplete transfer or unacknowledged message
72	CPU redundancy loss	If no redundant diagnostic repeater is connected to this CPU, the "Slave" failure/return message is output.
70	Redundancy loss	If there is no redundant slave connected to this DP master system, message "Device" failure/return, otherwise message "Slave" redundancy loss/return
83	Removal/insertion	Message "Slave" failure/return
86	Rack failure	Message "Slave" failure/return
100	Restart	Initialization of ALARM_8P

If the diagnostic blocks (e.g., MOD_PAL0) of a device also report the failure of a device, the "Device failure" message can be disabled with EN_MSG_D = FALSE (this is done automatically by the driver generator).

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of OB_DIAG1 (Page 297)

Maintenance status MS (Page 533)

6.49.2 I/Os of OB_DIAG1

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnostic address of the slave or DP/PA link	INT	0
DELAY	Alarm delay time [s]	INT	15
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
DP_SL_DIAG	DP slave diagnostics	STRUCT	
DPA_LINK	Slave connection: 0 = DP master system 1 = Link	BOOL	0
DPA_M	Status of the PA or DP slave module (DPV0)	STRUCT	
EN_MSG	1 = enable message	BOOL	1
EN_MSG_D	1 = Enable message "Device failure"	BOOL	1
EV_ID	Message number	DWORD	0
FEATURE	Feature parameter	BYTE	0
IO_ADDR	Address of the slave	INT	0
LADDR	Logical basic address of the slave	INT	0
MS	Maintenance status	DWORD	0
PADP_ADR	Address of the PA/DP slave	BYTE	255
RACK_NO	Rack number	BYTE	255
SLOT_NO	Slot number 0 of the slave at the DP/PA Link	BYTE	255
SUBN_TYP	1 = External DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
DP_SL_DIAG_OUT	DP slave diagnostics	STRUCT	
EN_DIAG	1 = Read diagnostics with SFC 13	BOOL	0
EN_F	1 = Enable function/function block	BOOL	0
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
QRACKF	1 = higher-level error	BOOL	0
RAC_DIAG	System structure: RACK diagnostics	STRUCT	
SUBN1ACT	1 = Slave 1 is active	BOOL	0
SUBN1ERR	1 = Error in the primary DP master system	BOOL	0
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN2ERR	1 = Error in the redundant DP master system	BOOL	0
V1_MODE	1 = DPV1 mode of the DP master system	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = Accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
CPU_OB_5X	OB_5x start information	STRUCT	
RAC_DIAG_I	System structure: RACK diagnostics	STRUCT	
SUB_DIAG	System structure: SUBNET diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of OB_DIAG1 (Page 297)

Maintenance status MS (Page 533)

6.49.3 Message texts and associated values of OB_DIAG1

Assignment of message text and message class

Message No.	Default message text	Message class
1	DP slave @4%d@/ @2%d@: Redundancy loss	PLC Process Control Message - Error
2	DP slave @1%d@/ @2%d@: Failure	PLC Process Control Message - Failure
3	DP slave @1%d@/ @2%d@/@3%d@ : Multiple failure	PLC Process Control Message - Failure
4	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 82)	PLC Process Control Message - Failure
5	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 55)	PLC Process Control Message - Failure
6	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 56)	PLC Process Control Message - Failure
7	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 57)	PLC Process Control Message - Failure
8	Device @1%d@/ @2%d@/@3%d@: Failure	PLC Process Control Message - Failure

Assignment of Associated Values

Associated value	Block parameters
1	ID of the primary DP master system (SUBN_ID)
2	Rack/station number (RACK_NO)

Associated value	Block parameters
3	Slot number (SLOT_NO)
4	Subnet ID of the master in the event of redundancy loss (SUBN2_ID)

See also

Message Classes (Page 531)

6.50 OB_DIAG1_PN: OB diagnostics for avoiding stoppages in DPV1 master systems

6.50.1 Description of OB_DIAG1_PN

Object name (type + number)

FB 202

- I/Os of OB_DIAG1_PN (Page 298)

Area of application

Block OB_DIAG1_PN monitors the failure and recovery of all Profinet standard slaves and the IE/PB-Link. The slaves can be connected to an IE/PB. To prevent the CPU stopping, OB_DIAG1_PN blocks further evaluation if a slave is defective.

6.50.2 I/Os of OB_DIAG1_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	IE/PB link diagnostic address	INT	0
DELAY	Alarm delay time [s]	INT	15
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
DPA_LINK	Slave connection: 0 = PN-IO Master 1 = IE/PB link	BOOL	0
EN_MSG	1 = enable message	BOOL	1

I/O (parameter)	Meaning	Data type	Default
EN_MSG_D	1 = Enable message "Device failure"	BOOL	1
EV_ID	Message number ALARM_8P (assigned by the ES)	DWORD	0
FEATURE	Feature parameter	BYTE	0
IO_ADDR	Address of the slave	INT	0
LADDR	Logical basic address of the slave	INT	0
MS	Maintenance status	DWORD	0
PADP_ADR	Diagnostic address of the PN IO device	BYTE	255
PNIO_ADR	Diagnostic address PN-IO interface	INT	0
PORT1_ADR	Diagnostic address PORT 1	INT	0
PORT1_CON-NECT	1=Port 1 connected	BYTE	0
PORT2_ADR	Diagnostic address PORT 2	INT	0
PORT2_CON-NECT	1=Port 2 connected	BYTE	0
RACK_NO	Rack number	BYTE	255
SLOT_NO	Slot number of the slave at the IE/PB link	BYTE	255
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 2 ID (100 - 115)	BYTE	255
PORT_ERR	Port error	STRUCT	
PN_REDUNDAN-CY_LEVEL	PN redundancy level S1=16#1; S2=16#2; R1=16#4; R2=16#8	BYTE	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
EN_F	1 = Enable function/function block	BOOL	0
EN_DIAG	1 = Diagnostic event pending	BOOL	0
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	STATUS output of the ALARM_8P	WORD	0
O_MS	Maintenance status	DWORD	0
QRACKF	1 = higher-level error	BOOL	0
RAC_DIAG	System structure: RACK diagnostics	STRUCT	
SUBN1ACT	1 = PN IO device 1 active	BOOL	0
SUBN1ERR	1 = Error in the PN IO device 1	BOOL	0
SUBN2ACT	1 = PN IO device 2 active	BOOL	0
SUBN2ERR	1 = Error in the PN IO device 2	BOOL	0
V1_MODE	Not used	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	
CPU_OB_5X	OB_5x start information	STRUCT	
RAC_DIAG_I	System structure: RACK diagnostics	STRUCT	
SUB_DIAG	OB startup information	STRUCT	

6.50.3 Message texts and associated values of OB_DIAG1_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID	1	Device @4%d@/@2%d@: Loss of redundancy	PLC Process Control Message - Error
	2	Device @1%d@/@2%d@: Failure	PLC Process Control Message - Failure
	3	Device @1%d@/@2%d@/@3%d@: Multiple failure	PLC Process Control Message - Failure
	4	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 82)	PLC Process Control Message - Failure
	5	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 55)	PLC Process Control Message - Failure
	6	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 56)	PLC Process Control Message - Failure
	7	Device @1%d@/ @2%d@/@3%d@: Multiple alarm (OB 57)	PLC Process Control Message - Failure
	8	Device @1%d@/ @2%d@/@3%d@: Failure	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID:

Associated value	Block parameter	Data type
1	ID of the primary PN IO system (SUBN1_ID)	BYTE
2	Rack/station number (RACK_NO)	BYTE
3	Slot number (SLOT_NO)	BYTE

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Device @1%d@/@2%d@: Port1 Error	PLC Process Control Message - Error
	2	Device @1%d@/@2%d@: Port 2 Error	PLC Process Control Message - Error
	3	Device @1%d@/@2%d@: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
	4	Device @1%d@/@2%d@: Maintenance required (PN-IO)	Preventative Maintenance - Standard
	5	Device @1%d@/@2%d@/@3%d@: Port 1 Error	PLC Process Control Message - Error
	6	Device @1%d@/@2%d@/@3%d@: Port 2 Error	PLC Process Control Message - Error
	7	Device @1%d@/@2%d@/@3%d@: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
	8	Device @1%d@/@2%d@/@3%d@: Maintenance required (PN-IO)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1:

Associated value	Block parameter	Data type
1	ID of the primary PN IO system (SUBN1_ID)	BYTE
2	Rack/station number (RACK_NO)	BYTE
3	Slot number (SLOT_NO)	BYTE

See also

Message Classes (Page 531)

6.51 OB_DIAG2: OB Diagnostic Function - DP/PA Link - Extended Fieldbus Diagnostics

6.51.1 Description of OB_DIAG2

Object name (type + number)

FB 416

- OB_DIAG2 block I/Os (Page 303)

Area of application

The OB_DIAG2 block monitors the DP/PA Link and coupler with extended fieldbus diagnostics for

- Failure/return of the DP/PA Link
- Redundancy loss
- Diagnostic interrupts
- Status interrupts

and reports these events.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 55	Status interrupt
OB 70	I/O redundancy error
OB 72	CPU redundancy error
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of OB_DIAG2 (Page 304)

Maintenance status MS (Page 533)

See also

Error Information of Output Parameter MSG_STAT (Page 530)

6.51.2 I/Os of OB_DIAG2

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnostic address of the slave or DP/PA link	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
DPA_LINK	Slave connection: 0 = DP master system 1 = Link	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EN_MSG_D	1 = Enable message "Device failure"	BOOL	1
EV_ID	Message number	DWORD	0
LADDR	Logical basic address of the slave	INT	0
MS	Maintenance status	DWORD	0
PADP_ADR	Address of the PA/DP slave	BYTE	255
RACK_NO	Rack number	BYTE	0
SLOT_NO	Slot number 0 of the slave at the DP/PA Link	BYTE	255
SUBN_TYP	1 = External DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
EN_DIAG	1 = Read diagnostics with SFC 13	BOOL	0
EN_F	1 = Enable function/function block	BOOL	0
MOD_INF	System structure: Module diagnostics	STRUCT	
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
QRACKF	1 = higher-level error	BOOL	0
RAC_DIAG	System structure: RACK diagnostics	STRUCT	
SUBN1ACT	1 = Slave 1 is active	BOOL	0
SUBN1ERR	1 = Error in the primary DP master system	BOOL	0
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN2ERR	1 = Error in the redundant DP master system	BOOL	0
V1_MODE	1 = DPV1 mode of the DP master system	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = Accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
CPU_OB_5X	OB_5x start information	STRUCT	
RAC_DIAG_I	System structure: RACK diagnostics	STRUCT	
SUB_DIAG	System structure: SUBNET diagnostics	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of OB_DIAG1 (Page 304)

Maintenance status MS (Page 533)

6.51.3 Message texts and associated values of OB_DIAG2

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message No.	Default message text	Message class
1	DP slave @3%d@/ @2%d@: Redundancy loss	PLC Process Control Message - Error
2	DP slave @1%d@/ @2%d@: Failure	PLC Process Control Message - Failure
3	DP slave @1%d@/ @2%d@ : Multiple failure	PLC Process Control Message - Failure
4	DP slave @1%d@/ @2%d@: Multiple alarm (OB 82)	PLC Process Control Message - Failure
5	DP slave @1%d@/ @2%d@: Multiple alarm (OB 55)	PLC Process Control Message - Failure
6	DP slave @1%d@/ @2%d@: Multiple alarm (OB 56)	PLC Process Control Message - Failure

Message No.	Default message text	Message class
7	DP slave @1%d@/ @2%d@: Multiple alarm (OB 57)	PLC Process Control Message - Failure
8	DP slave @1%d@/ @2%d@: Maintenance required	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID:

Associated value	Block parameters
1	DP master system ID (SUBN1_ID)
2	Rack/station number (RACK_NO)
3	Subnet ID of the master in the event of redundancy loss (SUBN2_ID)

See also

Message Classes (Page 531)

6.52 OB_DIAG_NC: OB diagnostic for network devices

6.52.1 Description of OB_DIAG_NC

Object name (type + number)

FB 439

- I/Os of OB_DIAG_NC (Page 306)

Area of application

The OB_DIAG_NC block monitors the failure and recovery for all the PROFINET network components up to 32 network ports.

Calling OBs

The cyclic OB 1 and OB 82, OB 70, OB 72, OB 83, OB 85, OB 86 and OB 100.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block will be placed for all profinet devices of the main family "13" (Network Components)
- The inputs will be connected and parameterized with the information out of hardware (Object Type)

Startup characteristics

Initialization of the ALARM_8P blocks.

6.52.2 I/Os of OB_DIAG_NC

I/Os

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
DADDR	Diagnostic address of slave	INT	0
DELAY	Interrupt delay (s)	INT	2
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = Enable message	BOOL	1
EN_MSG_D	1 = Enable message "Device failure"	BOOL	1
EV_ID	Message number	DWORD	16#0
FEATURE	Reserve	BYTE	0
LADDR	Logical address of slave	INT	16#0
MS	Maintenance state	DWORD	0
PNIO_ADR	Diagnostic address of PN-IO interface	INT	0
PORT1_ADR	Diagnostic address PORT 1	INT	0
PORT1_CONNECT	1 = Port 1 connected	BYTE	0
PORT2_ADR	Diagnostic address PORT 2	INT	0
PORT2_CONNECT	1 = Port 2 connected	BYTE	0
PORT3_ADR	Diagnostic address PORT 3	INT	0
PORT3_CONNECT	1 = Port 3 connected	BYTE	0
PORT4_ADR	Diagnostic address PORT 4	INT	0
PORT4_CONNECT	1 = Port 4 connected	BYTE	0

I/O (parameter)	Meaning	Type	Default
PORT5_ADR	Diagnostic address PORT 5	INT	0
PORT5_CONNECT	1 = Port 5 connected	BYTE	0
PORT6_ADR	Diagnostic address PORT 6	INT	0
PORT6_CONNECT	1 = Port 6 connected	BYTE	0
PORT7_ADR	Diagnostic address PORT 7	INT	0
PORT7_CONNECT	1 = Port 7 connected	BYTE	0
PORT8_ADR	Diagnostic address PORT 8	INT	0
PORT8_CONNECT	1 = Port 8 connected	BYTE	0
PORT9_ADR	Diagnostic address PORT 9	INT	0
PORT9_CONNECT	1 = Port 9 connected	BYTE	0
PORT10_ADR	Diagnostic address PORT 10	INT	0
PORT10_CON-NECT	1 = Port 10 connected	BYTE	0
PORT11_ADR	Diagnostic address PORT 11	INT	0
PORT11_CON-NECT	1 = Port 11 connected	BYTE	0
PORT12_ADR	Diagnostic address PORT 12	INT	0
PORT12_CON-NECT	1 = Port 12 connected	BYTE	0
PORT13_ADR	Diagnostic address PORT 13	INT	0
PORT13_CON-NECT	1 = Port 13 connected	BYTE	0
PORT14_ADR	Diagnostic address PORT 14	INT	0
PORT14_CON-NECT	1 = Port 14 connected	BYTE	0
PORT15_ADR	Diagnostic address PORT 15	INT	0
PORT15_CON-NECT	1 = Port 15 connected	BYTE	0
PORT16_ADR	Diagnostic address PORT 16	INT	0
PORT16_CON-NECT	1 = Port 16 connected	BYTE	0
PORT17_ADR	Diagnostic address PORT 17	INT	0
PORT17_CON-NECT	1 = Port 17 connected	BYTE	0
PORT18_ADR	Diagnostic address PORT 18	INT	0
PORT18_CON-NECT	1 = Port 18 connected	BYTE	0
PORT19_ADR	Diagnostic address PORT 19	INT	0
PORT19_CON-NECT	1 = Port 19 connected	BYTE	0
PORT20_ADR	Diagnostic address PORT 20	INT	0
PORT20_CON-NECT	1 = Port 20 connected	BYTE	0
PORT21_ADR	Diagnostic address PORT 21	INT	0

I/O (parameter)	Meaning	Type	Default
PORT21_CON-NECT	1 = Port 21 connected	BYTE	0
PORT22_ADR	Diagnostic address PORT 22	INT	0
PORT22_CON-NECT	1 = Port 22 connected	BYTE	0
PORT23_ADR	Diagnostic address PORT 23	INT	0
PORT23_CON-NECT	1 = Port 23 connected	BYTE	0
PORT24_ADR	Diagnostic address PORT 24	INT	0
PORT24_CON-NECT	1 = Port 24 connected	BYTE	0
PORT25_ADR	Diagnostic address PORT 25	INT	0
PORT25_CON-NECT	1 = Port 25 connected	BYTE	0
PORT26_ADR	Diagnostic address PORT 26	INT	0
PORT26_CON-NECT	1 = Port 26 connected	BYTE	0
PORT27_ADR	Diagnostic address PORT 27	INT	0
PORT27_CON-NECT	1 = Port 27 connected	BYTE	0
PORT28_ADR	Diagnostic address PORT 28	INT	0
PORT28_CON-NECT	1 = Port 28 connected	BYTE	0
PORT29_ADR	Diagnostic address PORT 29	INT	0
PORT29_CON-NECT	1 = Port 29 connected	BYTE	0
PORT30_ADR	Diagnostic address PORT 30	INT	0
PORT30_CON-NECT	1 = Port 30 connected	BYTE	0
PORT31_ADR	Diagnostic address PORT 31	INT	0
PORT31_CON-NECT	1 = Port 31 connected	BYTE	0
PORT32_ADR	Diagnostic address PORT 32	INT	0
PORT32_CON-NECT	1 = Port 32 connected	BYTE	0
PORT_NUM	Highest port address	INT	0
RACK_NO	Rack number	BYTE	0
SUBN_TYP	1 = External DP interface	BOOL	0
SUBN1_ID	DP master system 1 ID	BYTE	255
SUBN2_ID	ID of redundant subnet	BYTE	255

Out parameters

I/O (parameter)	Meaning	Type	Default
MSG_ACK	Message acknowledged	WORD	0
MSG_STAT	Message failure	WORD	0
O_MS	Maintenance state	DWORD	0
EN_RST_DIAG	Reset enable	BOOL	0
PORT_EXIST	Port exists	DWORD	0
PORT_ACTIVE	Port active	DWORD	0
PORT_NOK	Port not OK	DWORD	0
PORT_NOKG	Port not OK gone	DWORD	0
MSG_ERR	1 = Message error	BOOL	0
QRACKF	1 = higher level error	BOOL	0
RAC_DIAG	System structure: RACK diagnostic	STRUCT	
SUBN1ACT	1 = Slave 1 active	BOOL	0
SUBN1ERR	1 = Slave 1 failure	BOOL	0
V1_MODE	Not used	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Type	Default
DIAG_RST	Reset of diagnostic values	BOOL	0
ACC_ID	Accept new ID settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostic	STRUCT	
CPU_OB_5X	OB_5x start information	STRUCT	
RAC_DIAG_I	System structure: RACK diagnostic	STRUCT	
SUB_DIAG	OB start information	STRUCT	

You can find additional information in the section: Message Classes (Page 531).

6.52.3 Message texts and associated values of OB_DIAG_NC

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message No.	Default message text	Message class
1	Device @3%d@/@2%d@: Maintenance alarm	PLC Process Control Message - Failure
2	Device @3%d@/@2%d@: Maintenance demanded	PLC Process Control Message - Error

Message No.	Default message text	Message class
3	Device @3%d@/@2%d@: Maintenance required	Preventative Maintenance - Standard
4		No message
5		No message
6		No message
7		No message
8		No message

Associated values of ALARM_8P with EV_ID:

Associated value	Block parameters	Data type
1	not used	
2	Rack/station number (RACK_NO)	BYTE
3	PN-IO system number	BYTE

You can find additional information in the section: Message Classes (Page 531).

6.53 OB_DIAGF: Monitoring of the FF link and coupler

6.53.1 Description of OB_DIAGF

Object name (type + number)

FB 146

- I/Os of OB_DIAGF (Page 312)

Area of application

The OB_DIAGF block monitors the FF link and coupler for

- Failure and return of FF link and coupler
- Redundancy loss
- diagnostic interrupts

and reports these events.

The OB_DIAGF block runs acyclically and is enabled to run by the higher-level SUBNET block.

Calling OBs

The block must be installed in the run sequence downstream from the SUBNET block in the following OBs (this is done automatically in the CFC):

OB no.	Start Event
1	Cyclic processing
72	CPU redundancy loss
70	Redundancy loss
82	Diagnostic interrupt
83	Removal/insertion
85	Program execution error
86	Module driver failure
100	Restart

Use in CFC

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OB_DIAGF block is installed downstream from the SUBNET block.
- The DADDR, SUBN1_ID, SUBN2_ID, RACK_NO, COUP_RED, and SLOT_NO inputs are assigned parameters.
- The EN input is interconnected with the output of an AND block. The block inputs will be interconnected with output EN_SUBx (x = DP master system ID) of the OB_BEGIN block and with output EN_Rxxx (xxx = rack/station number) of the SUBNET block.
- The CPU_DIAG OUT structure of the OB_BEGIN block and SUB_DIAG of the SUBNET block are interconnected with the IN_OUT structures of the same name of block OB_DIAGF.

Message response

The DELAY input is used to delay the outputting of error messages for an outgoing, higher-priority error. For example, if the OB_DIAGF block recognizes an outgoing error at a DP master connected with it, it initially assumes that there is a faulty assigned DP slave in the rack it monitors, and sets the corresponding output SUBNxERR. The error status is not reset until the DP slave returns (in this case: OB 86, OB 70). The OB_DIAGF blocks suppress the potential slave failure for DELAY seconds so as not to trigger a surge of messages from DP slaves which are not yet synchronized when the master returns. An error message is only output to the OS when the DP slave has not reported its return before this delay time has expired.

Note: Do not set the value of DELAY too high, since messages reporting faulty DP slaves or their removal during a master failure will be output too late to the OS after the DP master returns.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

6.53.2 I/Os of OB_DIAGF

I/Os of OB_DIAGF

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
COUP_RED	0 = No redundant structure 1 = Coupler redundancy 2 = Ring redundancy	BYTE	16#FF
DADDR	Diagnostic address of the FF link	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
DELAY	Interrupt delay (s)	INT	15
EN_MSG	1 = enable message	BOOL	1
EV_ID1	Message number	DWORD	0
EV_ID2	Message number	DWORD	0
MS	Maintenance status	DWORD	0
RACK_NO	Number of the rack	BYTE	16#FF
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	16#FF
SUBN2_ID	ID of the redundant DP master system	BYTE	16#FF

Output parameters

I/O (parameter)	Meaning	Data type	Default
DINFO	Diagnostic information	STRUCT	
EN_F	1 = Enable function/function block	BOOL	0
FF_DIAG	Diagnostics of the FF device	STRUCT	
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error	WORD	0
O_MS	Maintenance status	DWORD	0

I/O (parameter)	Meaning	Data type	Default
QRACKF	1 = higher-level error	BOOL	0
RAC_DIAG	RACK diagnostics	STRUCT	
RETURN_CODE_O	Return value	INT	0
SUBN1ACT	1 = Slave 1 is active	BOOL	0
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN1ERR	1 = Error in the primary DP master system	BOOL	0
SUBN2ERR	1 = Error in the redundant DP master system	BOOL	0
V1_MODE	1 = DPV1 mode of the DP master system active	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
SUB_DIAG	System structure: SUBNET diagnostics	STRUCT	

6.53.3 Message texts and associated values of OB_DIAGF

Message texts and associated values of OB_DIAGF

Assignment of message text and message class (Page 531)

Message block ALARM_8P	Message No.	Default message text	Message class
EV_ID1	1	FF Link @4%d@/@2%d@: Loss of redundancy	PLC Process Control Message - Error
	2	FF link @1%d@/@2%d@: Failure	PLC Process Control Message - Failure
	3	FF link @1%d@/@2%d@: Multiple failure	PLC Process Control Message - Failure
	4	FF link @1%d@/@2%d@: Multiple alarm (OB 82)	PLC Process Control Message - Failure
	5	Coupler @1%d@/@2%d@/2: Loss of redundancy	PLC Process Control Message - Error
	6	Coupler @1%d@/@2%d@/3: Loss of redundancy	PLC Process Control Message - Error
	7	FF-Link @1%d@/@2%d@/1:DIP switch has a different DP address setting than at "power on" of the IM/Redundant configuration, neighboring IM has a different DP address.	PLC Process Control Message - Failure

Message block ALARM_8P	Message No.	Default message text	Message class
	8	FF link @1%d@/@2%d@/1: SDB_UUID does not match saved UUID	PLC Process Control Message - Failure
EV_ID2	1	Coupler @1%d@/@2%d@/2: Failure	PLC Process Control Message - Failure
	2	Coupler @1%d@/@2%d@/2: Conflict with configuration:Coupler configuration does not match determined configuration	PLC Process Control Message - Error
	3	Coupler @1%d@/@2%d@/2: External connection, short circuit or wire break detected	PLC Process Control Message - Error
	4	Coupler @1%d@/@2%d@/2: Loss of redundancy in case of ring redundancy	PLC Process Control Message - Error
	5	Coupler @1%d@/@2%d@/3: Failure	PLC Process Control Message - Failure
	6	Coupler @1%d@/@2%d@/3: Conflict with configuration: Coupler configuration does not match determined configuration	PLC Process Control Message - Error
	7	Coupler @1%d@/@2%d@/3: External connection, short circuit or wire break detected	PLC Process Control Message - Error
	8	Coupler @1%d@/@2%d@/3: Loss of redundancy in case of ring redundancy	PLC Process Control Message - Error

Assignment of Associated Values

Associated values of ALARM_8P with EV_ID1:

Associated value	Block parameters
1	DP master system ID (SUBN_ID)
2	Rack/station number (RACK_NO)
3	ID of the redundant DP master system (SUBN2_ID)
4	ID of the redundant DP master system (SUBN2_ID)

Associated values of ALARM_8P with EV_ID2:

Associated value	Block parameters
1	DP master system ID (SUBN_ID)
2	Rack/station number (RACK_NO)

6.54 OB_DIAGF2: Monitoring device-specific diagnostics for Foundation Fieldbus Compact Link IM 655-2 FF

6.54.1 Description of OB_DIAGF2

Object name (type + number)

FB 418

- I/Os of OB_DIAGF2 (Page 316)

Area of application

The OB_DIAGF2 block reports diagnostics events of a Foundation Fieldbus Compact Link IM 655-2 FF and monitors the following events:

- Failure and return of FF link and coupler
- Redundancy loss
- diagnostic interrupts

and reports these events.

Calling OBs

OB 1	Cyclic processing
OB72	CPU redundancy loss
OB 70	Redundancy loss
OB 82	Diagnostic interrupt
OB 83	Removal/insertion
OB 85	Program execution error
OB 86	Module driver failure
OB 100	Restart

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

6.54.2 I/Os of OB_DIAGF2

I/Os of OB_DIAGF2

The factory setting of the block display in the CFC is identified in the "I/O" column.

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
COUP_RED	0 = No redundant structure 1 = Coupler redundancy 2 = Ring redundancy	BYTE	16#FF
DADDR	Diagnostic address of the FF link	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
DELAY	Interrupt delay (s)	INT	15
EN_MSG	1 = enable message	BOOL	1
EV_ID1	Message number	DWORD	0
EV_ID2	Message number	DWORD	0
MS	Maintenance status	DWORD	0
RACK_NO	Number of the rack	BYTE	16#FF
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	16#FF
SUBN2_ID	ID of the redundant DP master system	BYTE	16#FF

Output parameters

I/O (parameter)	Meaning	Data type	Default
DINFO	Diagnostic information	STRUCT	
EN_F	1 = Enable function/function block	BOOL	0
FF_DIAG	Diagnostics of the FF device	STRUCT	
MSG_ACK	Message acknowledgment	WORD	0
MSG_STAT	Message error	WORD	0
O_MS	Maintenance status	DWORD	0
QRACKF	1 = higher-level error	BOOL	0
RAC_DIAG	RACK diagnostics	STRUCT	
RETURN_CODE_O	Return value	INT	0
SUBN1ACT	1 = Slave 1 is active	BOOL	0

I/O (parameter)	Meaning	Data type	Default
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN1ERR	1 = Error in the primary DP master system	BOOL	0
SUBN2ERR	1 = Error in the redundant DP master system	BOOL	0
V1_MODE	1 = DPV1 mode of the DP master system active	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
SUB_DIAG	System structure: SUBNET diagnostics	STRUCT	

6.54.3 Message texts and associated values of OB_DIAGF2

Message texts and associated values of OB_DIAGF2

Assignment of message text and message class (Page 531)

Message block ALARM_8P	Message No.	Default message text	Message class
EV_ID1	1	FF Link @1%d@/@2%d@:Maintenance alarm	PLC Process Control Message - Failure
	2	FF Link @1%d@/@2%d@:Maintenance demanded	PLC Process Control Message - Error
	3	FF Link @1%d@/@2%d@:Maintenance required	Preventative Maintenance - Standard
	4		No message
	5		No message
	6		No message
	7		No message
	8		No message

Assignment of Associated Values

Associated value	Block parameters
1	DP master system ID (SUBN1_ID)
2	Rack/station number (RACK_NO)

6.55 OB_END: Reset stack pointer of OB_BEGIN

6.55.1 Description of OB_END

Object name (type + number)

FC 280

- OB_END block I/Os (Page 319)

Area of application

The OB_END block is used to reset the stack pointer of OB_BEGIN and OB_BEGIN_PN.

Calling OBs

The OB_END block is the final entry in the OB that contains an OB_BEGIN and/or an OB_BEGIN_PN block.

OB 1	Cyclic processing
OB 55	Status interrupt (only as required)
OB 56	Update interrupt (only as required)
OB 57	Manufacturer-specific alarms (only as required)
OB 70	I/O redundancy error
OB 72	CPU redundancy error
OB 80	Timeout error
OB 81	Power supply error
OB 82	Diagnostic interrupt
OB 83	Remove/insert interrupt
OB 84	CPU hardware error (only for CPU with this function)
OB 85	Program execution error
OB 86	Rack failure
OB 88	Stop avoidance
OB 100	Restart
OB 121	Programming error
OB 122	I/O access error

Use in CFC

When the CFC function "**Generate module drivers**" is used, OB_END is automatically installed in the above OBs of the run sequence.

Function

The OB_END block decrements the stack pointer (NUM_CNT) of OB_BEGIN and OB_BEGIN_PN. In the event of an interruption, it enters the last interrupted OB number read from the CPU stack into the CPU_DIAG and CPU_DIAG_PN structure.

Error handling

Not available

Startup characteristics

Not available

Initial startup behavior

Not available

Time response

Not available

Message response

Not available

Operator control and monitoring

The block has no faceplate.

6.55.2 I/Os of OB_END

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

In-out parameters

I/O (parameter)	Meaning	Data type
CPU_DIAG	System structure: CPU diagnostics	STRUCT
CPU_DIAG_PN	System structure: CPU diagnostics (PN)	STRUCT

6.56 OB5X2OB5: OB5X PN information in STRUCT OB55, OB56, OB57

6.56.1 Description of OB5X2OB5

The function provides the information to be used on the output structure OB55_PN...OB57_PN.

The function is inserted in sequence before the IM_TS_PN block.

Object name (type + number)

FC 265

- I/Os of OB5X2OB5 (Page 320)

Area of application

This block is a system block and is used exclusively internally. For this reason, a Help is not available.

6.56.2 I/Os of OB5X2OB5

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure: CPU diagnosis	STRUCT	
CPU_OB_5X_PN	System structure: CPU diagnosis	STRUCT	

Output parameters

I/O (parameter)	Meaning	Data type	Default
OB_55_PN	System structure: CPU diagnosis	STRUCT	
OB_56_PN	System structure: CPU diagnosis	STRUCT	
OB_57_PN	System structure: CPU diagnosis	STRUCT	

6.57 OR_16_PN: QUALITY of 2 redundant Module (<= 16 Channels)

6.57.1 Description of OR_16_PN

Object name (type + number)

FB 428

- I/Os of OR_16_PN (Page 322)

Area of application

The OR_16_PN block generates a channel-granular value status from two redundant signal modules.

Calling OBs

OB 1	Cyclic program
OB 100	Warm restart

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OR_16_PN block is installed upstream in the OBs of the channel blocks that are interconnected with it.
- MODE1_x inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_x inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.
- The MOD_INF1 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the primary module.
- The MOD_INF2 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the redundant module.
- The ACTIV_H and ACTIV_L inputs are interconnected with the outputs of the same name of the RED block in the redundant module.
- The OMODE_xx outputs are interconnected with the relevant channel blocks.
- The OUT structure CPU_DIAG of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of the OR_16_PN block.
- The RACKF1 and RACKF2 inputs are interconnected with the QRACKF1 and QRACKF2 outputs of MOD_xx.
- The CH_INF_H and CH_INF_L inputs are interconnected with the outputs of the same name of the RED block.

- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Startup characteristics

The OMODE_xx outputs are updated when the "Startup" bit is set.

Error handling

The plausibility of input parameters is not checked.

Redundancy

Redundancy of the modules in an H system is monitored in the higher-level RED block.

6.57.2 I/Os of OR_16_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_L	1=Low module active	BOOL	0
ACTIV_H	1=High module active	BOOL	0
RACKF1	1=Rack 1 failure	BOOL	0
RACKF2	1=Rack 2 failure	BOOL	0
CH_INF_L	Low address: 1 = Channel x active	DWORD	0
CH_INF_H	High address: 1 = Channel x active	DWORD	0
RED_STAT	Return value of RED_STATUS	INT	0
MOD_STAT	Reserve	WORD	0
MOD_STAT_PN	MODUL_STATUS of PN RED_STATUS	DWORD	0
CHAN_NUM	Total number of channels -1	INT	7
MODE1_xx	Module 1 mode channel xx (xx = 00 - 15)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 15)	DWORD	0
MS	Maintenance State	DWORD	0
RED_LIB_PCS7	Reserve	BOOL	0
FEATURE	Reserve	DWORD	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG		STRUCT	
MOD_INF1	Module 1 information structure	STRUCT	
MOD_INF2	Module 2 information structure	STRUCT	
DXCHG1_xx	Bidirectional data exchange channel xx (xx = 00 - 15)	DWORD	0
DXCHG11_xx	Bidirectional data exchange channel xx (xx = 00 - 15)	DWORD	0
DXCHG2_xx	Bidirectional data exchange channel xx (xx = 00 - 15)	DWORD	0
DXCHG21_xx	Bidirectional data exchange channel xx (xx = 00 - 15)	DWORD	0
MS_XCHG1_xx	MS exchange channel xx (xx = 00 - 15)	DWORD	0
MS_XCHG2_xx	MS exchange channel xx (xx = 00 - 15)	DWORD	0
DEPASS_RED_PCS7	1=Depassivation	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QMODF1	1=Module 1 pulled / out of order	BOOL	0
QMODF2	1=Module 2 pulled / out of order	BOOL	0
QDISCREP	1=Module discrepancy	BOOL	0
CH_ALM	Channel – Failure of redundancy pair	DWORD	0
CH_WRN	Channel – Redundancy loss	DWORD	0
O_MS	Maintenance State	DWORD	0
CH_EXIST	Channel exist	DWORD	0
CH_ACTIVE	Channel active	DWORD	0
CH_OK	Channel OK	DWORD	0
EXT_STAT	Maintenance release – Extended status	DWORD	0
EXT_STAT_A	Extended status – application	DWORD	0
OMODE_xx	Mode channel xx (xx = 00 - 15)	DWORD	0
DXCHG_xx	Bidirectional data exchange channel xx (xx = 00 - 15)	DWORD	0
DXCHG_1_xx	Bidirectional data exchange channel xx (xx = 00 - 15)	DWORD	0
MS_XCHG_xx	MS exchange channel xx (xx = 00 - 15)	DWORD	0
RETURN_VAL	Return value of FC451	INT	0
EXT_INFO	Extension information of FC451	INT	0

6.58 OR_32_PN: QUALITY of 2 redundant Module (<= 32 Channels)

6.58.1 Description of OR_32_PN

Object name (type + number)

FB 429

- I/Os of OR_32_PN (Page 325)

Area of application

The OR_32_PN block generates a channel-granular value status from two redundant signal modules.

Calling OBs

OB 1	Cyclic program
OB 100	Warm restart

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OR_32_PN block is installed upstream in the OBs of the channel blocks that are interconnected with it.
- MODE1_x inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_x inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.
- The MOD_INF1 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the primary module.
- The MOD_INF2 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the redundant module.
- The ACTIV_H and ACTIV_L inputs are interconnected with the outputs of the same name of the RED block in the redundant module.
- The OMODE_xx outputs are interconnected with the relevant channel blocks.
- The OUT structure CPU_DIAG of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of the OR_32_PN block.
- The RACKF1 and RACKF2 inputs are interconnected with the QRACKF1 and QRACKF2 outputs of MOD_xx.
- The CH_INF_H and CH_INF_L inputs are interconnected with the outputs of the same name of the RED block.

- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Startup characteristics

The OMODE_xx outputs are updated when the "Startup" bit is set.

Error handling

The plausibility of input parameters is not checked.

Redundancy

The Redundancy of the modules in an Redundant-System is monitored in the higher-level RED block.

6.58.2 I/Os of OR_32_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_L	1=Low module active	BOOL	0
ACTIV_H	1=High module active	BOOL	0
RACKF1	1=Rack 1 failure	BOOL	0
RACKF2	1=Rack 2 failure	BOOL	0
CH_INF_L	Low address: 1 = Channel x active	DWORD	0
CH_INF_H	High address: 1 = Channel x active	DWORD	0
RED_STAT	Return value of RED_STATUS	INT	0
MOD_STAT	Reserve	WORD	0
MOD_STAT_PN	MODUL_STATUS of PN RED_STATUS	DWORD	0
CHAN_NUM	Total number of channels -1	INT	7
MODE1_xx	Module 1 mode channel xx (xx = 00 - 31)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 31)	DWORD	0
MS	Maintenance State	DWORD	0

I/O (parameter)	Meaning	Data type	Default
RED_LIB_PCS7	Reserve	BOOL	0
FEATURE	Reserve	DWORD	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG		STRUCT	
MOD_INF1	Module 1 information structure	STRUCT	
MOD_INF2	Module 2 information structure	STRUCT	
DXCHG1_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
DXCHG11_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
DXCHG2_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
DXCHG21_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
MS_XCHG1_xx	MS exchange channel xx (xx = 00 - 31)	DWORD	0
MS_XCHG2_xx	MS exchange channel xx (xx = 00 - 31)	DWORD	0
DEPASS_RED_PCS7	1=Depassivation	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QMODF1	1=Module 1 pulled / out of order	BOOL	0
QMODF2	1=Module 2 pulled / out of order	BOOL	0
QDISCREP	1=Module discrepancy	BOOL	0
CH_ALM	Channel – Failure of redundancy pair	DWORD	0
CH_WRN	Channel – Redundancy loss	DWORD	0
O_MS	Maintenance State	DWORD	0
CH_EXIST	Channel exist	DWORD	0
CH_ACTIVE	Channel active	DWORD	0
CH_OK	Channel OK	DWORD	0
EXT_STAT	Maintenance release – Extended status	DWORD	0
EXT_STAT_A	Extended status – application	DWORD	0
OMODE_xx	Mode channel xx (xx = 00 - 31)	DWORD	0
DXCHG_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
DXCHG_1_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0

I/O (parameter)	Meaning	Data type	Default
MS_XCHG_xx	MS exchange channel xx (xx = 00 - 31)	DWORD	0
RETURN_VAL	Return value of FC451	INT	0
EXT_INFO	Extension information of FC451	INT	0

6.59 OR_32_TS: OR value status of two redundant time-stamped signal modules, max. 32 channels

6.59.1 Description of OR_32_TS

Object name (type + number)

FB 138

- OR_32_TS block I/Os (Page 328)

Area of application

The OR_32_TS block forms the resulting time stamp from two redundant time-stamped signal modules.

Calling OBs

The block must be installed in OB 1.

Use in CFC

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OR_32_TS block is installed in OB 1.
- The `TS1_xx` inputs are interconnected with the `TS_xx` output of IMDRV_TS that is responsible for the signal module with the lower address.
- The `TS2_xx` inputs are interconnected with the `TS_xx` output of IMDRV_TS that is responsible for the signal module with the higher address.
- The `TS_xx` outputs are interconnected with the inputs of the MSG_TS channel blocks or Pcs7InIT.

Function and method of operation

The OR_32_TS block forwards the time stamps of the channels of two redundant signal modules to the MSG_TS channel blocks or Pcs7InIT and acts like an OR function.

- If both channels are active, the time stamp of the signal module with the lower address is always used.
- If one channel is passivated, the time stamp of the redundant channel is forwarded.
- If both channels are passivated, the time stamp of the signal module with the lower address is entered.

Redundancy

Redundancy of the modules in an H system is monitored in the higher-level RED_STATUS block.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

Not available

Message response

Not available

Operator control and monitoring

Not available

Additional information

You will find more information in Description of IMDRV_TS (Page 94)

6.59.2 I/Os of OR_32_TS

The factory setting of the block display in CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Type	Default
CH_INF_H	Status of the channels of the 2nd module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
CH_INF_L	Status of the channels of the 1st module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
RED	1 = with redundant time stamp	BOOL	0
RED_STAT	Return value from RED_STATUS	INT	0
TS1_xx	Time stamp (xx = 00 - 31) from the module with the lower address Byte 0: Bit 0: Message signal state (MsgSig) Bit 1: Edge change information (TriInf) Bit 2: Handshake (HdSh) Byte 1: Quality code of the time stamp (ST) DWORD TS0: Date/time stamp in ISP format (seconds) DWORD TS1: Date/time stamp in ISP format (fractions of seconds)	STRUCT	
TS2_xx	Time stamp (xx = 00 - 31) from the module with the higher address Byte 0: Bit 0: Message signal state (MsgSig) Bit 1: Edge change information (TriInf) Bit 2: Handshake (HdSh) Byte 1: Quality code of the time stamp (ST) DWORD TS0: Date/time stamp in ISP format (seconds) DWORD TS1: Date/time stamp in ISP format (fractions of seconds)	STRUCT	
TS1_C_xx	TS communication (xx = 00 - 31) from the module with the lower address Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0
TS2_C_xx	TS communication (xx = 00 - 31) from the module with the higher address Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0

Output parameters

I/O (parameter)	Meaning	Type	Default
CH_ALM	Channel failure Redundant pair	DWORD	0
CH_WRN	Channel redundancy loss	DWORD	0
QERR	1 = program error (module status not available)	BOOL	1
TS_xx	Time stamp (xx = 00 - 31) Byte 0: Bit 0: Message signal state (MsgSig) Bit 1: Edge change information (TriInf) Bit 2: Handshake (HdSh) Byte 1: Quality code of the time stamp (ST) DWORD TS0: Date/time stamp in ISP format (seconds) DWORD TS1: Date/time stamp in ISP format (fractions of seconds)	STRUCT	
TS_C_xx	TS communication (xx = 00 - 31) Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0

Additional information

For additional information, refer to the following sections:

- Maintenance status MS (Page 533)

6.60 OR_32TPN: Time stamps of 2 redundant module (1..32 Channels)

6.60.1 Description of OR_32TPN

Object name (type + number)

FB 431

- I/Os of OR_32TPN (Page 331)

Area of application

The OR_32TPN block forms the resulting time stamp from two redundant time-stamped signal modules.

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OR_32TPN block is installed in OB 1.
- The TS1_xx inputs are interconnected with the TS_xx output of IM_TS_PN that is responsible for the signal module with the lower address.
- The TS2_xx inputs are interconnected with the TS_xx output of IM_TS_PN that is responsible for the signal module with the higher address.
- The TS_xx outputs are interconnected with the inputs of the Pcs7DiIT.

Error handling

The plausibility of input parameters is not checked.

Block functions

The OR_32TPN block forwards the time stamps of the channels of two redundant signal modules to the Pcs7DiIT and acts like an OR function.

- If both channels are active, the time stamp of the signal module with the lower address is always used.
- If one channel is passivated, the time stamp of the redundant channel is forwarded.
- If both channels are passivated, the time stamp of the signal module with the lower address is entered.

Redundancy

Redundancy of the modules in an H system is monitored in the higher-level RED_x block.

6.60.2 I/Os of OR_32TPN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
EN	Enable the block	BOOL	1
CH_INF_Mas	Status of the channels of the master module; information channel by channel 0 = passivated, 1 = operational	DWORD	0
CH_INF_Slv	Status of the channels of the slave module; information channel by channel 0 = passivated, 1 = operational	DWORD	0
RED	1 = with redundant time stamp	BOOL	0
RED_STAT	Return value from RED_STATUS	INT	0
TS1_xx	Time stamp (xx = 00 - 31) from the module with the lower address Byte 0: Bit 0: Message signal state (MsgSig) Bit 1: Edge change information (TriInf) Bit 2: Handshake (HdSh) Byte 1: Quality code of the time stamp (ST) DWORD TS0: Date/time stamp in ISP format (seconds) DWORD TS1: Date/time stamp in ISP format (fractions of seconds)	STRUCT	
TS2_xx	Time stamp (xx = 00 - 31) from the module with the higher address Byte 0: Bit 0: Message signal state (MsgSig) Bit 1: Edge change information (TriInf) Bit 2: Handshake (HdSh) Byte 1: Quality code of the time stamp (ST) DWORD TS0: Date/time stamp in ISP format (seconds) DWORD TS1: Date/time stamp in ISP format (fractions of seconds)	STRUCT	
TS1_C_xx	TS communication (xx = 00 - 31) from the module with the lower address Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0
TS2_C_xx	TS communication (xx = 00 - 31) from the module with the higher address Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ALM	Channel failure Redundant pair	DWORD	0
CH_WRN	Channel redundancy loss	DWORD	0
QERR	1 = program error (module status not available)	BOOL	1
TS_xx	Time stamp (xx = 00 - 31) Byte 0: Bit 0: Message signal state (MsgSig) Bit 1: Edge change information (TriInf) Bit 2: Handshake (HdSh) Byte 1: Quality code of the time stamp (ST) DWORD TS0: Date/time stamp in ISP format (seconds) DWORD TS1: Date/time stamp in ISP format (fractions of seconds)	STRUCT	
TS_C_xx	TS communication (xx = 00 - 31) Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
TS1_C_xx	TS communication (xx = 00 - 31) Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0
TS2_C_xx	TS communication (xx = 00 - 31) Bit 0: Acknowledgment of transfer (HS) Bit 1: Interconnection check (LI)	BYTE	0

6.61 OR_8_PN: Quality of 2 redundant modules (<=8 Channels)

6.61.1 Description of OR_8_PN

Object name (type + number)

FB 430

- I/Os of OR_8_PN (Page 335)

Area of application

The OR_8_PN block generates a channel-granular value status from two redundant signal modules.

Calling OBs

OB 1	Cyclic program
OB 100	Warm restart

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OR_PN block is installed upstream in the OBs of the channel blocks that are interconnected with it.
- MODE1_x inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_x inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.
- The MOD_INF1 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the primary module.
- The MOD_INF2 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the redundant module.
- The ACTIV_H and ACTIV_L inputs are interconnected with the outputs of the same name of the RED block in the redundant module.
- The OMODE_xx outputs are interconnected with the relevant channel blocks.
- The OUT structure CPU_DIAG of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of the OR_8_PN block.
- The RACKF1 and RACKF2 inputs are interconnected with the QRACKF1 and QRACKF2 outputs of MOD_xx.
- The CH_INF_H and CH_INF_L inputs are interconnected with the outputs of the same name of the RED block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Startup characteristics

The OMODE_xx outputs are updated when the "Startup" bit is set.

Error handling

The plausibility of input parameters is not checked.

Redundancy

Redundancy of the modules in an H system is monitored in the higher-level RED block.

6.61.2 I/Os of OR_8_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_L	1=Low module active	BOOL	0
ACTIV_H	1=High module active	BOOL	0
RACKF1	1=Rack 1 failure	BOOL	0
RACKF2	1=Rack 2 failure	BOOL	0
CH_INF_L	Low address: 1 = Channel x active	DWORD	0
CH_INF_H	High address: 1 = Channel x active	DWORD	0
RED_STAT	Return value of RED_STATUS	INT	0
MOD_STAT	Reserve	WORD	0
MOD_STAT_PN	MODUL_STATUS of PN RED_STATUS	DWORD	0
CHAN_NUM	Total number of channels -1	INT	7
MODE1_xx	Module 1 mode channel xx (xx = 00 - 07)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 07)	DWORD	0
MS	Maintenance State	DWORD	0
RED_LIB_PCS7	Reserve	BOOL	0
FEATURE	Reserve	DWORD	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG		STRUCT	
MOD_INF1	Module 1 information structure	STRUCT	
MOD_INF2	Module 2 information structure	STRUCT	
DXCHG1_xx	Bidirectional data exchange channel xx (xx = 00 - 07)	DWORD	0

I/O (parameter)	Meaning	Data type	Default
DXCHG11_xx	Bidirectional data exchange channel xx (xx = 00 - 07)	DWORD	0
DXCHG2_xx	Bidirectional data exchange channel xx (xx = 00 - 07)	DWORD	0
DXCHG21_xx	Bidirectional data exchange channel xx (xx = 00 - 07)	DWORD	0
MS_XCHG1_xx	MS exchange channel xx (xx = 00 - 07)	DWORD	0
MS_XCHG2_xx	MS exchange channel xx (xx = 00 - 07)	DWORD	0
DEPASS_RED_PCS7	1=Depassivation	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QMODF1	1=Module 1 pulled / out of order	BOOL	0
QMODF2	1=Module 2 pulled / out of order	BOOL	0
QDISCREP	1=Module discrepancy	BOOL	0
CH_ALM	Channel – Failure of redundancy pair	DWORD	0
CH_WRN	Channel – Redundancy loss	DWORD	0
O_MS	Maintenance State	DWORD	0
CH_EXIST	Channel exist	DWORD	0
CH_ACTIVE	Channel active	DWORD	0
CH_OK	Channel OK	DWORD	0
EXT_STAT	Maintenance release – Extended status	DWORD	0
EXT_STAT_A	Extended status – application	DWORD	0
OMODE_xx	Mode channel xx (xx = 00 - 07)	DWORD	0
DXCHG_xx	Bidirectional data exchange channel xx (xx = 00 - 07)	DWORD	0
DXCHG_1_xx	Bidirectional data exchange channel xx (xx = 00 - 07)	DWORD	0
MS_XCHG_xx	MS exchange channel xx (xx = 00 - 07)	DWORD	0
RETURN_VAL	Return value of FC451	INT	0
EXT_INFO	Extension information of FC451	INT	0

6.62 OR_H16PN: QUALITY of 2 redundant multi function Modules (<= 16 HART Channels)

6.62.1 Description of OR_H16PN

Object name (type + number)

FB 423

- I/Os of OR_H16PN (Page 338)

Area of application

The OR_H16PN block represents the value status from two redundant multi-function signal modules up to 32 IO channels including 16 HART channels. The OR_H16PN block determines the loss of redundancy.

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OR_HA16PN block is installed before its interconnected MOD_HA_PN driver block in its OB.
- MODE1_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.
- The MOD_INF1 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the primary module.
- The MOD_INF2 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the redundant module.
- The ACTIV_H and ACTIV_L inputs are interconnected with the outputs of the same name of the RED block in the redundant module.
- The OMODE_xx outputs are interconnected with the downstream MOD_HA_PN.
- The OUT structure CPU_DIAG_PN of the OB_BEGIN_PN block is interconnected with the IN_OUT structures of the same name of the OR_H16PN block.
- The inputs RACKF1 and RACKF2 are interconnected with the outputs QRACKF1 and QRACKF2 of MOD_x.
- The CH_INF_H and CH_INF_L inputs are interconnected with the outputs of the same name of the RED block.

- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Redundancy

Redundancy of the modules is monitored in a higher-level RED block.

Startup characteristics

The OMODE_xx outputs are updated when the "Startup" bit is set.

Error handling

The plausibility of input parameters is not checked.

Block functions

The value status of a signal module and of a redundant signal module are disjuncted by the OR_H16PN block. Signal modules or signal channels set to passive mode by the system are regarded as invalid.

When module signals are processed in different OB 3x, in very few cases, a faulty signal value may be processed in one cycle by one of the channel blocks configured to process the module signals following a process-control malfunction affecting the module. This can be avoided by processing all channel blocks of a module inthe OB 3x that also processes the process image partition to which this module is assigned

6.62.2 I/Os of OR_H16PN

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_L	1=Low module active	BOOL	0
ACTIV_H	1=High module active	BOOL	0
RACKF1	1=Rack 1 failure	BOOL	0
RACKF2	1=Rack 2 failure	BOOL	0
CH_INF_L	Low address: 1 = Channel x active	DWORD	0

I/O (parameter)	Meaning	Data type	Default
CH_INF_H	High address: 1 = Channel x active	DWORD	0
CH_INF_L_AUX	Low address: 1 = Aux value x active	DWORD	0
CH_INF_H_AUX	High address: 1 = Aux value x active	DWORD	0
RED_STAT	Return value of RED_STATUS	INT	0
MOD_STAT	MODUL_STATUS_WORD of RED_STATUS	WORD	0
MOD_STAT_PN	MODUL_STATUS of PN RED_STATUS	DWORD	0
CHAN_NUM	Total number of channels -1	INT	7
MODE1_xx	Module 1 mode channel xx (xx = 00 - 31)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 31)	DWORD	0
MS	Maintenance State	DWORD	0
RED_LIB_PCS7	Reserve	BOOL	0
FEATURE	Reserve	DWORD	0
SUBN1_ID	PN-IO System 1 ID (100 – 115)	BYTE	255
SUBN2_ID	PN-IO System 2 ID (100 – 115)	BYTE	255

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG		STRUCT	
MOD_INF1	Module 1 information structure	STRUCT	
MOD_INF2	Module 2 information structure	STRUCT	
DXCHG1_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
DXCHG11_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
DXCHG2_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
DXCHG21_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
MS_XCHG1_xx	MS exchange channel xx (xx = 00 - 31)	DWORD	0
MS_XCHG2_xx	MS exchange channel xx (xx = 00 - 31)	DWORD	0
DEPASS_RED_PCS7	1=Depassivation	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QMODF1	1=Module 1 pulled / out of order	BOOL	0
QMODF2	1=Module 2 pulled / out of order	BOOL	0
QDISCREP	1=Module discrepancy	BOOL	0
CH_ALM	Channel – Failure of redundancy pair	DWORD	0

I/O (parameter)	Meaning	Data type	Default
CH_WRN	Channel – Redundancy loss	DWORD	0
O_MS	Maintenance State	DWORD	0
CH_EXIST	Channel exist	DWORD	0
CH_ACTIVE	Channel active	DWORD	0
CH_OK	Channel OK	DWORD	0
EXT_STAT	Maintenance release – Extended status	DWORD	0
EXT_STAT_A	Extended status – application	DWORD	0
OMODE_xx	Mode channel xx (xx = 00 - 31)	DWORD	0
DXCHG_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
DXCHG_1_xx	Bidirectional data exchange channel xx (xx = 00 - 31)	DWORD	0
MS_XCHG_xx	MS exchange channel xx (xx = 00 - 31)	DWORD	0
RETURN_VAL	Return value of FC451	INT	0
EXT_INFO	Extension information of FC451	INT	0

6.63 OR_HA16C: OR value status of 2 redundant HART modules, max. 16 channels

6.63.1 Description of OR_HA16C

Object name (type + number)

FB 133

- OR_HA16C block I/Os (Page 343)

Area of application

The OR_HA16C block is used to create a value status from two redundant signal modules, and reports loss of redundancy for HART modules.

Calling OBs

The block must be installed in OB 100 and in the OB before the MOD_HA driver block that is responsible for the relevant module.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The OR_HA16C block is installed before its interconnected MOD_HA driver block in its OB.
- MODE1_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.
- The MOD_INF1 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the primary module.
- The MOD_INF2 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the redundant module.
- The ACTIV_H and ACTIV_L inputs are interconnected with the outputs of the same name of the RED_STATUS block in the redundant module.
- The OMODE_xx outputs are interconnected with the downstream MOD_HA.
- The OUT structure CPU_DIAG of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of the OR_HA_16C block.
- The inputs RACKF1 and RACKF2 are interconnected with the outputs QRACKF1 and QRACKF2 of MOD_x.
- The CH_INF_H and CH_INF_L inputs are interconnected with the outputs of the same name of the RED_STATUS block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function and method of operation

The value status of a signal module and of a redundant signal module are ORed by the OR_HA16C block. Signal modules or signal channels set to passive mode by the system are regarded as invalid. The "At least one channel pair does not match", "Redundancy loss" and "Failure of the redundant I/O" events are reported by ALARM_8P. The message function can be disabled.

When module signals are processed in different OB 3x, in very few cases, a faulty signal value may be processed in one cycle by one of the channel blocks configured to process the module signals following a process-control malfunction affecting the module. This can be avoided by processing all channel blocks of a module in the OB 3x that also processes the process image partition to which this module is assigned.

Depassivation can be triggered for a passivated block or channel by setting the DEPASS input. For this the function RED_DEPA (FC 451) is called internally.

For OR_M_xxC / OR_HA16C blocks:

With channel-granular redundancy, "Loss of redundancy channel x" is reported if one channel fails. If both channels fail, "Redundancy pair failure channel x" is reported.

With OR_HA16C, the message "Redundancy pair failure HART variable 01" to "Redundancy pair failure HART variable 08" is output for HART signals 01 to 08. The message function can be disabled.

For all OR blocks

Depassivation can be triggered for a passivated block or channel by setting the DEPASS input. For this, the RED_DEPA function (FC 451) is called internally.

Redundancy

Redundancy of the modules is monitored in a higher-level RED_STATUS block (FB 453).

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

The OMODE_xx outputs are updated when the "Startup" bit is set. ALARM_8P will be initialized.

Time response

Not available

Message response

OR_HA16C uses ALARM_8P for reporting. The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Note: Online help and the manual "PCS 7 FACEPLATES" are only available if the "PCS 7 FACEPLATES" software package is installed.

Additional information

For additional information, refer to the sections:

Message texts and associated values of OR_HA16C (Page 345)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.63.2 I/Os of OR_M_8C / OR_M_16C / OR_M_32C / OR_HA16C

The OR_M_8C and OR_M_16C / OR_HA16C / OR_M_32C block I/Os are identical, with the exception of the number of MODE1_xx and MODE2_xx and OMODE_xx.

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_H	1 = module with more significant address is active	BOOL	0
ACTIV_L	1 = module with less significant address is active	BOOL	0
CHAN_NUM	Total number of channels -1	INT	0
CH_INF_H	Status of the channels of the 2nd module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
CH_INF_L	Status of the channels of the 1st module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
DEPASS	1 = depassivation	BOOL	0
DEPASS_EN	1 = enable depassivation	BOOL	1
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	DWORD	0
MOD_STAT	Module status word from RED_STATUS	WORD	0
MODE1_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) on the primary module HART variable mode x (x = 1 - 8) on the primary module	DWORD	0
MODE2_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) on the redundant module HART variable mode x (x = 1 - 8) on the redundant module	DWORD	0
MS	Maintenance status	DWORD	0
RACKF1	1 = error rack 1	BOOL	0
RACKF2	1 = error rack 2	BOOL	0
RED_STAT	Value returned by the RED_STATUS block	INT	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_ALM	Channel failure Redundant pair	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
CH_WRN	Channel redundancy loss	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_INFO	Supplemental info of RED_OUT	INT	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment ALARM_8P_x (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	WORD	0
MSG_STATx	Message error information ALARM_8P_x (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) mode HART variable x (x = 1 - 8)	DWORD	0
QDISCREP	1 = At least one channel pair does not match	BOOL	0
QERR	1 = program error (cannot determine module status)	BOOL	1
QMODF1	1 = error module 1	BOOL	0
QMODF2	1 = error module 2	BOOL	0
QPASS	1 = at least one module is passivated	BOOL	0
RETURN_VAL	Error information from RED_OUT	INT	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
DXCHG1_xx	Bidirectional data exchange channel 1 xx = 00 to 07 (OR_M8C and OR_HA16C xx = 00 to 15 (OR_M16C) xx = 00 to 31 (OR_32C)	DWORD	0
DXCHG11_xx	Bidirectional data exchange channel 1 (xx = 00 - 07 / 00 - 15 / 00 - 31 / 00 - 63)	DWORD	0

I/O (parameter)	Meaning	Data type	Default
DXCHG2_xx	Bidirectional data exchange channel 2 xx = 00 to 07 (OR_M8C and OR_HA16C xx = 00 to 15 (OR_M16C) xx = 00 to 31 (OR_32C)	DWORD	0
DXCHG21_xx	Bidirectional data exchange channel	DWORD	0
MOD_INF1	Module parameters module 1	STRUCT	
MOD_INF2	Module parameters module 2	STRUCT	
MS_XCHG1_xx	Maintenance Status - Data exchange channel	DWORD	0
MS_XCHG2_xx	Maintenance Status - Data exchange channel	DWORD	0

Additional information

For additional information, refer to the sections:

Maintenance status MS (Page 533)

Message texts and associated values of OR_M_8C (Page 364)

Message texts and associated values of OR_M_16C (Page 351)

Message texts and associated values of OR_HA16C (Page 345)

Message texts and associated values of OR_M_32C (Page 356)

General Information About Block Description (Page 15)

6.63.3 Message texts and associated values of OR_HA16C

Assignment of message text and message classes

You can find more information under Message classes (Page 531)

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Failure module redundancy pair	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Modules loss of redundancy	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Cannot determine module status	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Discrepancy time has expired for at least one channel pair	Preventative Maintenance - Standard
	5		No message
	6	...	
	8		No message

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 00	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 01	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 02	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 03	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 04	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 05	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 06	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 07	PLC Process Control Message - Failure
EV_ID3	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair HART variable 01	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair HART variable 02	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair HART variable 03	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair HART variable 04	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair HART variable 05	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair HART variable 06	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair HART variable 07	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair HART variable 08	PLC Process Control Message - Failure
EV_ID4	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 00	PLC Process Control Message - Error
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 01	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 02	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 03	PLC Process Control Message - Error

Message block ALARM_8P	Message number	Default message text	Message class
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 04	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 05	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 06	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 07	PLC Process Control Message - Error
EV_ID5	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss HART variable 01	PLC Process Control Message - Error
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss HART variable 02	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss HART variable 03	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss HART variable 04	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss HART variable 05	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss HART variable 06	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss HART variable 07	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss HART variable 08	PLC Process Control Message - Error

Assignment of associated values

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
EV_ID1 ... 5	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)

Redundancy loss causes the geographic address of the failed module to be entered dynamically.

If both modules fail, the message text always contains the geographic address of the primary module.

6.64 OR_M_16C: OR value status of 2 redundant signal modules, max. 16 channels, channel granular

6.64.1 Description of OR_M_16C

Object name (type + number)

FB 84

- OR_M_16C block I/Os (Page 348)

The OR_M_16C block corresponds to OR_M_8C (Page 360), but with 16, rather than 8 channels.

Additional information

For further information, refer to the following sections:

Message texts and associated values of OR_M_16C (Page 351)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.64.2 I/Os of OR_M_8C / OR_M_16C / OR_M_32C / OR_HA16C

The OR_M_8C and OR_M_16C / OR_HA16C / OR_M_32C block I/Os are identical, with the exception of the number of MODE1_xx and MODE2_xx and OMODE_xx.

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_H	1 = module with more significant address is active	BOOL	0
ACTIV_L	1 = module with less significant address is active	BOOL	0
CHAN_NUM	Total number of channels -1	INT	0
CH_INF_H	Status of the channels of the 2nd module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
CH_INF_L	Status of the channels of the 1st module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0

I/O (parameter)	Meaning	Data type	Default
DEPASS	1 = depassivation	BOOL	0
DEPASS_EN	1 = enable depassivation	BOOL	1
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	DWORD	0
MOD_STAT	Module status word from RED_STATUS	WORD	0
MODE1_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) on the primary module HART variable mode x (x = 1 - 8) on the primary module	DWORD	0
MODE2_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) on the redundant module HART variable mode x (x = 1 - 8) on the redundant module	DWORD	0
MS	Maintenance status	DWORD	0
RACKF1	1 = error rack 1	BOOL	0
RACKF2	1 = error rack 2	BOOL	0
RED_STAT	Value returned by the RED_STATUS block	INT	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_ALM	Channel failure Redundant pair	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
CH_WRN	Channel redundancy loss	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_INFO	Supplemental info of RED_OUT	INT	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment ALARM_8P_x (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	WORD	0
MSG_STATx	Message error information ALARM_8P_x (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) mode HART variable x (x = 1 - 8)	DWORD	0
QDISCREP	1 = At least one channel pair does not match	BOOL	0
QERR	1 = program error (cannot determine module status)	BOOL	1

I/O (parameter)	Meaning	Data type	Default
QMODF1	1 = error module 1	BOOL	0
QMODF2	1 = error module 2	BOOL	0
QPASS	1 = at least one module is passivated	BOOL	0
RETURN_VAL	Error information from RED_OUT	INT	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
DXCHG1_xx	Bidirectional data exchange channel 1 xx = 00 to 07 (OR_M8C and OR_HA16C xx = 00 to 15 (OR_M16C) xx = 00 to 31 (OR_32C)	DWORD	0
DXCHG11_xx	Bidirectional data exchange channel 1 (xx = 00 - 07 / 00 - 15 / 00 - 31 / 00 - 63)	DWORD	0
DXCHG2_xx	Bidirectional data exchange channel 2 xx = 00 to 07 (OR_M8C and OR_HA16C xx = 00 to 15 (OR_M16C) xx = 00 to 31 (OR_32C)	DWORD	0
DXCHG21_xx	Bidirectional data exchange channel	DWORD	0
MOD_INF1	Module parameters module 1	STRUCT	
MOD_INF2	Module parameters module 2	STRUCT	
MS_XCHG1_xx	Maintenance Status - Data exchange channel	DWORD	0
MS_XCHG2_xx	Maintenance Status - Data exchange channel	DWORD	0

Additional information

For additional information, refer to the sections:

Maintenance status MS (Page 533)

Message texts and associated values of OR_M_8C (Page 364)

Message texts and associated values of OR_M_16C (Page 351)

Message texts and associated values of OR_HA16C (Page 345)

Message texts and associated values of OR_M_32C (Page 356)

General Information About Block Description (Page 15)

6.64.3 Message texts and associated values of OR_M_16C

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Failure module redundancy pair	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Modules loss of redundancy	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Cannot determine module status	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Discrepancy time has expired for at least one channel pair	Preventative Maintenance - Standard
	5		No message
	...	...	
	8		No message
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 00	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 01	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 02	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 03	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 04	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 05	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 06	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 07	PLC Process Control Message - Failure
EV_ID3	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 08	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 09	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 10	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 11	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 12	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 13	PLC Process Control Message - Failure

Message block ALARM_8P	Message number	Default message text	Message class
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 14	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 15	PLC Process Control Message - Failure
EV_ID4	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 00	PLC Process Control Message - Error
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 01	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 02	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 03	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 04	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 05	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 06	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 07	PLC Process Control Message - Error
EV_ID5	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 08	PLC Process Control Message - Error
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 09	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 10	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 11	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 12	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 13	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 14	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 15	PLC Process Control Message - Error

Assignment of associated values

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
EV_ID1 ... 5	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)

Redundancy loss causes the geographic address of the failed module to be entered dynamically.

If both modules fail, the message text always contains the geographic address of the primary module.

See also

Message Classes (Page 531)

6.65 OR_M_32C: OR value status of 2 redundant signal modules, max. 32 channels, channel granular

6.65.1 Description of OR_M_32C

Object name (type + number)

FB85

- OR_M_32C block I/Os (Page 353)

Block OR_M_32C corresponds to the OR_M_8C (Page 360) block, but with 32 channels instead of 8.

Additional information

You will find more information in:

Message texts and associated values of OR_M_32C (Page 356)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.65.2 I/Os of OR_M_8C / OR_M_16C / OR_M_32C / OR_HA16C

The OR_M_8C and OR_M_16C / OR_HA16C / OR_M_32C block I/Os are identical, with the exception of the number of MODE1_xx and MODE2_xx and OMODE_xx.

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_H	1 = module with more significant address is active	BOOL	0
ACTIV_L	1 = module with less significant address is active	BOOL	0
CHAN_NUM	Total number of channels -1	INT	0
CH_INF_H	Status of the channels of the 2nd module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
CH_INF_L	Status of the channels of the 1st module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
DEPASS	1 = depassivation	BOOL	0
DEPASS_EN	1 = enable depassivation	BOOL	1
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	DWORD	0
MOD_STAT	Module status word from RED_STATUS	WORD	0
MODE1_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) on the primary module HART variable mode x (x = 1 - 8) on the primary module	DWORD	0
MODE2_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) on the redundant module HART variable mode x (x = 1 - 8) on the redundant module	DWORD	0
MS	Maintenance status	DWORD	0
RACKF1	1 = error rack 1	BOOL	0
RACKF2	1 = error rack 2	BOOL	0
RED_STAT	Value returned by the RED_STATUS block	INT	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_ALM	Channel failure Redundant pair	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
CH_WRN	Channel redundancy loss	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_INFO	Supplemental info of RED_OUT	INT	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0

I/O (parameter)	Meaning	Data type	Default
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment ALARM_8P_x (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	WORD	0
MSG_STATx	Message error information ALARM_8P_x (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) mode HART variable x (x = 1 - 8)	DWORD	0
QDISCREP	1 = At least one channel pair does not match	BOOL	0
QERR	1 = program error (cannot determine module status)	BOOL	1
QMODF1	1 = error module 1	BOOL	0
QMODF2	1 = error module 2	BOOL	0
QPASS	1 = at least one module is passivated	BOOL	0
RETURN_VAL	Error information from RED_OUT	INT	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
DXCHG1_xx	Bidirectional data exchange channel 1 xx = 00 to 07 (OR_M8C and OR_HA16C xx = 00 to 15 (OR_M16C) xx = 00 to 31 (OR_32C)	DWORD	0
DXCHG11_xx	Bidirectional data exchange channel 1 (xx = 00 - 07 / 00 - 15 / 00 - 31 / 00 - 63)	DWORD	0
DXCHG2_xx	Bidirectional data exchange channel 2 xx = 00 to 07 (OR_M8C and OR_HA16C xx = 00 to 15 (OR_M16C) xx = 00 to 31 (OR_32C)	DWORD	0
DXCHG21_xx	Bidirectional data exchange channel	DWORD	0
MOD_INF1	Module parameters module 1	STRUCT	
MOD_INF2	Module parameters module 2	STRUCT	
MS_XCHG1_xx	Maintenance Status - Data exchange channel	DWORD	0
MS_XCHG2_xx	Maintenance Status - Data exchange channel	DWORD	0

Additional information

For additional information, refer to the sections:

Maintenance status MS (Page 533)

Message texts and associated values of OR_M_8C (Page 364)

Message texts and associated values of OR_M_16C (Page 351)
Message texts and associated values of OR_HA16C (Page 345)
Message texts and associated values of OR_M_32C (Page 356)
General Information About Block Description (Page 15)

6.65.3 Message texts and associated values of OR_M_32C

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Failure module redundancy pair	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Modules loss of redundancy	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Cannot determine module status	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Discrepancy time has expired for at least one channel pair	Preventative Maintenance - Standard
	5		No message
	...	...	
	8		No message
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 00	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 01	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 02	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 03	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 04	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 05	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 06	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 07	PLC Process Control Message - Failure
EV_ID3	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 08	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 09	PLC Process Control Message - Failure

Message block ALARM_8P	Message number	Default message text	Message class
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 10	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 11	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 12	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 13	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 14	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 15	PLC Process Control Message - Failure
EV_ID4	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 16	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 17	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 18	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 19	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 20	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 21	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 22	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 23	PLC Process Control Message - Failure
EV_ID5	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 24	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 25	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 26	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 27	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 28	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 29	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 30	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 31	PLC Process Control Message - Failure
EV_ID6	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 00	PLC Process Control Message - Error

Message block ALARM_8P	Message number	Default message text	Message class
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 01	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 02	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 03	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 04	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 05	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 06	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 07	PLC Process Control Message - Error
EV_ID7	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 08	PLC Process Control Message - Error
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 09	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 10	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 11	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 12	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 13	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 14	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 15	PLC Process Control Message - Error
EV_ID8	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 16	PLC Process Control Message - Error
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 17	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 18	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 19	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 20	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 21	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 22	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 23	PLC Process Control Message - Error

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID9	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 24	PLC Process Control Message - Error
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 25	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 26	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 27	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 28	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 29	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 30	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 31	PLC Process Control Message - Error

Assignment of associated values

Message block ALARM_8P	Associ-ated value	Block parameters	Meaning
EV_ID1 ... 9	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)

Redundancy loss causes the geographic address of the failed module to be entered dynamically.

If both modules fail, the message text always contains the geographic address of the primary module.

See also

Message Classes (Page 531)

6.66 OR_M_8C: OR value status of 2 redundant signal modules, max. 8 channels, channel granular

6.66.1 Description of OR_M_8C

Object name (type + number)

FB 83

- OR_M_8C block I/Os (Page 362)

Area of application

The OR_M_8C block generates a channel-granular value status from two redundant signal modules.

Calling OBs

The block must be installed in OB 100 and in the fastest OB upstream of the CH_x block that is interconnected with OR_M_8C.

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The OR_M_8C block is installed upstream in the OBs of the CH_x channel blocks that are interconnected with it.
- MODE1_x inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_x inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.
- The MOD_INF1 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the primary module.
- The MOD_INF2 input structure is interconnected with the MOD_INF output structure of the MOD_x block in the redundant module.
- The ACTIV_H and ACTIV_L inputs are interconnected with the outputs of the same name of the RED_STATUS block in the redundant module.
- The OMODE_xx outputs are interconnected with the relevant CH_x channel blocks.
- The OUT structure CPU_DIAG of the OB_BEGIN block is interconnected with the IN_OUT structures of the same name of the OR_M_8C block.
- The RACKF1 and RACKF2 inputs are interconnected with the QRACKF1 and QRACKF2 outputs of MOD_xx.

- The CH_INF_H and CH_INF_L inputs are interconnected with the outputs of the same name of the RED_STATUS block.
- The output parameter of DXCHG_xx is interconnected with the following channel block at the DataXchg parameter.
- The output parameter of O_MS is interconnected with the following channel block at the MS parameter.

Function and method of operation

The value statuses of a signal module and of a redundant signal module are ORed by the OR_M_8C block. Signal modules or signal channels set to passive mode by the system are regarded as invalid. For redundant digital input modules, when a signal discrepancy occurs, no module or channel is set to passive after the discrepancy time has elapsed. The module or channel whose signal does not change is then set to passive. The "At least one channel pair does not match", "Redundancy loss" and "Failure of the redundant I/O" events are reported by ALARM_8P. The message function can be disabled.

Note: When module signals are processed in different OB 3x, in very few cases, a faulty signal value may be processed in one cycle by one of the channel blocks configured to process the module signals following a process-control malfunction affecting the module. This can be avoided by processing all channel blocks of a module in the OB 3x that also processes the process image partition to which this module is assigned.

For OR_M_Cxx blocks:

With channel-granular redundancy, "Loss of redundancy channel x" is reported if one channel fails. If both channels fail, "Redundancy pair failure channel x" is reported. The message function can be disabled.

For all OR blocks:

Depassivation can be triggered for a passivated block or channel by setting the DEPASS input. This is done by calling the RED_DEPA FC451 function internally.

Redundancy

Redundancy of the modules in an H system is monitored in the higher-level RED_STATUS block.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

The OMODE_xx (Page 527) outputs are updated when the "Startup" bit is set.

ALARM_8P will be initialized.

Message response

OR_M_8C uses ALARM_8P for reporting. The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of OR_M_8C (Page 364)

Maintenance status MS (Page 533)

You can also find additional information on this in PCS 7 Advanced Process Library > Basics of APL > General functions of the blocks > Operating, monitoring and reporting > Release for maintenance

6.66.2 I/Os of OR_M_8C / OR_M_16C / OR_M_32C / OR_HA16C

The OR_M_8C and OR_M_16C / OR_HA16C / OR_M_32C block I/Os are identical, with the exception of the number of MODE1_xx and MODE2_xx and OMODE_xx.

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_H	1 = module with more significant address is active	BOOL	0
ACTIV_L	1 = module with less significant address is active	BOOL	0
CHAN_NUM	Total number of channels -1	INT	0
CH_INF_H	Status of the channels of the 2nd module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
CH_INF_L	Status of the channels of the 1st module; info on a channel-specific basis 0 = passivated, 1 = operational	DWORD	0
DEPASS	1 = depassivation	BOOL	0
DEPASS_EN	1 = enable depassivation	BOOL	1
EN_MSG	1 = Enable message	BOOL	1
EV_IDx	Message number (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	DWORD	0
MOD_STAT	Module status word from RED_STATUS	WORD	0

I/O (parameter)	Meaning	Data type	Default
MODE1_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) on the primary module HART variable mode x (x = 1 - 8) on the primary module	DWORD	0
MODE2_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) on the redundant module HART variable mode x (x = 1 - 8) on the redundant module	DWORD	0
MS	Maintenance status	DWORD	0
RACKF1	1 = error rack 1	BOOL	0
RACKF2	1 = error rack 2	BOOL	0
RED_STAT	Value returned by the RED_STATUS block	INT	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_ACTIVE	Channel active	DWORD	16#00000000
CH_ALM	Channel failure Redundant pair	DWORD	0
CH_EXIST	Channel exists	DWORD	0
CH_OK	Channel OK	DWORD	0
CH_WRN	Channel redundancy loss	DWORD	0
DXCHG_xx	1st internal data exchange channel for channel block	DWORD	0
DXCHG1_xx	2nd internal data exchange channel for channel block	DWORD	0
EXT_INFO	Supplemental info of RED_OUT	INT	0
EXT_STAT	Release for maintenance - extended status	DWORD	0
EXT_STAT_A	Extended status	DWORD	0
MS_REQ	1 = Request maintenance release	BOOL	0
MS_XCHG_xx	Maintenance Status - Data exchange channel (xx = 00 - 63)	DWORD	0
MSG_ACKx	Message acknowledgment ALARM_8P_x (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	WORD	0
MSG_STATx	Message error information ALARM_8P_x (x = 1 – 3 / 1 – 5 / 1 - 9 / 1 - 5)	WORD	0
O_MS	Maintenance status	DWORD	0
OMODE_xx	Channel mode (xx = 00 – 07 / 00 – 15 / 00 - 31) mode HART variable x (x = 1 - 8)	DWORD	0
QDISCREP	1 = At least one channel pair does not match	BOOL	0
QERR	1 = program error (cannot determine module status)	BOOL	1
QMODF1	1 = error module 1	BOOL	0
QMODF2	1 = error module 2	BOOL	0
QPASS	1 = at least one module is passivated	BOOL	0
RETURN_VAL	Error information from RED_OUT	INT	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	System structure: CPU diagnostics	STRUCT	
DXCHG1_xx	Bidirectional data exchange channel 1 xx = 00 to 07 (OR_M8C and OR_HA16C xx = 00 to 15 (OR_M16C) xx = 00 to 31 (OR_32C)	DWORD	0
DXCHG11_xx	Bidirectional data exchange channel 1 (xx = 00 - 07 / 00 - 15 / 00 - 31 / 00 - 63)	DWORD	0
DXCHG2_xx	Bidirectional data exchange channel 2 xx = 00 to 07 (OR_M8C and OR_HA16C xx = 00 to 15 (OR_M16C) xx = 00 to 31 (OR_32C)	DWORD	0
DXCHG21_xx	Bidirectional data exchange channel	DWORD	0
MOD_INF1	Module parameters module 1	STRUCT	
MOD_INF2	Module parameters module 2	STRUCT	
MS_XCHG1_xx	Maintenance Status - Data exchange channel	DWORD	0
MS_XCHG2_xx	Maintenance Status - Data exchange channel	DWORD	0

Additional information

For additional information, refer to the sections:

Maintenance status MS (Page 533)

Message texts and associated values of OR_M_8C (Page 364)

Message texts and associated values of OR_M_16C (Page 351)

Message texts and associated values of OR_HA16C (Page 345)

Message texts and associated values of OR_M_32C (Page 356)

General Information About Block Description (Page 15)

6.66.3 Message texts and associated values of OR_M_8C

Assignment of message text and message class

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Module @1%d@/@2%d@/@3%d@: Failure module redundancy pair	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Modules loss of redundancy	PLC Process Control Message - Error

Message block ALARM_8P	Message number	Default message text	Message class
	3	Module @1%d@/@2%d@/@3%d@: Cannot determine module status	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Discrepancy time has expired for at least one channel pair	Preventative Maintenance - Standard
	5		No message
	...	...	
	8		No message
EV_ID2	1	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 00	PLC Process Control Message - Failure
	2	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 01	PLC Process Control Message - Failure
	3	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 02	PLC Process Control Message - Failure
	4	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 03	PLC Process Control Message - Failure
	5	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 04	PLC Process Control Message - Failure
	6	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 05	PLC Process Control Message - Failure
	7	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 06	PLC Process Control Message - Failure
	8	Module @1%d@/@2%d@/@3%d@: Failure redundancy pair channel 07	PLC Process Control Message - Failure
EV_ID3	1	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 00	PLC Process Control Message - Error
	2	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 01	PLC Process Control Message - Error
	3	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 02	PLC Process Control Message - Error
	4	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 03	PLC Process Control Message - Error
	5	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 04	PLC Process Control Message - Error
	6	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 05	PLC Process Control Message - Error
	7	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 06	PLC Process Control Message - Error
	8	Module @1%d@/@2%d@/@3%d@: Redundancy loss channel 07	PLC Process Control Message - Error

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameters	Meaning
EV_ID1 / 2 / 3	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	SLOT_NO	Slot number (byte)

Redundancy loss causes the geographic address of the failed module to be entered dynamically.

If both modules fail, the message text always contains the geographic address of the primary module.

See also

Message Classes (Page 531)

6.67 OR_MHA_CO: Multi HART variable read coordination (0 - 15 Channel) - redundancy

6.67.1 Description of OR_MHA_CO

Object name (type + number)

FB 427

- I/Os of OR_MHA_CO (Page 367)

Area of application

The block OR_MHA_CO coordinates the two upstream MHA_CO blocks and forwards the value of the MultiHART variables to the Pcs7HaAI / Pcs7HaAO channel blocks for ET 200SP HA HART modules.

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OR_MHA_CO block is installed after its interconnected MHA_CO driver block in its OB.
- MODE1_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.

- MULTI_HART_00_xx inputs are interconnected with the MULTI_HART_00_xx outputs of the MHA_CO block in the master module.
- MULTI_HART_00_xx inputs are interconnected with the MULTI_HART_00_xx outputs of the MHA_CO block in the slave module.
- The ACTIV_H and ACTIV_L inputs are interconnected with the outputs of the same name of the RED block in the redundant module.
- The MULTI_HART_00_xx outputs are interconnected with the downstream Pcs7HaAI/ Pcs7HaAO blocks.
- The OUT structure CPU_DIAG_PN of the OB_BEGIN_PN block is interconnected with the IN_OUT structures of the same name of the OR_MHA_CO block.
- The ouputs CH_INF_L_AUX_x (x=0,1) and CH_INF_H_AUX_x (x=0,1) are connected with the inputs of the same name of the OR_HA16PN block in the redundant mode.

Error handling

The plausibility of input parameters is not checked.

Messaging

Not available

6.67.2 I/Os of OR_MHA_CO

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_L	1=Low Module Active	Bool	0
ACTIV_H	1=High Module Active	Bool	0
CHAN_NUM	Total number of channels -1	INT	0
RACKF1	1=Higher level error	BOOL	0
RACKF2	1=Higher level error	BOOL	0
FEATURE	Reserve	DWORD	0
MODE1_xx	Channel mode xx (xx : 00 - 15) Module 1	DWORD	0
MODE2_xx	Channel mode xx (xx : 00 - 15) Module 2	DWORD	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_L_AUX_0	Low address aux value 0..31: 1 = active	DWORD	0
CH_INF_H_AUX_0	High address aux value 0..31: 1 = active	DWORD	0
CH_INF_L_AUX_1	Low address aux value 32..63: 1 = active	DWORD	0
CH_INF_H_AUX_1	High address aux value 32..63: 1 = active	DWORD	0
MULTI_HART_xx	Bidirectional information exchange (xx = 00 – 15)	STRUCT	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = Accept new settings	BOOL	0
CPU_DIAG_PN	System structure: CPU-Diagnose	STRUCT	
MOD_INF1	Module 1 information structure	STRUCT	
MOD_INF2	Module 2 information structure	STRUCT	
MULTI_HART_xx_1	Multi HART values of Module 1 (xx = 00 – 15)	STRUCT	
MULTI_HART_xx_2	Multi HART values of Module 2 (xx = 00 – 15)	STRUCT	

6.68 OR_MHA1_CO: Coordinates multiHART variables - redundancy

6.68.1 Description of OR_MHA1_CO

Object name (type + number)

FB 440

- I/Os of OR_MHA1_CO (Page 369)

Area of application

The block OR_MHA1_CO coordinates with the two upstream MHA_CO blocks and forwards the value of the MultiHART variables to the Pcs7HaAI / Pcs7HaAO channel blocks for ET 200SP HA HART modules.

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OR_MHA1_CO block is installed after its interconnected MHA_CO driver block in its OB.
- MODE1_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.
- MULTI_HART_00_xx inputs are interconnected with the MULTI_HART_00_xx outputs of the MHA_CO block in the master module.
- MULTI_HART_00_xx inputs are interconnected with the MULTI_HART_00_xx outputs of the MHA_CO block in the slave module.
- The ACTIV_H and ACTIV_L inputs are interconnected with the outputs of the same name of the RED block in the redundant module.
- The MULTI_HART_00_xx outputs are interconnected with the downstream Pcs7HaAI/ Pcs7HaAO blocks.
- The OUT structure CPU_DIAG_PN of the OB_BEGIN_PN block is interconnected with the IN_OUT structures of the same name of the OR_MHA1_CO block.
- The ouputs CH_INF_L_AUX_0 and CH_INF_H_AUX_0 are connected with the inputs of the same name of the OR_HA16PN block in the redundant mode.

Error handling

The plausibility of input parameters is not checked.

Messaging

Not available

6.68.2 I/Os of OR_MHA1_CO

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_L	1=Low Module Active	Bool	0
ACTIV_H	1=High Module Active	Bool	0

I/O (parameter)	Meaning	Data type	Default
CHAN_NUM	Total number of channels -1	INT	0
RACKF1	1=Higher level error	BOOL	0
RACKF2	1=Higher level error	BOOL	0
FEATURE	Reserve	DWORD	0
MODE1_xx	Channel mode xx (xx : 00 - 15) Module 1	DWORD	0
MODE2_xx	Channel mode xx (xx : 00 - 15) Module 2	DWORD	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_L_AUX_0	Low address aux value 0..31: 1 = active	DWORD	0
CH_INF_H_AUX_0	High address aux value 0..31: 1 = active	DWORD	0
MULTI_HART_xx	Bidirectional information exchange (xx = 00 – 15)	STRUCT	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = Accept new settings	BOOL	0
CPU_DIAG_PN	System structure: CPU-Diagnose	STRUCT	
MOD_INF1	Module 1 information structure	STRUCT	
MOD_INF2	Module 2 information structure	STRUCT	
MUL-TI_HART_xx_1	Multi HART values of Module 1 (xx = 00 – 07)	STRUCT	
MUL-TI_HART_xx_2	Multi HART values of Module 2 (xx = 00 – 07)	STRUCT	

6.69 PADP_L0x: Monitoring DP/PA slaves

6.69.1 Description of PADP_L00

Object name (type + number)

FB 109

- PADP_L00 block I/Os (Page 374)

Area of application

Block PADP_L00 monitors DP/PA field devices operating as DPV0 or DPV1 slaves downstream of a DP/PA or Y-Link that is operated as a DPV0 slave. The PA field devices must conform to the PROFIBUS V3.0 profile. There must be individual blocks available for the diagnostics and signal processing for DP field devices. H systems support only the PA field devices at an active DP/PA-Link.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- Block PADP_L00 is integrated in the run sequence downstream of block DPAY_V0.
- Parameters are assigned to the MODE_xx input (mode of slot xx of a field device).
- The PADP_ADR input (DP/PA slave address downstream of the DP/PA link or Y link) is configured.
- The DPA_M input is interconnected with the DPA_M_xx output of the DPAY_V0 block.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the DPAY_V0 block are interconnected with the IN_OUT structures of the same name of PADP_L00.
- The QMODF and PA_DIAG outputs are interconnected with the MOD_PAL0 block.

Note

The CFC function "**Generate module drivers**" can only be used if the PA field device belongs to slave family 12.

Function and method of operation

Block PADP_L00 analyzes all events affecting a DP or PA field device and its slots acyclically. It generates the relevant DP_MODE or PA_MODE, depending on the slot, and the value status for the DP or PA signal processing blocks. The permitted PA_MODE (Page 528) is already defined for the PA signal processing blocks. The DP_MODE must be defined individually for the DP field device blocks. ALARM_8P is used to report these events. The message function can be disabled.

The higher-level DPAY_V0 block enables the block to run. The diagnostic event is entered in the start information (CPU_DIAG) of the OB_BEGIN block.

The data is already evaluated by the link block (DPAY_V0) if diagnostics are required. The diagnostic information concerning the PA field device is stored in the DPA_M structure. The structure consists of 2 DWORD (S_01 for module 1 to 16 and S_02 for module 17 to 32), and 1 BOOL (S_ERR = DP/PA field device faulty) variables. Two bits of the DWORD are assigned to each slot of the DP/PA field device, whereby bit 0 and bit 1 belong to slot 1 of the DP/PA field device, etc. Slots 1 to 7 are evaluated. The bit states are defined as follows:

Status Bit 0	Status Bit 1	Meaning
0	0	Module x OK (valid user data)
0	1	Module x error (invalid user data)
1	0	Wrong module x (invalid user data)
1	1	No module x (invalid user data)

There is an input (MODE_xx) for each slot (module) on the DP/PA field device that is used to read in configuration settings made for the PA field device slots (module) in HW Config.

For DP field devices, the user must do his own encoding at the MODE input.

The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current slot value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx. The following events are evaluated by block DPAY_V0 and lead to the value status “Invalid value” due to a higher-level error (OMODE_xx = 16#40xxxxxx):

• Rack failure (OB 86)	(Output parameter QRACKF = TRUE)
• Diagnostic interrupt that affects entire field device (OB 82)	(Output parameter QMODF = TRUE, if DPA_M.S_ERR = TRUE)
• Diagnostic interrupt slot xx that affects a field device (OB 82):	(Output parameter OMODE_xx = Module (slot) error-specific DPA_M)

In the event of a diagnostic interrupt, the block reports field-device-specifically to WinCC by means of ALARM_8P. We distinguish between the field device and its slots; each slot is assigned a message ID.

The “Device failure” message can be disabled with EM_MSG_D = FALSE.

Redundancy

The higher-level block DPAY_V0 evaluates the redundancy of the DP master systems used in an H system.

MODE Setting for PA Profiles

You will find additional information in "PA_MODE Settings (Page 528)".

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

After a restart or an initial start, the system verifies that the PA field device is available under its logical base address. A restart (OB100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

The block signals field device errors using ALARM_8P, and generates the following messages in the OBs listed below:

OB no.	Start Event	Message
OB 1	Cyclic processing	Repeat the update of ALARM_8P outputs/messages, if necessary
OB 82	Diagnostic interrupt	Device error incoming/outgoing Device module xx error incoming/outgoing Device module xx incorrect incoming/outgoing Device module xx missing incoming/outgoing
OB 100	Restart	Initialization of ALARM_8P

Operator control and monitoring

The block has no faceplate.

Additional information

For additional information, refer to the sections:

Message texts and associated values of PADP_L00 (Page 375)

6.69.2 I/Os of PADP_L00/PADP_L01/PADP_L02

I/Os

The I/Os of the PADP_L00, PADP_L01 and PADP_L02 blocks are identical save for the number of MODE_xx and OMODE_xx. The number of monitored slots determines the number of corresponding I/O parameters.

The default block view in the CFC is identified in the "I/O" column:
I/O name in **bold** = I/O is visible, standard I/O name = I/O is not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DPA_M	DP/PA field device diagnostic information	STRUCT	
EN_MSG	1 = enable message	BOOL	1
EN_MSG_D	1 = enable "Device failure" message	BOOL	1
EV_ID	Message number	DWORD	0
MODE_xx	Module mode (xx = 00 - 06 / 00 - 15 / 00 - 31)	WORD	0
PADP_ADR	DP/PA field device address	BYTE	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
MSG_ACK	Message acknowledgment	WORD	0
MSGSTAT	Message error information	WORD	0
OMODE_xx	Module mode (xx = 00 - 06 / 00 - 15 / 00 - 31)	DWORD	0
PA_DIAG	PA field device diagnostic information	DWORD	0
QERR	1 = program error	BOOL	1
QMODF	1 = module removed/defective	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In-out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics	STRUCT	
RAC_DIAG	1 = DPV1 mode	STRUCT	

Additional information

For additional information, refer to the following sections:

Message texts and associated values of PADP_L00 (Page 375)
Message texts and associated values of PADP_L01 (Page 379)
Message texts and associated values of PADP_L02 (Page 384)

6.69.3 Message texts and associated values of PADP_L00

Assignment of message text and message class

Message block ALARM_8P	Message number	Block parameter	Default message text	Message class
EV_ID	1	QMODF	Device @1%d@/ @2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	-	Device @1%d@/ @2%d@/@3%d@: Module 00 @4W%t#PADP_L00_TXT@	PLC Process Control Message - Failure
	3	-	Device @1%d@/ @2%d@/@3%d@: Module 01 @5W%t#PADP_L00_TXT@	PLC Process Control Message - Failure
	4	-	Device @1%d@/ @2%d@/@3%d@: Module 02 @6W%t#PADP_L00_TXT@	PLC Process Control Message - Failure
	5	-	Device @1%d@/ @2%d@/@3%d@: Module 03 @7W%t#PADP_L00_TXT@	PLC Process Control Message - Failure
	6	-	Device @1%d@/ @2%d@/@3%d@: Module 04 @8W%t#PADP_L00_TXT@	PLC Process Control Message - Failure
	7	-	Device @1%d@/ @2%d@/@3%d@: Module 05 @9W%t#PADP_L00_TXT@	PLC Process Control Message - Failure
	8	-	Device @1%d@/ @2%d@/@3%d@: Module 06 @10W%t#PADP_L00_TXT@	PLC Process Control Message - Failure

You will find the message texts and their text numbers in the

Text library for PADP_L00 (Page 537)".

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameter	Meaning
EV_ID	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 10	-	Text number (message 2 - 8) from PADP_L00_TXT

If the PA field device is connected downstream from an inactive DP/PA-Link V0and SUBN1_ID = 16#FF, the associated variable is substituted by SUBN2_ID.

See also

Message Classes (Page 531)

6.69.4 Description of PADP_L01

Object name (type + number)

FB 110

- PADP_L01 block I/Os (Page 374)

Area of application

The PADP_L01 monitors DP/PA field devices that are used as DPV0 or DPV1 slaves, downstream of a DP/PA or Y link that is used as a DPV0 slave. The PA field devices must conform to the PROFIBUS V3.0 profile. There must be individual blocks available for the diagnostics and signal processing for DP field devices. H systems support only the PA field devices at an active DP/PA-Link.

Calling OBs

The block must be installed in the run sequence in the following OBs (this is done automatically in the CFC):

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The PADP_L01 block is integrated in the run sequence downstream of block DPAY_V0.
- Parameters are assigned to the MODE_xx input (mode of slot xx of a field device).
- The PADP_ADR input (DP/PA slave address downstream of the DP/PA link or Y link) is configured.
- The DPA_M input is interconnected with the DPA_M_xx output of the DPAY_V0 block.

- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the DPAY_V0 block are interconnected with the IN_OUT structures of the same name of PADP_L01.
- The outputs QMODF and PA_DIAG are interconnected with the MOD_PAL0 block.

Note

The CFC function "**Generate module drivers**" can only be used if the PA field device belongs to slave family 12.

Function and method of operation

Block PADP_L01 analyzes all events affecting a DP or PA field device and its slots acyclically. It generates the relevant DP_MODE or PA_MODE, depending on the slot, and the value status for the DP or PA signal processing blocks. The permitted PA_MODE (Page 528) is already defined for the PA signal processing blocks. The DP_MODE must be defined individually for the DP field device blocks. ALARM_8P is used to report these events. The message function can be disabled.

The higher-level DPAY_V0 block enables the block to run. The diagnostic event is entered in the start information (CPU_DIAG) of the OB_BEGIN block.

The data is already evaluated by the link block (DPAY_V0) if diagnostics are required. The diagnostic information concerning the PA field device is stored in the DPA_M structure. The structure consists of 2 DWORD (S_01 for module 1 to 16 and S_02 for module 17 to 32), and 1 BOOL (S_ERR = DP/PA field device faulty) variables. Two bits of the DWORD are assigned to each slot of the DP/PA field device, whereby bit 0 and bit 1 belong to slot 1 of the DP/PA field device, etc. Slots 1 to 16 are evaluated. The bit states are defined as follows:

Status Bit 0	Status Bit 1	Meaning
0	0	Module x OK (valid user data)
0	1	Module x error (invalid user data)
1	0	Wrong module x (invalid user data)
1	1	No module x (invalid user data)

There is an input (MODE_xx (Page 517)) for each slot (module) on the DP/PA field device that is used to read in configuration settings made for the PA field device slots (module) in HW Config.

For DP field devices, the user must do his own encoding at the MODE input.

The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current slot value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx. The following events are evaluated by block DPAY_V0 and lead to the value status “Invalid value” due to a higher-level error (OMODE_xx = 16#40xxxxxx):

• Rack failure (OB 86)	(Output parameter QRACKF = TRUE)
• Diagnostic interrupt that affects entire field device (OB 82)	(Output parameter QMODF = TRUE, if DPA_M.S_ERR = TRUE)
• Diagnostic interrupt slot xx that affects a field device (OB 82):	(Output parameter OMODE_xx = Module (slot) error-specific DPA_M)

The block reports a diagnostic interrupt to the OS for a specific field device using ALARM_8P. We distinguish between the field device and its slots; each slot is assigned a message ID.

The “Device failure” message can be disabled with EM_MSG_D = FALSE.

Redundancy

The higher-level block DPAY_V0 evaluates the redundancy of the DP master systems used in an H system.

MODE setting for PA profiles

You will find additional information in "PA_MODE settings (Page 528)".

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE structure

You will find additional information in the "OMODE (Page 527)" section.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

After a restart or an initial start, the system verifies that the PA field device is available under its logical base address. A restart (OB100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

The block signals field device errors using ALARM_8P, and generates the following messages in the OBs listed below:

OB no.	Start Event	Message
OB 1	Cyclic processing	Repeat the update of ALARM_8P outputs/messages, if necessary
OB 82	Diagnostic interrupt	Device error incoming/outgoing Device module xx error incoming/outgoing Device module xx incorrect incoming/outgoing Device module xx missing incoming/outgoing
OB 100	Restart	Initialization of ALARM_8P

Operator control and monitoring

The block has no faceplate.

Additional information

For additional information, refer to the sections:

Message texts and associated values of PADP_L01 (Page 379)

6.69.5 Message texts and associated values of PADP_L01

Assignment of message text and message class

Message block ALARM_8P	Message number	Block parameter	Default message text	Message class
EV_ID1	1	QMODF	Device @1%d@/ @2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	2	-	Device @1%d@/ @2%d@/@3%d@: Module 07 @4W%t#PADP_L01_TXT@	PLC Process Control Message - Failure
	3	-	Device @1%d@/ @2%d@/@3%d@: Module 15 @5W%t#PADP_L01_TXT@	PLC Process Control Message - Failure
	4	-	-	No message
	...		...	
	8	-	-	No message
EV_ID2	1	-	Device @1%d@/ @2%d@/@3%d@: Module 00 @4W%t#PADP_L01_TXT@	PLC Process Control Message - Failure
	...		...	
	7	-	Device @1%d@/ @2%d@/@3%d@: Module 06 @10W%t#PADP_L01_TXT@	PLC Process Control Message - Failure
	8	-	-	No message

Message block ALARM_8P	Message number	Block parameter	Default message text	Message class
EV_ID3	1	-	Device @1%d@/ @2%d@/@3%d@: Module 08 @4W%t#PADP_L01_TXT@	PLC Process Control Message - Failure
	...		...	
	7	-	Device @1%d@/ @2%d@/@3%d@: Module 14 @10W%t#PADP_L01_TXT@	PLC Process Control Message - Failure
	8	-	-	No message

You will find the message texts and their text numbers in the Text library for PADP_L01 (Page 537)".

Assignment of associated values

Message block ALARM_8P	Associated value	Block parameter	Meaning
EV_ID1	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 5	-	Text number (message 2 - 3) from PADP_L01_TXT
EV_ID2	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 10	-	Text number (message 1 - 7) from PADP_L01_TXT
EV_ID3	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 10	-	Text number (message 1 - 7) from PADP_L01_TXT

If the PA field device is connected downstream from an inactive DP/PA-Link V0and SUBN1_ID = 16#FF, the associated variable is substituted by SUBN2_ID.

See also

Message Classes (Page 531)

6.69.6 Description of PADP_L02

Object name (type + number)

FB 111

- PADP_L02 block I/Os (Page 374)

Area of application

The PADP_L02 monitors DP/PA field devices that are used as DPV0 or DPV1 slaves, downstream of a DP/PA or Y link that is used as a DPV0 slave. The PA field devices must conform to the PROFIBUS V3.0 profile. There must be individual blocks available for the diagnostics and signal processing for DP field devices. H systems support only the PA field devices at an active DP/PA-Link.

Calling OBs

The PADP_L02 block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 82	Diagnostic interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The PADP_L02 block is integrated in the run sequence downstream of block DPAY_V0.
- Parameters are assigned to the MODE_xx input (mode of slot xx of a field device).
- The PADP_ADR input (DP/PA slave address downstream of the DP/PA link or Y link) is configured.
- The DPA_M input is interconnected with the DPA_M_xx output of the DPAY_V0 block.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the DPAY_V0 block are interconnected with the IN_OUT structures of the same name of PADP_L02.
- The QMODF and PA_DIAG outputs are interconnected with the MOD_PAL0 block.

Function and method of operation

Block PADP_L02 analyzes all events affecting a DP or PA field device and its slots acyclically. It generates the relevant DP_MODE or PA_MODE, depending on the slot, and the value status for the DP or PA signal processing blocks. The permitted PA_MODE (Page 528) is already defined for the PA signal processing blocks. The DP_MODE must be defined individually for the DP field device blocks. ALARM_8P is used to report these events. The message function can be disabled.

The higher-level DPAY_V0 block enables the block to run. The event to be evaluated is entered in the start information (CPU_DIAG) of OB_BEGIN.

The data is already evaluated by the link block (DPAY_V0) if diagnostics are required. The diagnostic information concerning the PA field device is stored in the DPA_M structure. The structure consists of 2 DWORD (S_01 for module 1 to 16 and S_02 for module 17 to 32), and 1 BOOL (S_ERR = DP/PA field device faulty) variables. Two bits of the DWORD are assigned to each

slot of the DP/PA field device, whereby bit 0 and bit 1 belong to slot 1 of the DP/PA field device, etc. Slots 1 to 32 are evaluated. The bit states are defined as follows:

Status Bit 0	Status Bit 1	Meaning
0	0	Module x OK (valid user data)
0	1	Module x error (invalid user data)
1	0	Wrong module x (invalid user data)
1	1	No module x (invalid user data)

There is an input (MODE_xx) for each slot (module) on the DP/PA field device that is used to read in configuration settings made for the PA field device slots (module) in HW Config.

For DP field devices, the user must do his own encoding at the MODE input.

The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current slot value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx. The following events are evaluated by block DPAY_V0 and lead to the value status “Invalid value” due to a higher-level error (OMODE_xx = 16#40xxxxxx):

• Rack failure (OB 86)	(Output parameter QRACKF = TRUE)
• Diagnostic interrupt that affects entire field device (OB 82)	(Output parameter QMODF = TRUE, if DPA_M.S_ERR = TRUE)
• Diagnostic interrupt slot xx that affects a field device (OB 82):	(Output parameter OMODE_xx = Module (slot) error-specific DPA_M)

The block reports a diagnostic interrupt to WinCC for a specific field device using ALARM_8P. We distinguish between the field device and its slots; each slot is assigned a message ID.

The “Device failure” message can be disabled with EM_MSG_D = FALSE.

Redundancy

The higher-level block DPAY_V0 evaluates the redundancy of the DP master systems used in an H system.

MODE setting for PA profiles

You will find additional information in "PA_MODE settings (Page 528)".

Note

If you change the parameter settings for the MODE_xx inputs at runtime, these changes will not be accepted at the outputs until the ACC_MODE is set to 1.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

After a restart or an initial start, the system verifies that the PA field device is available under its logical base address. A restart (OB100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

The block signals field device errors using ALARM_8P, and generates the following messages in the OBs listed below:

OB no.	Start Event	Message
OB 1	Cyclic processing	Repeat the update of ALARM_8P outputs/messages, if necessary
OB 82	Diagnostic interrupt	Device error incoming/outgoing Device module xx error incoming/outgoing Device module xx incorrect incoming/outgoing Device module xx missing incoming/outgoing
OB 100	Restart	Initialization of ALARM_8P

Operator control and monitoring

The block has no faceplate.

Additional information

For additional information, refer to the sections:

Message texts and associated values of PADP_L02 (Page 384)

6.69.7 Message texts and associated values of PADP_L02

Assignment of message text and message class

Message block ALARM_8P	Message number	Block parameter	Default message text	Message class
EV_ID1	1	QMODF	Device @1%d@/ @2%d@/@3%d@: Failure	PLC Process Control Message - Failure
	...		...	
	5	-	Device @1%d@/ @2%d@/@3%d@: Module 31 @7W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	6	-	-	No message
	...		...	
	8	-	-	No message
EV_ID2	1	-	Device @1%d@/ @2%d@/@3%d@: Module 00 @4W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	...		...	
	7	-	Device @1%d@/ @2%d@/@3%d@: Module 06 @10W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	8	-		No message
EV_ID3	1	-	Device @1%d@/ @2%d@/@3%d@: Module 08 @4W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	...		...	
	7	-	Device @1%d@/ @2%d@/@3%d@: Module 14 @10W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	8	-		No message
EV_ID4	1	-	Device @1%d@/ @2%d@/@3%d@: Module 16 @4W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	...		...	
	7	-	Device @1%d@/ @2%d@/@3%d@: Module 22 @10W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	8	-		No message
EV_ID5	1	-	Device @1%d@/ @2%d@/@3%d@: Module 24 @4W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	...		...	
	7	-	Device @1%d@/ @2%d@/@3%d@: Module 30 @10W%t#PADP_L02_TXT@	PLC Process Control Message - Failure
	8	-		No message

You will find the message texts and their text numbers in "Text library for PADP_L02 (Page 537)".

Assignment of associated values to the block parameters of PADP_L02

Message block ALARM_8P	Associated value	Block parameter	Meaning
EV_ID1	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 7	-	Text number (message 2 - 5) from PADP_L02_TXT
EV_ID2	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 10	-	Text number (message 1 - 7) from PADP_L02_TXT
EV_ID3	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 10	-	Text number (message 1 - 7) from PADP_L02_TXT
EV_ID4	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 10	-	Text number (message 1 - 7) from PADP_L02_TXT
EV_ID5	1	SUBN_ID	DP master system ID (byte)
	2	RACK_NO	Rack/station number (byte)
	3	PADP_ADR	DP/PA device address (byte)
	4 - 10	-	Text number (message 1 - 7) from PADP_L02_TXT

If the PA field device is connected downstream from an inactive DP/PA-Link V0and SUBN1_ID = 16#FF, the associated variable is substituted by SUBN2_ID.

See also

Message Classes (Page 531)

6.70 PADP_L10: Monitoring PA slaves downstream of DPV0 with up to 16 slots

6.70.1 Description of PADP_L10

Object name (type + number)

FB 116

- PADP_L10 block I/Os (Page 390)

Area of application

Block PADP_L10 monitors DPV0 PA field devices with a maximum of 32 slots, which are operated as DPV0 slaves on a DP master system, either directly or via a DP/PA coupler. The DP/PA coupler is connected downstream of a DPV1 DP/PA link. The PA field devices must conform to the PROFIBUS V3.0 profile. H systems support only the PA field devices at an active DP/PA-Link.

Calling OBs

The block must be installed in the run sequence downstream from the OB_DIAG1 block in the following OBs (this is done automatically in the CFC):

OB 1	Cyclic program
OB 55	Status interrupt (only if a PA slave is required)
OB 56	Update interrupt (only if a PA slave is required)
OB 57	Vendor-specific interrupt (only if a PA slave is required)
OB 82	Diagnostic interrupt
OB 83	Remove/insert module interrupt (failure/return of a field device)
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- Block OB_DIAG1 is installed in the run sequence upstream of PADP_L10.
- The following are configured, depending on whether the PA field device is connected directly to a DP master system or downstream of a DP/PA link:
  - the diagnostic address of the PA field device or of the DADDR DP/PA link
  - the geographic address (SUBN1_ID, SUBN2_ID, RACK_NO of the PA address of the PA field device or the DP/PA link)
  - SLOT_NO = 0 or the geographic address of the PA field device in the DP/PA link (SLOT0_NO = Slot 0 no. for the PA field device, SLOTS_NO = number of slots of the PA field device)
  - SLOTS_NO = number of slots of the PA field device
  - the PA address of the PA field device (PADP_ADR)
  - MODE_xx (mode of slot xx of a PA field device)
- The CPU_DIAG and CPU_OB_5X OUT structures of OB_BEGIN and RAC_DIAG of OB_DIAG1 are interconnected with the IN_OUT structures of the same name of PADP_L10.
- The EN input is interconnected with the output of an AND block.
  whose inputs are interconnected with the outputs EN_SUBx (x = number of the DP master system) of the OB_BEGIN block, EN_Rxxx (xxx = rack/station number) of the SUBNET block, EN_Mx (x= number of the PA device) of the DPAY_V1 block, and EN_F of the OB_DIAG1 block.
- EN_DIAG is interconnected with output EN_DIAG of OB_DIAG1.

- Output QPERAF is interconnected with input PERAF of MOD_PAX0 or MOD_PAL0.
- Output QMODF is interconnected with input MODF of MOD_PAX0 or MOD_PAL0.
- Output PA_DIAG is interconnected with input PA_DIAG of MOD_PAX0 or MOD_PAL0.

Note

The CFC function "**Generate module drivers**" can only be used if the PA field device belongs to slave family 12.

Description of the functions

Block PADP_L10 analyzes all events affecting a PA field device acyclically. It generates the slot-specific MODE (PA_MODE (Page 528)) and the value status for signal processing blocks. The permitted PA_MODE is defined for PA field devices.

If you are using modular PA field devices (DPV0), the next block (MOD_PAX0/MOD_PAL0) always reports the events in slot 0 of the PA field device in the DP/PA link. The affected MOD_PAX0/MOD_PAL0 block is enabled.

How it works

Block PADP_L10 is enabled to run by the higher-level OB_DIAG1 block. The event to be evaluated is entered in the start information (CPU_DIAG) of OB_BEGIN. Block PADP_L10 checks the geographic address and the number of slots (SLOT_NO) of the PA field device to determine whether it is responsible for this event.

For a diagnostic event (OB 82, OB 55, OB 56, OB 57), SFB 54 is used to synchronously read the data from OB_BEGIN.

If diagnostic data could not be read synchronously from OB_BEGIN or when requested by OB_DIAG1 (EN_DIAG = TRUE), SFB 52 (RDREC) is used to read the current diagnostic data asynchronously.

Byte 9 of the additional alarm information contains the slot number of the field device that triggered the diagnostic interrupt. The corresponding slot is enabled.

The following diagnostic data is interpreted as a higher-level error in the block:

Additional alarm information

Byte no.	DPV1 name	Bit no.	Value	Info
Byte 1 to 6			DDLM_SLAVE_DIAG	
Byte 7	Header	Bit 7 Bit 6 Bit 5 to bit 0	0 0 8 or optional	fixed fixed Length of diagnostic data
Byte 8	Status_Type	Bit 7 Bit 6 to bit 0	1 126	Status Highest vendor-specific status, will not be used in future
Byte 9	Slot_number		Slot number of the PB	The PB contains the diagnostic data.

Byte no.	DPV1 name	Bit no.	Value	Info
Byte 10	Specifier	Bit 7 to bit 2 Bit 1 to bit 0	Reserved 1: status is displayed 2: status is not displayed	depends on the content of diagnostic data
Byte 11 to 14			Diagnostics	
optional Bytes 11 to 20				

With a DPV0 PA field device, the diagnostic data is always assigned to slot 0.

It is also possible to generate slot-specific diagnostics for DPV1 PA field devices. These have not yet been defined. With a DPV1 field device, only the field-device slot that triggered the diagnostics is enabled. Evaluation of the coding in the context of higher-level errors in the slot-specific OMODE_xx (Page 527) outputs is based solely on the diagnostic information at slot 0.

MODE setting for PA profiles (PA_MODE)

For more information, refer to the section: "MODE settings for PA devices (Page 528)".

The function writes MODE_xx to the low word of the OMODE_xx (Page 527) output parameter. This occurs only during startup or if you set ACC_MODE = TRUE. The current slot value status is written to the most significant byte. If the result is positive, the system sets OMODE_xx = 16#80xxxxxx. The following events lead to the value status "invalid value due to higher-level error" (OMODE_xx = 16#40xxxxxx):

- Rack failure (OB 86) (output parameter QRACKF = TRUE)
- Failure/return of a field device (OB 83)
- Slot-specific diagnostic interrupt (OB 82)

Bytes 11 to 14 of the additional interrupt information are evaluated to form the slot-specific value status:

Byte	Bit	Mnemonics	Description	Display class
11	0	DIA_HW_ELECTR	Electronic hardware failure	R
	1	DIA HW MECH	Mechanical hardware failure	R
	2	DIA_TEMP_MOTOR	Excess motor temperature	R
	3	DIA TEMP ELECTR	Excess temperature at electronic circuit	R
	4	DIA MEM CHKSUM	Memory error	R
	5	DIA_MEASUREMENT	Measurement failure	R
	6	DIA NOT INIT	Device not initialized (no auto-calibration)	R
	7	DIA_INIT_ERR	Auto-calibration error	R
12	0	DIA ZERO ERR	Zero error (limit position)	R
	1	DIA_SUPPLY	No power supply (electr. pneum.)	R
	2	DIA CONV INVAL	Invalid configuration	R
	3	DIA_WARMSTART	Warm start executed	A
	4	DIA COLDSTART	Complete restart executed	A
	5	DIA MAINTENANCE	Maintenance necessary	R
	6	DIA_CHARACT	Invalid identifier	R
	7	IDENT NUMBER Violation	= 1, if the ID number of the current cyclic data transfer and the value of the IDENT NUMBER parameter of the physical block are different	R
13	0	DIA_MAINTENANCE_ALARM	Device error	R
	1	DIA_MAINTENANCE_DEMANDED	Maintenance requested	R
	2	DIA_FUNCTION_CHECK	Device is in a functional check or in simulation or under local operator control (maintenance)	R
	3	DIA_INV_PRO_COND	The process conditions do not permit valid values to be returned. (Set if quality "Uncertain, process-related, no maintenance" or "Bad, process-related, no maintenance")	R
	4...7	Reserved	Reserved for PNO, default 0	
14	0...4	Reserved	Reserved for PNO use	
	5	PROFILE_SPECIFIC_EXTENSION_AVAILABLE	= 0: For devices with this profile	
	6		= 0: For devices with this profile	
	7	MANUFACTURER_SPECIFIC_EXTENSION_AVAILABLE	= 0: No further diagnostic information available	
		EXTENSION_AVAILABLE	= 1: Further diagnostic information available in DIAGNOSIS_EXTENSION	

Display class R = incoming / outgoing events.

Display class A = incoming events that are reset by the field device after a few cycles. All events in byte 11 and the events of bit 0, 1 and 2 in byte 12 lead to the value status “Higher-level error” (OMODE_xx (Page 527) = 16#40xxxxxx).

Bytes 11, 12, 13, and 14 are entered in bytes 0 to 3 of the PA_DIAG parameter to generate messages and maintenance status (MS) in the MOD_PAX0/MOD_PAL0 block.

Special features of PA_AO and PA_DO field devices

With the field devices listed above, the PA profiles can be defined at two different slots. In this case, the driver generator will assign the mode code of the PA field device to the first slot and the mode code 16#8000 to the second at the corresponding MODE inputs of the block. The block links the diagnostic information of the second slot with the first with an OR logic operation. which allows the generation of a uniform value status for the PA_x block.

Redundancy

The higher-level block evaluates the redundancy of DP master systems operating in an H system.

OMODE Structure

You will find additional information in the "OMODE (Page 527)" section.

Addressing

You will find additional information in the "Addressing (Page 530)" section.

Error handling

The plausibility of input parameters is not checked.

Startup characteristics

A restart (OB 100) is reported via the LSB in byte 2 of the OMODE_xx (Page 527) outputs.

Time response

Not available

Message response

Not available

Operator control and monitoring

The block has no faceplate.

6.70.2 I/Os of PADP_L10

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O	Meaning	Type	Default
DADDR	Diagnostic address of the PA field device or DP/PA link	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_DIAG	1 = Queued diagnostic event	BOOL	0
MODE_xx	Mode slot (xx = 16 - 31)	WORD	0
PADP_ADR	Address of the PA field device	BYTE	0
PROF_V30	1 = PA slave profile V3.0	BOOL	0
RACK_NO	Address of PA field device or rack number	BYTE	255
SLOT0_NO	Slot number 0 of the field device in the DP/PA or Y link, or 0 if there is no link	BYTE	0
SLOTS_NO	Number of slots of the field device	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O	Meaning	Type	Default
DINFO	Diagnostic status of the PA field device	STRUCT	
EN_M_xx	Enable slot (xx = 0 - 31)	BOOL	0
OMODE_xx	Mode slot (xx = 16 - 31)	DWORD	0
PA_DIAG	PA field device diagnostic information	DWORD	0
QERR	1 = program error	BOOL	0
QMODF	1 = field device error/fault	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O	Meaning	Type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics	STRUCT	
CPU_OB_5X	OB_5x startup information	STRUCT	
RAC_DIAG	PA field device or link diagnostics	STRUCT	

6.71 PADP_L10_PN: Monitoring PA slaves downstream of DPV0 with up to 16 slots

6.71.1 Description of PADP_L10_PN

Object name (type + number)

FB 203

- I/Os of PADP_L10_PN (Page 392)

Area of application

Block PADP_L10_PN monitors DPV0 PA field devices with a maximum of 16 slots which are operated as DPV0 slaves on a DP master system, either directly or via a DP/PA coupler. The DP/PA coupler is connected downstream of an IE/PB link. The PA field devices must conform to the PROFIBUS V3.0 profile.

6.71.2 I/Os of PADP_L10_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O	Meaning	Type	Default
DADDR	Diagnostic address of the PN IO device	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_DIAG	1 = Queued diagnostic event	BOOL	0
MODE_xx	Mode slot (xx = 00 - 31)	WORD	0
PADP_ADR	Address of the PA field device	BYTE	0
PROF_V30	1 = PA slave profile V3.0	BOOL	0
RACK_NO	Rack number	BYTE	255
SLOT0_NO	Slot number 0 of the slave at the IE/PB link	BYTE	0
SLOTS_NO	Number of slots of the field device	BYTE	0
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	PN IO system 1 ID (100 - 115)	BYTE	255
SUBN2_ID	PN IO system 2 ID (100 - 115)	BYTE	255

Output parameters

I/O	Meaning	Type	Default
DINFO	Diagnostic status of the PA field device	STRUCT	
EN_M_xx	Enable slot (xx = 0 - 31)	BOOL	0
OMODE_xx	Mode slot (xx = 16 - 31)	DWORD	0
PA_DIAG	PA field device diagnostic information	DWORD	0
QERR	1 = program error	BOOL	0
QMODF	1 = field device error/fault	BOOL	0
QPERAF	1 = I/O access error	BOOL	0
QRACKF	1 = higher-level error	BOOL	0

In/out parameters

I/O	Meaning	Type	Default
ACC_MODE	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	
CPU_OB_5X	OB_5x startup information	STRUCT	
RAC_DIAG	System structure: RACK diagnostics	STRUCT	

6.72 PAM_CD: Monitoring Compact Devices within the Package Unit

6.72.1 Description of PAM_CD

Object name (type + number)

FB 438

- I/Os of PAM_CD (Page 397)

Functions

The PAM_CD block:

- Retrieves data from the Compact Devices(CD) of the package unit and sends it to the automation station of the PAM unit.
- Reads 160 bytes of data specific to PAM_CD block from the user data block (for example: DB_PAM_CD) of the package unit.

How it works

The PAM_CD block retrives data either through the DB_PAM_CD block of the package unit or through the PAM_IF block. (For more information on PAM_IF block see: PAM_IF: Interface block to PAM Diagnostic Blocks (Page 505))

It creates Maintenance Status (MS) that depends on:

- MS provided by SIMATIC PDM.
- External MS.
- Analog values that are monitored for three limits.
- Status of the analog values.

Of all these events, the highest priority event is displayed in the MS.

Note

The table below is valid exclusively for the MS and not for the signal status displays of the individual process values; these are created exclusively by the ST parameters. The priority is similar to the MS coding. Therefore, the following applies: the lower the value of the MS, the higher the priority.

GP bits of DB_CPU	MS via PDM	PVx.Value via DXCHG	PVx.ST via DXCHG	MS_Ext via DXCHG	Output parameter (O_MS)
10...16: Reserve					10...16
9: Redundancy error	9				9
8: Unknown	8				8
7: Configuration changed	7	`PVx.Value >= PVx_AH`	16#00	7	7
6: Function control	6	`PVx_AH > PVx.Value >= PVx_DH`	16#68	6	6
5: Passivated	5	`PVx_DH > PVx.Value >= PVx_RH`	16#A4	5	5
4: Out of order	4				4
3: Maintenance request	3		16#60		3
2: Maintenance demand	2				2
1: Maintenance alarm	1				1
	0	`PVx_RH > PVx.Value`	16#28, 16#78		0

The inputs `PVx.Value` and `PVx.ST` are transfered via DXCHG with PAM_IF block. However, the source of these inputs might differ between DB or direct connection in CFC (Link).

When you click the "Reset" button in the faceplate, a reset impulse is available at the corresponding output of the PAM_IF block for one cycle. After one successful cycle, the reset value is set back to 0 PAM_CD block and the diagnostic information is transferred to PAM_IF block.

The PAM_CD block does not participate in coordination if DBNO=0.

A message "Communication breakdown" is reported and MS of 6 is set.

- If the communication between PAM_CD block of PAM station and package unit is disrupted.
- If the OT <> 4 (compact device). In case the OT delivered by data block do not match with the expected OT of PAM_CD, then OT = 4.

Calling OBs

The PAM_CD block is instantiated during diagnostics screen generation in OB35. The block coordinates the FB_GET operations of lower order objects. Here, the lower order block refers to PAM_SM, PAM_IM, and PAM_CD whereas, the higher order block refers to PAM_CPU.

The following parameters are automatically parametrized by the driver generator:

Parameter	Meaning
`PLT_ID`	PLT-ID of SIMATIC PDM object.
`ID`	Netpro connection ID.
`DBNO`	Data block number configured in the "Advanced Diagnostics Settings" of Plant Hierarchy (PH).

The following output parameters are automatically connected with corresponding parameters within the lower order blocks by the driver generator:

Output parameter of PAM_CPU block	connected with I/O parameter of PAM_CD block
`TOP_SI`	`TOP_SI`
`START_UP_SI`	`START_UP_SI`
`DXCHG_xx (xx: 00..199)`	`DXCHG_IN`

If the processing of Process Value for the corresponding PAM object is enabled in "Advanced Diagnostic Settings" dialog of PH, the following connections are automatically created by the driver generator:

Output parameter of PAM_CPU block	connected with I/O parameter of PAM_IF block
`DXCHG_PAM`	`DXCHG_PAM`

Error handling

The values of I/Os `QERR` and `ERR_NUM` are independent of each other.

The value of `QERR = 1` represents a runtime error.

The ERR_NUM I/O is used to obtain the following errors in the output:

Error number	Meaning
-1	Predefined value when inserting the block; block is not processed.
0	There is no error.
1	Connection problems, for example: • Connection is not established. • Connection establishment is in progress. • No availability of information regarding connection status. • Connection is not configured.
2	Negative acknowledgement from the partner device. The function cannot be executed.
3	Access error on the partner CPU.
4	Errors in the receive area pointers RD_i involving the data length or the data type.
5	No instance data block found. • Access to the local user memory is not possible (for example, access to a deleted data block). • S7-400: Not enough work memory is available. If there is still enough total work memory available, then the solution is to compress the work memory.
6	OT number is not equal to 4.

Startup characteristics

The PAM_CD block initializes the instances of ALARM_8P and NOTIFY_8P. Once the startup for the number of cycles is set at RunUpCyc, the messages are suppressed.

Modes

The following modes are available for operators in the faceplate to initiate or select an operation:

- On
- Passivated
- Out of service

On

The following actions occur in this mode:

- processing of messages (for example: alarms).
- processing of MS, MS_Ext, and signal states.

Passivated

The following actions occur in this mode:

- processing of MS, MS_Ext, and signal states but without any impact on MS.
- setting the value of MS_OUT to 16#01 (to denote the "passivated" mode).

The following action **does not** occur in this mode:

- processing of messages (for example: alarms).

Out of service

The following actions occur in this mode:

- setting the value of `MS_OUT` = 16#02 (to denote "out of service" mode).
- processing of analog values `PVx.Value` = 0, `PVx_ST`=16#80.
- disabling the display of `DIAG_GB` / `DIAG_DD` parameter in "Binary details diagnose view" of faceplate. The value of `DIAG_GB` / `DIAG_DD` is set to 0.

The following actions **do not** occur in this mode:

- processing of messages (for example: alarms).
- processing of `MS`, `MS_Ext`, and signal states.
- FB_GET operations.

In the "Monitoring View", all the information is displayed in grey.

Time response

Not available

Additional information

For additional information, refer to the sections:

Messages and associated values of PAM_CD (Page 400)

I/Os of PAM_CD (Page 397)

6.72.2 I/Os of PAM_CD

I/Os of PAM_CD

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O Parameter	Meaning	Type	Default
PLT_ID	Asset ID for EDD	DWORD	16#00000000
MS	Maintenance status	DWORD	16#F0000008
MS2	Maintenance status 2 for OS operations	DWORD	16#00000000

I/O Parameter	Meaning	Type	Default
EV_ID1	Message number 1	DWORD	16#00000000
EV_ID2	Message number 2	DWORD	16#00000000
EN_MSG	1 = Enable message	BOOL	1
RUNUPCYC	Number of Run Up Cycles	INT	1
CYCL_UPD	1 = Cyclic update active (preselection for FB first run or CPU restart)	BOOL	1
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	1
FEATURE	Feature parameter	DWORD	16#00000000
ID	Netpro connection ID	WORD	16#0000
DBNO	Data block number	WORD	16#0000
PV_EN	1 = Enable process value	BOOL	1
PVx_AH_En	1=Enable maintenance alarm process value x (x: 0...2)	BOOL	1
PVx_DH_En	1=Enable maintenance demand process value x (x: 0...2)	BOOL	1
PVx_RH_En	1=Enable maintenance request process value x (x: 0...2)	BOOL	1
PVx_Rst	Reset process value x(x: 0...2)	BOOL	1

Output parameters

I/O Parameter	Meaning	Type	Default
QERR	1 = Runtime error	BOOL	1
O_MS	Maintenance state	DWORD	16#08000000
MSG_STATx	Message status x (x:1...2)	WORD	16#0000
MSG_ERRx	Message error x (x: 1...2)	WORD	16#0000
MSG_ACKx	Message acknowledgementx (x:1)	WORD	16#0000
NDR1	SFB14 New data received 1	BOOL	1
ERROR1	SFB14 Error 1	BOOL	1
STATUS1	SFB14 Status number 1	WORD	16#0000
DB_LID	LID	STRING(64)	”
DB_CP	Connection point	STRING(64)	”
DB_OT	Object type	INT	1
DIAG_GB	Interface sector Pos01-16	WORD	16#0000
DIAG_DD	Detail diagnosis	WORD	16#0000
DIAG_ST	Status information	BYTE	0
ERR_NUM	Error number	INT	1
P_PVx_Rst	1=Reset process value x (x: 0...2)	STRUCT	0
PVx_AH_Act	1=Limit maintenance alarm process value x (x: 0...2)	BOOL	1
PVx_DH_Act	1=Limit maintenance demand process value x (x: 0...2)	BOOL	1

I/O Parameter	Meaning	Type	Default
PVx_RH_Act	1=Limit maintenance request process value x (x: 0...2)	BOOL	1
PVx_Diff	Difference value to the next expected Alarm x (x: 0...2)	STRUCT	0 16#80
DXCHG_PAM	Bidirectional data exchange channel	STRUCT (UDT283)	0
ERROR	Connection function check ERROR	BOOL	1
STATUS	Connection function check STATUS	WORD	16#0000
C_CONN	Status of the corresponding connection	BOOL	1
C_STATUS	Connection status	WORD	16#0000
PVx	Process value x (x: 0...2)	STRUCT	0 16#80
PVx_AH	Limit maintenance alarm process value x (x: 0...2)	REAL	99.99
PVx_DH	Limit maintenance demand process value x (x: 0...2)	REAL	99.99
PVx_RH	Limit maintenance request process value x (x: 0...2)	REAL	99.99
PVx_Name	Text of Process value x (x:0...2)	STRING[16]	"
PVx_Unit	Unit of Process value x (x:0...2)	INT	1
PVx_OpScale	Range of process value x (x: 0...2)	STRUCT	0 100
UPDATE_TIME	Time of update in ms	DINT	0
PRE_UP-DATE_TIME	Time of previous update in ms	DINT	0
UP-DATE_DIFF_TIME	Time difference between present and previous update in ms	DINT	0

In_Out parameters

I/O Parameter	Meaning	Type	Default
ACC_MODE	1 = Accept new settings	BOOL	1
DXCHG_IN	Bidirectional data exchange channel	DWORD	16#00000000
TOP_SI	Start information of the current OB	STRUCT	0
START_UP_SI	Start information of the startup OB last started	STRUCT	0

Additional information

For additional information, refer to the section:

Messages and associated values of PAM_CD (Page 400)

Message Classes (Page 531)

6.72.3 Messages and associated values of PAM_CD

Assignment of message text and message class

The process control messages of `ALARM_8P` with `EV_ID1` are assigned as follows:

Message number	Default message text	Message class
1	Maintenance alarm (@4W%t#PAM_CD_TXT@): PLC	PLC Process Control Message - Failure
2	Communication breakdown: PLC Process Control Message - Error	PLC Process Control Message - Error
3	Maintenance demand (@4W%t#PAM_CD_TXT@): PLC Process Control Message - Error	PLC Process Control Message - Error
4	Maintenance request (@4W%t#PAM_CD_TXT@)	Preventative Maintenance - Standard
5	Device out of order (@4W%t#PAM_CD_TXT@)	PLC Process Control Message - Failure
6		No message
7		No message
8		No message

The process control messages of `NOTIFY_8P` with `EV_ID2` are assigned as follows:

Message number	Default message text	Message class
1	Device passivated (@1W%t#PAM_CD_TXT@)	Status Message - PLC
2	Undefined diagnostics (@1W%t#PAM_CD_TXT@)	Status Message - PLC
3	Local operation/functional check (@1W %t#PAM_CD_TXT@)	Status Message - PLC
4	Simulation (@1W%t#PAM_CD_TXT@	Status Message - PLC
5	Configuration change (@1W%t#PAM_CD_TXT@)	Status Message - PLC
6	Process-related fault (@1W%t#PAM_CD_TXT@)	Status Message - PLC
7		No message
8		No message

You can find additional information in the section: Message Classes (Page 531)

6.73 PAM_CPU: Monitoring CPUs within the Package Unit

6.73.1 Description of PAM_CPU

Object name (type + number)

FB 436

- I/Os of PAM_CPU (Page 405)

Functions

The PAM_CPU block:

- Coordinates with the lower order objects of package unit.
- Reads 160 bytes of data specific to PAM_CPU block from the user data block (for example: DB_CPU_XX) of the package unit.

How it works

The PAM_CPU block obtains data specific to PAM station either through the package unit or through the PAM_IF block. (For more information on PAM_IF block see:PAM_IF: Interface block to PAM Diagnostic Blocks (Page 505)).

It creates Maintenance Status (MS) that depends on:

- MS provided by SIMATIC PDM.
- External MS.
- Analog values that are monitored for three limits.
- Status of the analog values.

Of all these events, the highest priority event is displayed in the MS.

Note

The table below is valid exclusively for MS and not for the signal status displays of individual process values (these are created exclusively by the ST parameters). The priority is similar to MS coding. Therefore, the following applies: the lower the value of the MS, the higher the priority.

GP bits of DB_CPU	MS via PDM	PVx.Value via DXCHG	PVx.ST via DXCHG	MS_Ext via DXCHG	Output parameter (O_MS)
12...16: Reserve					12...16
11: Productinfo Rack 0/1					11
10: Productinfo Single/Red					10
9: Redundancy error	9				9
8: Unknown	8				8
7: Configuration changed	7	`PVx.Value >= PVx_AH`	16#00	7	7
6: Function control	6	`PVx_AH > PVx.Value >= PVx_DH`	16#68	6	6
5: Reserved	5	`PVx_DH > PVx.Value >= PVx_RH`	16#A4	5	5

GP bits of DB_CPU	MS via PDM	PVx.Value via DXCHG	PVx.ST via DXCHG	MS_Ext via DXCHG	Output parameter (O_MS)
4: Reserved	4				4
3: Maintenance request	3		16#60		3
2: Maintenance demand	2				2
1: Maintenance alarm	1				1
	0	`PVx_RH` > `PVx.Value`	16#28, 16#78		0

The inputs `PVx.Value` and `PVx.ST` are transfered via DXCHG with PAM_IF block. However, the source of these inputs might differ between DB or direct connection in CFC (Link).

When you click the "Reset" button in the faceplate, a reset impulse is available at the corresponding output of the PAM_IF block for one cycle. After one successful cycle, the reset value is set back to 0 in PAM_SM /PAM_IM /PAM_CD block and the diagnostic information is transferred to PAM_IF block.

A message "Communication breakdown" is reported and MS of 6 is set if:

- the communication between the PAM_CPU blocks of PAM station and the package unit is disrupted.
- OT (Object Type) <> 1 (CPU). In case the OT delivered by data block do not match with the expected OT of PAM_CPU, then OT = 1.

Calling OBs

The PAM_CPU block is instantiated during diagnostics screen generation in OB35. The block coordinates the FB_GET operations of lower order objects. Here, the lower order block refers to PAM_SM, PAM_IM, and PAM_CD whereas, the higher order block refers to PAM_CPU.

The following parameters are automatically parameterized by the driver generator:

Parameter	Meaning
`PLT_ID`	PLT-ID of SIMATIC PDM object.
`ID`	Netpro connection ID.
`DBNO`	Data block number configured in the "Advanced Diagnostics Settings" of Plant Hierarchy (PH).

The following output parameters are automatically connected with corresponding parameters within the lower order blocks by the driver generator:

Output parameter of PAM_CPU block	connected with I/O parameter of PAM_SM / PAM_IM / PAM_CD block
`TOP_SI`	`TOP_SI`
`START_UP_SI`	`START_UP_SI`
`DXCHG_xxx (xxx: 0...199)`	`DXCHG_IN`

If the processing of Process Value for the corresponding PAM object is enabled in "Advanced Diagnostic Settings" dialog of PH, the following connections are automatically created by the driver generator:

Output parameter of PAM_CPU block	connected with I/O parameter of PAM_IF block
DXCHG_PAM	DXCHG_PAM

Error handling

The values of I/Os QERR and ERR_NUM are independent of each other.

The value of QERR = 1 represents a runtime error.

The ERR_NUM I/O is used to obtain the following errors in the output:

Error number	Meaning
-1	Predefined value when inserting the block; block is not processed.
0	There is no error.
1	Connection problems, for example: • Connection is not established. • Connection establishment is in progress. • No availability of information regarding connection status. • Connection is not configured.
2	Negative acknowledgement from the partner device. The function cannot be executed.
3	Access error on the partner CPU.
4	Errors in the receive area pointers RD_i involving the data length or the data type.
5	No instance data block found. • Access to the local user memory is not possible (for example, access to a deleted data block). • S7-400: Not enough work memory is available. If there is still enough total work memory available, then the solution is to compress the work memory.
6	OT number is not equal to 1.

Startup characteristics

The PAM_CPU block initializes the instances of ALARM_8P and NOTIFY_8P . Once the startup for the number of cycles is set at RunUpCyc, the messages are suppressed.

Modes

The following modes are available for operators in the faceplate to initiate or select an operation:

- On
- Passivated
- Out of service

On

The following actions occur in this mode:

- processing of messages (for example: alarms).
- processing of `MS`, `MS_Ext` and signal states.

Passivated

The following actions occur in this mode:

- processing of `MS`, `MS_Ext`, and signal states but without any impact on MS.
- setting the value of MS_OUT to 16#01 (to denote the "passivated" mode).

The following action **does not** occur in this mode:

- processing of messages (for example: alarms).

Out of service

The following actions occur in this mode:

- setting the value of `MS_OUT` = 16#02 (to denote "out of service" mode).
- processing of analog values `PVx.Value` = 0, and `PVx_ST` = 16#80.
- disabling the display of `DIAG_GB` / `DIAG_DD` parameter in "Binary details diagnose view" of faceplate. The value of `DIAG_GB` / `DIAG_DD` is set to 0.

The following actions **do not** occur in this mode:

- processing of messages (for example: alarms).
- processing of `MS`, `MS_Ext`, and signal states.
- FB_GET operations.

In the "Monitoring View", all the information is displayed in grey.

Time response

Not available

Additional information

For additional information, refer to the sections:

Message text and associated values of PAM_CPU (Page 407)

Maintenance status MS (Page 533)

See also

Description of PAM_IF (Page 505)

6.73.2 I/Os of PAM_CPU

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
PLT_ID	Asset ID for EDD	DWORD	16#00000000
MS	Maintenance status	DWORD	16#F0000008
MS2	Maintenance status 2 for OS operations	DWORD	16#00000000
EV_ID1	Message number 1	DWORD	16#00000000
EV_ID2	Message number 2	DWORD	16#00000000
EN_MSG	1 = Enable message	BOOL	1
RUNUPCYC	Number of Run Up Cycles	INT	1
CYCL_UPD	1 = Cyclic update active (preselection for FB first run or CPU restart)	BOOL	1
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	1
FEATURE	Feature parameter	DWORD	16#00000000
ID	Netpro connection ID	WORD	16#0000
DBNO	Data block number	WORD	16#0000
PV_EN	1 = Enable process value	BOOL	1
PVx_AH_En	1=Enable maintenance alarm process value x (x: 0...2)	BOOL	1
PVx_DH_En	1=Enable maintenance demand process value x (x: 0...2)	BOOL	1
PVx_RH_En	1=Enable maintenance request process value x (x: 0...2)	BOOL	1
PVx_Rst	Reset process value x (x: 0...2)	BOOL	1

Output parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1 = Runtime error	BOOL	1
O_MS	Maintenance state	DWORD	16#08000000

I/O (parameter)	Meaning	Data type	Default
MSG_STATx	Message status x (x:1...2)	WORD	16#0000
MSG_ERRx	Message error x (x: 1...2)	WORD	16#0000
MSG_ACKx	Message	WORD	16#0000
NDR1	SFB14 New data received 1	BOOL	1
ERROR1	SFB14 Error 1	BOOL	1
STATUS1	SFB14 Status number 1	WORD	16#0000
DB_LID	LID	STRING(64)	"
DB_CP	OKZ	STRING(64)	"
DB_OT	Object type	INT	1
DIAG_GB	Global part	WORD	16#0000
DIAG_DD	Detail diagnosis	WORD	16#0000
P_PVx_Rst	1=Reset process value x (x: 0...2)	STRUCT	16#0000
PVx_AH_Act	1=Limit maintenance alarm process value x (x: 0...2)	BOOL	1
PVx_DH_Act	1=Limit maintenance demand process value x (x: 0...2)	BOOL	1
PVx_RH_Act	1=Limit maintenance request process value x (x: 0...2)	BOOL	1
PVx_Diff	Difference value to the next expected Alarm x (x: 0...2)	STRUCT	0 16#80
PVx	Process value x (x: 0...2)	STRUCT	0 16#80
PVx_AH	Limit maintenance alarm process value x (x: 0...2)	REAL	99.99
PVx_DH	Limit maintenance demand process value x (x: 0...2)	REAL	99.99
PVx_RH	Limit maintenance request process value x (x: 0...2)	REAL	99.99
PVx_Name	Text of Process value x (x:0...2)	STRING[16]	"
PVx_Unit	Unit of Process value x (x:0...2)	INT	1
PVx_OpScale	Range of process value x (x: 0...2)	STRUCT	0 100
RESERVE_00	Reserve	BYTE	0
DXCHG_xx	Bidirectional data exchange Channel xx (xx:00...199)	DWORD	16#00000000
TOP_SI	Start information of the current OB	STRUCT	0
START_UP_SI	Start information of the startup OB last started	STRUCT	0
ERROR	Connection function check ERROR	BOOL	1
STATUS	Connection function check STATUS	WORD	16#0000
C_CONN	Status of the corresponding connection	BOOL	1
C_STATUS	Connection status	WORD	16#0000
UPDATE_TIME	Time of update in ms	DINT	0

I/O (parameter)	Meaning	Data type	Default
PRE_UP-DATE_TIME	Time of previous update in ms	DINT	0
UP-DATE_DIFF_TIME	Time difference between present and previous update in ms	DINT	0
ERR_NUM	Error number	INT	1
DXCHG_PAM	Bidirectional data exchange Channel	STRUCT (UDT283)	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_MODE	1= Accept new settings	BOOL	1

Additional information

For additional information, refer to the section:

Message text and associated values of PAM_CPU (Page 407)

Maintenance status MS (Page 533)

6.73.3 Message text and associated values of PAM_CPU

Assignment of message text and message class

The process control messages of `ALARM_8P` with `EV_ID1` are assigned as follows:

Message number	Default message text	Message class
1	Maintenance alarm (@4W%t#PAM_CPU_TXT@)	PLC Process Control Message - Failure
2	Communication breakdown: PLC Process Control	PLC Process Control Message - Error
3	Maintenance demand (@4W %t#PAM_CPU_TXT@):PLC	PLC Process Control Message - Error
4	Maintenance request (@4W%t#PAM_CPU_TXT@)	Preventative Maintenance - Standard
5	Device out of order (@4W%t#PAM_CPU_TXT@): PLC	PLC Process Control Message - Failure
6		No message
7		No message
8		No message

The process control messages of `NOTIFY_8P` with `EV_ID2` are assigned as follows:

Message number	Default message text	Message class
1	Device passivated (@1W%t#PAM_CPU_TXT@):	Status Message - PLC
2	Undefined diagnostics (@1W%t#PAM_CPU_TXT@)	Status Message - PLC
3	Local operation/functional check (@1W %t#PAM_SM_TXT@)	Status Message - PLC
4	Simulation (@1W%t#PAM_CPU_TXT@)	Status Message - PLC
5	Configuration change (@1W%t#PAM_SM_TXT@)	Status Message - PLC
6	Process-related fault (@1W%t#PAM_CPU_TXT@)	Status Message - PLC
7		No message
8		No message

You can find additional information in the section: Message Classes (Page 531)

6.74 PAM_IM: Monitoring Interface Modules within the Package Unit

6.74.1 Description of PAM_IM

Object name (type + number)

FB 422

- I/Os of PAM_IM (Page 412)

Functions

The PAM_IM block:

- Retrieves data from the Interface Modules (IM) of the package unit and sends it to the automation station of the PAM unit.
- Reads 160 bytes of data specific to the PAM_IM block from the user data block (DB_PAM_IM) of the package unit.

How it works

The PAM_IM block retrives data either through the DB_PAM_IM block of the package unit or through the PAM_IF block. (For more information on PAM_IF block see: PAM_IF: Interface block to PAM Diagnostic Blocks (Page 505)).

It creates Maintenance Status (MS) that depends on:

- MS provided by SIMATIC PDM.
- External MS.

- Analog values that are monitored for three limits.
- Status of the analog values.

Of all these events, the highest priority event is displayed in the MS.

Note

The table below is valid exclusively for the MS and not for the signal status displays of the individual process values; these are created exclusively by the ST parameters. The priority is similar to the MS coding. Therefore, the following applies:the lower the value of the MS, the higher the priority.

GP bits of DB_CPU	MS via PDM	PVx.Value via DXCHG	PVx.ST via DXCHG	MS_Ext via DXCHG	Output parameter (O_MS)
10...16: Reserve					10...16
9: Redundancy error	9				9
8: Unknown	8				8
7: Configuration changed	7	`PVx.Value >= PVx_AH`	16#00	7	7
6: Function control	6	`PVx_AH > PVx.Value >= PVx_DH`	16#68	6	6
5: Passivated	5	`PVx_DH > PVx.Value >= PVx_RH`	16#A4	5	5
4: Out of order	4				4
3: Maintenance request	3		16#60		3
2: Maintenance demand	2				2
1: Maintenance alarm	1				1
	0	`PVx_RH > PVx.Value`	16#28, 16#78		0

The inputs `PVx.Value` and `PVx.ST` are transfered via DXCHG with PAM_IF block. However, the source of these inputs might differ between DB or direct connection in CFC (Link).

When you click the "Reset" button in the faceplate, a reset impulse is available at the corresponding output of the PAM_IF block for one cycle. After one successful cycle, the reset value is set back to 0 PAM_IM block and the diagnostic information is transferred to PAM_IF block.

The PAM_IM block does not participate in coordination if DBNO=0.

A message "Communication breakdown" is reported and MS of 6 is set:

- If the communication between PAM_IM block of PAM station and package unit is disrupted.
- If the OT <> 2 (interface modules). In case the OT delivered by data block do not match with the expected OT of PAM_IM, then OT = 2.

Calling OBs

The PAM_IM block is instantiated during diagnostics screen generation in OB35. The block coordinates the FB_GET operations of lower order objects. Here, the lower order block refers to PAM_SM, PAM_IM, and PAM_CD whereas, the higher order block refers to PAM_CPU.

The following parameters are automatically parametrized by the driver generator:

Parameter	Meaning
PLT_ID	PLT-ID of SIMATIC PDM object.
ID	Netpro connection ID.
DBNO	Data block number configured in the "Advanced Diagnostics Settings" of Plant Hierarchy (PH).

The following output parameters are automatically connected with corresponding parameters within the lower order blocks by the driver generator:

Output parameter of PAM_CPU block	connected with I/O parameter of PAM_IM block
TOP_SI	TOP_SI
START_UP_SI	START_UP_SI
DXCHG_xx (xx: 00...199)	DXCHG_IN

If the processing of Process Value for the corresponding PAM object is enabled in "Advanced Diagnostic Settings" dialog of PH, the following connections are automatically created by the driver generator:

Output parameter of PAM_CPU block	connected with I/O parameter of PAM_IF block
DXCHG_PAM	DXCHG_PAM

Error handling

The values of I/Os QERR and ERR_NUM are independent of each other.

The value of QERR = 1 represents a runtime error.

The ERR_NUM I/O is used to obtain the following errors in output:

Error number	Meaning
-1	Predefined value when inserting the block; block is not processed.
0	There is no error.

Error number	Meaning
1	Connection problems, for example: • Connection is not established. • Connection establishment is in progress. • No availability of information regarding connection status. • Connection is not configured.
2	Negative acknowledgement from the partner device. The function cannot be executed.
3	Access error on the partner CPU.
4	Errors in the receive area pointers `RD_i` involving the data length or the data type.
5	No instance data block found. • Access to the local user memory is not possible (for example, access to a deleted data block). • S7-400: Not enough work memory is available. If there is still enough total work memory available, then the solution is to compress the work memory.
6	OT number is not equal to 2.

Startup characteristics

The PAM_IM block initializes the instances of `ALARM_8P` and `NOTIFY_8P` . Once the startup for the number of cycles is set at RunUpCyc, the messages are suppressed.

Modes

The following modes are available for operators in the faceplate to initiate or select an operation:

- On
- Passivated
- Out of service

On

The following actions occur in this mode:

- processing of messages (for example: alarms).
- processing of `MS`, `MS_Ext`, and signal states.

Passivated

The following actions occur in this mode:

- processing of `MS`, `MS_Ext`, and signal states but without any impact on MS.
- setting the value of MS_OUT to 16#01 (to denote the "passivated" mode).

The following action **does not** occur in this mode:

- processing of messages (for example: alarms).

Out of service

The following actions occur in this mode:

- setting the value of `MS_OUT` = 16#02 (to denote "out of service" mode).
- processing of analog values `PVx.Value` = 0, `PVx_ST`=16#80.
- disabling the display of `DIAG_GB` / `DIAG_DD` parameter in "Binary details diagnose view" of faceplate. The value of `DIAG_GB` / `DIAG_DD` is set to 0.

The following actions **do not** occur in this mode:

- processing of messages (for example: alarms).
- processing of `MS`, `MS_Ext`, and signal states.

In the "Monitoring View", all the information is displayed in grey.

Time response

Not available

Additional information

For additional information, refer to the sections:

Messages and associated values of PAM_IM (Page 415)

I/Os of PAM_IM (Page 412)

See also

Description of PAM_IF (Page 505)

6.74.2 I/Os of PAM_IM

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O Parameter	Meaning	Type	Default
PLT_ID	Asset ID for EDD	DWORD	16#00000000
MS	Maintenance status	DWORD	16#F0000008
MS2	Maintenance status 2 for OS operations	DWORD	16#00000000
EV_ID1	Message number 1	DWORD	16#00000000
EV_ID2	Message number 2	DWORD	16#00000000

I/O Parameter	Meaning	Type	Default
EN_MSG	1 = Enable message	BOOL	1
RUNUPCYC	Number of Run Up Cycles	INT	1
CYCL_UPD	1 = Cyclic update active (preselection for FB first run or CPU restart)	BOOL	1
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	1
FEATURE	Feature parameter	WORD	16#0000
ID	Netpro connection ID	WORD	16#0000
DBNO	Data block number	WORD	16#0000
PV_EN	1 = Enable process value	BOOL	1
PVx_AH_En	1=Enable maintenance alarm process value x (x: 0...2)	BOOL	1
PVx_DH_En	1=Enable maintenance demand process value x (x: 0...2)	BOOL	1
PVx_RH_En	1=Enable maintenance request process value x (x: 0...2)	BOOL	1
PVx_Rst	Reset process value x(x: 0...2)	BOOL	1

Output parameters

I/O Parameter	Meaning	Type	Default
QERR	1 = Runtime error	BOOL	1
O_MS	Maintenance state	DWORD	16#08000000
MSG_STATx	Message status x (x:1...2)	WORD	16#0000
MSG_ERRx	Message error x (x: 1...2)	WORD	16#0000
MSG_ACKx	Message acknowledgement x (x:1)	WORD	16#0000
NDR1	SFB14 New data received 1	BOOL	1
ERROR1	SFB14 Error 1	BOOL	1
STATUS1	SFB14 Status number 1	WORD	1
DB_LID	LID	STRING(64)	″
DB_CP	Connection point	STRING(64)	″
DB_OT	Object type	INT	1
RESERVE_00	Reserve	DWORD	16#00000000
DIAG_GB	Global part	WORD	16#0000
DIAG_DD	Detail diagnosis	WORD	16#0000
DIAG_ST	Status information	BYTE	0
RESERVE_01	Reserve	WORD	16#0000
SM_NOK1	Signal module status 0...31	DWORD	16#00000000
SM_NOK2	Signal module status 31...63	DWORD	16#00000000
ERR_NUM	Error number	INT	1
P_PVx_Rst	1=Reset process value x (x: 0...2)	STRUCT	0

I/O Parameter	Meaning	Type	Default
PVx_AH_Act	1=Limit maintenance alarm process value x (x: 0...2)	BOOL	1
PVx_DH_Act	1=Limit maintenance demand process value x (x: 0...2)	BOOL	1
PVx_RH_Act	1=Limit maintenance request process value x (x: 0...2)	BOOL	1
PVx_Diff	Difference value to the next expected Alarm x (x: 0...2)	STRUCT	0 16#80
DXCHG_PAM	Bidirectional data exchange Channel	STRUCT (UDT283)	0
ERROR	Connection function check ERROR	BOOL	1
STATUS	Connection function check STATUS	WORD	16#0000
C_CONN	Status of the corresponding connection	BOOL	1
C_STATUS	Connection status	WORD	16#0000
PVx	Process value x (x: 0...2)	STRUCT	0 16#80
PVx_AH	Limit maintenance alarm process value x (x: 0...2)	REAL	99.99
PVx_DH	Limit maintenance demand process value x (x: 0...2)	REAL	99.99
PVx_RH	Limit maintenance request process value x (x: 0...2)	REAL	99.99
PVx_Name	Text of Process value x (x:0...2)	STRING[16]	"
PVx_Unit	Unit of Process value x (x:0...2)	INT	1
PVx_OpScale	Range of process value x (x: 0...2)	STRUCT	0 100
UPDATE_TIME	Time of update in ms	DINT	0
PRE_UP-DATE_TIME	Time of previous update in ms	DINT	0
UP-DATE_DIFF_TIME	Time difference between present and previous update in ms	DINT	0
DXCHG_xx	Bidirectional data exchange Channel xx (xx: 00...63)	DWORD	16#00000000

In/Out parameters

I/O Parameter	Meaning	Type	Default
ACC_MODE	1 = Accept new settings	BOOL	1
DXCHG_IN	Bidirectional data exchange Channel	DWORD	16#00000000
TOP_SI	Start information of the current OB	STRUCT	0
START_UP_SI	Start information of the startup OB last started	STRUCT	0

Additional information

For additional information, refer to the section:

Messages and associated values of PAM_IM (Page 415)

Message Classes (Page 531)

6.74.3 Messages and associated values of PAM_IM

Assignment of message text and message class

The process control messages of `ALARM_8P` with `EV_ID1` are assigned as follows:

Message number	Default message text	Message class
1	Maintenance alarm (@4W%t#PAM_IM_TXT@)	PLC Process Control Message - Failure
2	Communication breakdown	PLC Process Control Message - Error
3	Maintenance demand (@4W%t#PAM_IM_TXT@)	PLC Process Control Message - Error
4	Maintenance request (@4w%t#PAM_IM_TXT@)	Preventative Maintenance - Standard
5	Device out of order (@4W%t#PAM_IM_TXT@)	PLC Process Control Message - Failure
6		No message
7		No message
8		No message

The process control messages of `NOTIFY_8P` with `EV_ID2` are assigned as follows:

Message number	Default message text	Message class
1	Device passivated (@1W%t#PAM_IM_TXT@)	Status Message - PLC
2	Undefined diagnostics (@1W%t#PAM_IM_TXT@)	Status Message - PLC
3	Local operation/functional check (@1W %t#PAM_IM_TXT@)	Status Message - PLC
4	Simulation (@1W%t#PAM_IM_TXT@)	Status Message - PLC
5	Configuration change (@1W%t#PAM_IM_TXT@)	Status Message - PLC
6	Process-related fault (@1W%t#PAM_IM_TXT@)	Status Message - PLC
7		No message
8		No message

You can find additional information in the section: Message Classes (Page 531)

6.75 PAM_SM: Monitoring Signal Modules within the Package Unit

6.75.1 Description of PAM_SM

Object name (type + number)

FB 437

- I/Os of PAM_SM (Page 419)

Functions

The PAM_SM block:

- Processes the data specific to Signal Module(SM) received from the higher order block (PAM_IM).
- Processes the values from PAM_IF block that is displayed in the operator station.

It is employed only to process the data but not to retrieve any data from the signal modules of PAM unit to the automation station of the PAM unit.

How it works

The PAM_IM block creates a Maintenance Status (MS) that depends on:

- MS provided by SIMATIC PDM.
- External MS.
- Analog values that are monitored for three limits.
- Status of the analog values.

Of all these events, the highest priority event is displayed in the MS.

Note

The table below is valid exclusively for the MS and not for the signal status displays of the individual process values; these are created exclusively by the ST parameters. The priority is similar to the MS coding. Therefore, the following applies:the lower the value of the MS, the higher the priority.

MS via PDM	PVx.Value via DXCHG	PVx.ST via DXCHG	MS_Ext Via DXCHG	Output parameter (O_MS)
9				9
8				8
7	`PVx.Value >= PVx_AH`	16#00	7	7

MS via PDM	PVx.Value via DXCHG	PVx.ST via DXCHG	MS_Ext Via DXCHG	Output parameter (O_MS)
6	`PVx_AH > PVx.Value >= PVx_DH`	16#68	6	6
5	`PVx_DH > PVx.Value >= PVx_RH`	16#A4	5	5
4				4
3		16#60		3
2				2
1				1
0	`PVx_RH > PVx.Value`	16#28, 16#78		0

The inputs `PVx.Value` and `PVx.ST` are transfered via DXCHG with PAM_IF block. However, the source of these inputs might differ between DB or direct connection in CFC (Link).

When you click the "Reset" button in the faceplate a reset impulse is available at the corresponding output of the PAM_IF block for one cycle.After one successful cycle, the reset value is set back to 0 in PAM_CD and the information is transferred to PAM_IF block.

In the case of "Communication breakdown", the `SM_NOKx` (transferred via `DXCHG_PAM_IM` I/O parameter) Information is not processed.

Calling OBs

The PAM_SM block is instantiated during diagnostics screen generation in OB35. The block coordinates the FB_GET operations of lower order objects. Here, the lower order block refers to PAM_SM, PAM_IM, and PAM_CD whereas, the higher order block refers to PAM_CPU.

The following parameters are automatically parametrized by the driver generator:

Parameter	Value
`PLT_ID`	PLT-ID of SIMATIC PDM object.

The following output parameters are automatically connected with corresponding parameters within the lower order blocks by the driver generator:

Output parameter of PAM_CPU block	connected with I/O parameter of PAM_SM block
`TOP_SI`	`TOP_SI`
`START_UP_SI`	`START_UP_SI`
`DXCHG_xx (xx: 00...199)`	`DXCHG_IN`

The following connections between the PAM_SM and PAM_IM blocks are automatically created by the driver generator:

Output parameter of PAM_IM block	connected with I/O Parameter of PAM_SM block
DXCHG_xx (xx: 00...63)	DXCHG_PAM_IM

If the processing of Process Value for the corresponding PAM object is enabled in "Advanced Diagnostic Settings" dialog of PH, the following connections are automatically created by the driver generator:

Output parameter of PAM_IM block	connected with I/O parameter of PAM_IF block
DXCHG_PAM	DXCHG_PAM

Error handling

The values of I/Os QERR and ERR_NUM are independent of each other.

The value of QERR = 1 represents a runtime error.

The ERR_NUM I/O is used to obtain the following errors in output:

Error number	Meaning of the error number
-1	Predefined value when inserting the block; block is not processed.
0	There is no error.
6	OT number is not equal to 3.

Startup characteristics

The PAM_SM block initializes the instances of ALARM_8P and NOTIFY_8P. Once the startup for the number of cycles is set at RunUpCyc, the messages are suppressed.

Modes

The following modes are available for operators in the faceplate to initiate or select an operation:

- On
- Passivated
- Out of service

On

The following actions occur in this mode:

- processing of messages (for example: alarms).
- processing of MS, MS_Ext, and signal states.

Passivated

The following actions occur in this mode:

- processing of `MS`, `MS_Ext`, and signal states but without any impact on MS.
- setting the value of MS_OUT to 16#01 (to denote the "passivated" mode).

The following action **does not** occur in this mode:

- processing of messages (for example: alarms).

Out of service

The following actions occur in this mode:

- setting the value of `MS_OUT` = 16#02 (to denote "out of service" mode).
- processing of analog values `PVx.Value` = 0, `PVx_ST`=16#80.
- disabling the display of `DIAG_GB` / `DIAG_DD` parameter in "Binary details diagnose view" of faceplate. The value of `DIAG_GB` / `DIAG_DD` is set to 0.

The following actions **do not** occur in this mode

- processing of messages (for example: alarms).
- processing of `MS`, `MS_Ext`, and signal states.
- FB_GET operations.

In the "Monitoring View", all the information is displayed in grey.

Time response

Not available

Additional information

For additional information, refer to the sections:

Messages and associated values of PAM_SM (Page 421)

I/Os of PAM_SM (Page 419)

6.75.2 I/Os of PAM_SM

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O Parameter	Meaning	Type	Default
PLT_ID	Asset ID for EDD	DWORD	16#00000000
MS	Maintenance status	DWORD	16#F0000008
MS2	Maintenance status 2 for OS operations	DWORD	16#00000000
EV_ID1	Message number 1	DWORD	16#00000000
EV_ID2	Message number 2	DWORD	16#00000000
EN_MSG	1 = Enable message	BOOL	1
RUNUPCYC	Number of Run Up Cycles	INT	1
CYCL_UPD	1 = Cyclic update active (preselection for FB first run or CPU restart)	BOOL	1
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	1
FEATURE	Feature parameter	DWORD	16#00000000
PV_EN	1 = Enable process value	BOOL	1
PVx_AH_En	1=Enable maintenance alarm process value x (x: 0...2)	BOOL	1
PVx_DH_En	1=Enable maintenance demand process value x (x: 0...2)	BOOL	1
PVx_RH_En	1=Enable maintenance request process value x (x: 0...2)	BOOL	1
PVx_Rst	Reset process value x(x: 0...2)	BOOL	1

Output parameters

I/O Parameter	Meaning	Type	Default
QERR	1 = Runtime error	BOOL	1
O_MS	Maintenance state	DWORD	16#080000000
MSG_STATx	Message status x (x:1...2)	WORD	16#0000
MSG_ERRx	Message error x (x: 1...2)	WORD	16#0000
MSG_ACKx	Message acknowledgementx (x:1)	WORD	16#0000
SM_NOK	Signal module status	BOOL	1
ERR_NUM	Error number	INT	1
P_PVx_Rst	1=Reset process value x (x: 0...2)	STRUCT	0
Vx_AH_Act	1=Limit maintenance alarm process value x (x: 0...2)	BOOL	1
PVx_DH_Act	1=Limit maintenance demand process value x (x: 0...2)	BOOL	1
PVx_RH_Act	1=Limit maintenance request process value x (x: 0...2)	BOOL	1
PVx_Diff	Difference value to the next expected Alarm x (x: 0...2)	STRUCT	0 16#80

I/O Parameter	Meaning	Type	Default
DXCHG_PAM	Bidirectional data exchange Channel	STRUCT (UDT283)	0
PVx	Process value x (x: 0...2)	STRUCT	0 16#80
PVx_AH	Limit maintenance alarm process value x (x: 0...2)	REAL	99.99
PVx_DH	Limit maintenance demand process value x (x: 0...2)	REAL	99.99
PVx_RH	Limit maintenance request process value x (x: 0...2)	REAL	99.99
PVx_Name	Text of Process value x (x:0...2)	STRING[16]	”
PVx_Unit	Unit of Process value x (x:0...2)	INT	1
PVx_OpScale	Range of process value x (x: 0...2)	STRUCT	0 100

In/Out parameters

I/O Parameter	Meaning	Type	Default
ACC_MODE	1 = Accept new settings	BOOL	1
TOP_SI	Start information of the current OB	STRUCT	0
START_UP_SI	Start information of the startup OB last started	STRUCT	0
DXCHG_PAM_IM	Bidirectional data exchange Channel	DWORD	16#00000000

6.75.3 Messages and associated values of PAM_SM

Assignment of message text and message class

The process control messages of `ALARM_8P` with `EV_ID1` are assigned as follows:

Message number	Default message text	Message class
1	Maintenance alarm (@4W%t#PAM_SM_TXT@)	PLC Process Control Message - Failure
2		No message
3	Maintenance demand (@4W%t#PAM_SM_TXT@)	PLC Process Control Message - Error
4	Maintenance request (@4W%t#PAM_SM_TXT@)	Preventative Maintenance - Standard
5	Device out of order (@4W%t#PAM_SM_TXT@)	PLC Process Control Message - Failure

Message number	Default message text	Message class
6		No message
7		No message
8		No message

The process control messages of `NOTIFY_8P` with `EV_ID2` are assigned as follows:

Message-number	Default message text	Message class
1	Device passivated (@1W%t#PAM_SM_TXT@)	Status Message - PLC
2	Undefined diagnostics (@1W%t#PAM_SM_TXT@)	Status Message - PLC
3	Local operation/functional check (@1W %t#PAM_SM_TXT@)	Status Message - PLC
4	Simulation (@1W%t#PAM_SM_TXT@	Status Message - PLC
5	Configuration change (@1W%t#PAM_SM_TXT@)	Status Message - PLC
6	Process-related fault (@1W%t#PAM_SM_TXT@)	Status Message - PLC
7		No message
8		No message

You can find additional information in the section: Message Classes (Page 531)

6.76 PDM_MS: Monitoring of the maintenance status

6.76.1 Description of PDM_MS

Object name (type + number)

FB 81

- I/Os of PDM_MS (Page 422)

How it works

The block reports the maintenance state supplied by PDM via the maintenance station.

Additional information

You can find additional information in the section: Message texts and associated values of PDM_MS (Page 423).

6.76.2 I/Os of PDM_MS

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: General Information About Block Description (Page 15).

Input parameters

I/O (parameter)	Meaning	Type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN		BOOL	1
EN_MSG	1 = enable message	BOOL	1
EV_IDx	Message number (x = 1, 2)	DWORD	0
FEATURE	Reserve	DWORD	16#00000000
MS	Maintenance status	DWORD	0
MS2	Maintenance status 2 for OS operations	DWORD	16#00000000
RUNUPCYC	Number of replacement run cycles	INT	3
CYCL_UPD	1 = Cyclic update active (preselection for FB first run or CPU restart)".	BOOL	1

Output parameters

I/O (parameter)	Meaning	Type	Default
MSGSTATx	Message error information (x = 1, 2)	WORD	0
O_MS	Maintenance status	DWORD	0
QERR	1 = program error	BOOL	1

Additional information

Additional information is available in the section:

Message texts and associated values of PDM_MS (Page 423)

6.76.3 Message texts and associated values of PDM_MS

Messaging

The statuses are generated with ALARM_8P for messages requiring acknowledgment, and with NOTIFY_8P for those not requiring acknowledgment. The message function can be disabled by setting EN_MSG = 0. In this case MS = 8 is set.

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message block ALARM_8P	Message number	Default message text	Message class
EV_ID1	1	Maintenance alarm	PLC Process Control Message - Failure
	2		No message
	3	Maintenance demanded	PLC Process Control Message - Error
	4	Maintenance required	Preventative Maintenance - Standard
	5	Device out of order	PLC Process Control Message - Failure
	6		No message
	7		No message
	8		No message

The process control messages of ALARM_8P with EV_ID2 are assigned as follows:

Message block NOTIFY_8P	Message number	Default message text	Message class
EV_ID2	1	Device passivated	Status Message - PLC
	2	Undefined diagnostics	Status Message - PLC
	3	Local operation/functional check	Status Message - PLC
	4	Simulation	Status Message - PLC
	5	Configuration change	Status Message - PLC
	6		No message
	7		No message
	8		No message

Additional information

You can find additional information in the section: Message Classes (Page 531)

6.77 PNTS2BCD: Converts PNIO time to BCD format

6.77.1 Description of PNTS2BCD

The PNTS2BCD function converts the PNIO Time-stamp to BCD Format and delivers the values in the Output parameter TS_x.

Object name (type + number)

FC 266

- I/Os of PNTS2BCD (Page 425)

Area of application

This block is a system block and is used exclusively internally.

6.77.2 I/Os of PNTS2BCD

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
PNIO_TS_Status	Status of PNIO Timestamp	WORD	0
PNIO_TS_SecondsHigh	Seconds of PNIO Timestamp (> 136 Years)	WORD	0
PNIO_TS_SecondsLow	Seconds of PNIO Timestamp (< 136 Years)	DWORD	0
PNIO_TS_Nanoseconds	Nanoseconds of PNIO Timestamp	DWORD	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
TS_0	Years	BYTE	0
TS_1	Month	BYTE	0
TS_2	Date	BYTE	0
TS_3	Hour	BYTE	0

I/O (parameter)	Meaning	Data type	Default
TS_4	Minutes	BYTE	0
TS_5	Seconds	BYTE	0
TS_6	2 MSB of milliseconds	BYTE	0
TS_7	LSB of millisecond and Day of week	BYTE	
ErrNum	Error Number (0 = No error)	INT	-1

6.78 PNTS2DT: Converts PNIO time to DT format

6.78.1 Description of PNTS2DT

The PNTS2DT function converts the PNIO Time-stamp to DT Format and delivers the below mentioned values for the display in the Exit parameter PNTS_DT_DeltaTriggerDiscrete etc... for the various RS Alarm types.

Object name (type + number)

FC 261

- I/Os of PNTS2DT (Page 426)

Area of application

This block is a system block and is used exclusively internally.

6.78.2 I/Os of PNTS2DT

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
PNIO_TS_Status	Status of PNIO Timestamp	WORD	0
PNIO_TS_Second-sHigh	Seconds of PNIO Timestamp (> 136 Years)	WORD	0

I/O (parameter)	Meaning	Data type	Default
PNIO_TS_SecondsLow	Seconds of PNIO Timestamp (< 136 Years)	DWORD	0
PNIO_TS_Nanosec-onds	Nanoseconds of PNIO Timestamp	DWORD	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
Years	Years	INT	0
Month	Month	INT	0
Day	Date	INT	0
Hour	Hour	INT	0
Minutes	Minutes	INT	0
Seconds	Seconds	INT	0
Milliseconds	Milliseconds	INT	0
ErrNum	Error Number (0 = No error)	INT	-1

6.79 PNTS2ISP: Converts PNIO time to ISP format

6.79.1 Description of PNTS2ISP

The PNTS2ISP function converts the PNIO timestamp into ISP Format and delivers the values in the Output Parameter TS_x.

Object name (type + number)

FC 264

- I/Os of PNTS2ISP (Page 427)

Area of application

This block is a system block and is used exclusively internally.

6.79.2 I/Os of PNTS2ISP

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
PNIO_TS_Status	Status of PNIO Timestamp	WORD	0
PNIO_TS_Second-sHigh	Seconds of PNIO Timestamp (> 136 Years)	WORD	0
PNIO_TS_SecondsLow	Seconds of PNIO Timestamp (< 136 Years)	DWORD	0
PNIO_TS_Nanosec-onds	Nanoseconds of PNIO Timestamp	DWORD	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
TS_0	Seconds - Bit 31 ... 24	BYTE	0
TS_1	Seconds - Bit 23 ... 16	BYTE	0
TS_2	Seconds - Bit 15 ... 8	BYTE	0
TS_3	Seconds - Bit 7 ... 0	BYTE	0
TS_4	Part of milliSeconds in 1 / 2^32 - Bit 31 ... 24	BYTE	0
TS_5	Part of milliSeconds in 1 / 2^32 - Bit 23 ... 16	BYTE	0
TS_6	Part of milliSeconds in 1 / 2^32 - Bit 15 ... 8	BYTE	0
TS_7	Part of milliSeconds in 1 / 2^32 - Bit 7 ... 0	BYTE	0
ErrNum	Error Number (0=No error)	INT	-1

6.80 PO_UPDAT: Output Process Image

6.80.1 PO_UPDAT: Output Process Image

Object name (type + number)

FC 279

Area of application

The PO_UPDAT block safeguards the output module functions "Hold last value" and "Apply substitute value" when a CPU is restarted (OB 100).

Run Sequence

With the "Generate module drivers" CFC function, the PO_UPDAT block is automatically installed in OB 100 at the end.

Description of Functions

On a CPU restart (OB 100), the CH_DO and CH_AO blocks write the start values to the process image. The PO_UPDAT block sends all process images (partitions) to the modules at the end of OB 100 in order for these values to be active immediately when the CPU goes into RUN. Output PO_MAP indicates the process image partitions which have been updated or are used in the system (BIT0: Process image 0, BIT15: Process image partition 15).

6.81 PS: Power supply monitoring

6.81.1 Description of PS

Object name (type + number)

FB 89

- PS block I/Os (Page 431)

Area of application

The PS block monitors the status of a rack power supply, and reports the associated error events.

Calling OBs

The PS block must be installed in the run sequence of the following OBs:

OB 1	Cyclic program
OB 81	Power supply error
OB 83	Remove/insert interrupt
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The block is installed in the run sequence downstream of the RACK block.
- The SLOT_NO input (slot number of the power supply) is configured.

- The EN input is interconnected with the output of an AND block.
  Its inputs are interconnected with the output EN_SUBx of the OB_BEGIN block, the output EN_Rxxx of the SUBNET block and the output EN_Mxx of the RACK block.
- The OUT structures CPU_DIAG of the OB_BEGIN block and RAC_DIAG of the RACK block are interconnected with the IN_OUT structures of the same name of the PS block.

Function and method of operation

The PS block reports events of the power supply error OB 81 and OB 83 relating to the power supply module. The module is installed to supply power to the central rack, and to each expansion rack.

Note

Note the following:

- If a battery fails, the battery must always be replaced with the power supply turned on. Then press the "FMR" button. In all other situations, the block does not reset a reported error.
- For redundant power supply modules in a rack with a standard CPU, a corresponding message is sent for both power supply modules in the event of a battery error or power supply error. You can tell which module is affected by the "BATTF" LED that lights up.

Redundancy

In a redundant system, the block is also installed extra for the power supply of the redundant rack.

Error handling

The error handling of the block is limited to the evaluation of the error information of ALARM_8P. Refer to the section "Error information of output parameter MSG_STAT (Page 530)" for additional information on error handling.

Startup characteristics

The PS block initializes the messages of the ALARM_8P.

Overload behavior

Not available

Time response

You will find additional information in the "Message response" section.

Message response

After OB 81 or OB 83 is called, the block analyzes the status of the power supply of the rack assigned to it. It generates the "Backup battery failure", "Backup voltage failure" and "24 V supply failure" or "Module removed" or "Wrong or faulty module" messages with ALARM_8P. The message function can be disabled by setting EN_MSG = FALSE.

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of PS (Page 432)

Maintenance status MS (Page 533)

6.81.2 I/Os of PS

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number	DWORD	0
MS	Maintenance status	DWORD	0
SLOT_NO	Slot number of the power supply	BYTE	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	
RAC_DIAG	System structure	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of PS (Page 432)

Maintenance status MS (Page 533)

6.81.3 Message texts and associated values of PS

Message texts and associated values of PS

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message No.	Default message text	Message class
1	Station @1%d@/ @3%d@: Redundancy loss	PLC Process Control Message - Error
2	Station @2%d@/ @3%d@: Redundancy loss	PLC Process Control Message - Error
3	Station @1%d@/ @3%d@: Failure	PLC Process Control Message - Failure
4	Station @2%d@/ @3%d@: Failure	PLC Process Control Message - Failure
5		No message
6		No message
7		No message
8	Station @1%d@/ @3%d@: Multiple failure	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID:

Associated value	Block parameters
1	ID of the primary DP master system (SUBN1_ID)
2	ID of the redundant DP master system (SUBN2_ID)
3	Rack/station number (RACK_NO)

See also

Message Classes (Page 531)

6.82 RACK: Rack monitoring

6.82.1 Description of RACK

Object name (type + number)

FB 107

- RACK block I/Os (Page 436)

Area of application

The RACK block monitors the status of a rack, and reports the associated error events.

Calling OBs

The block is installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 70	I/O redundancy error
OB 72	CPU redundancy error
OB 81	Power supply error
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- The RACK block is installed in the run sequence downstream of the SUBNET block.
- The RACK_NO, DADDR, SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The EN input is interconnected with the output of an AND block.
  whose inputs are interconnected to the EN_SUBx output of the OB BEGIN block, and to the EN_Rxxx output of the SUBNET block.
- The CPU_DIAG OUT structure of the OB_BEGIN block and SUB_DIAG of the SUBNET block are interconnected with the IN_OUT structures of the same name of the RACK block.

Function and method of operation

The RACK block generates a process control error message for the OS in the event of redundancy losses and rack/station failures. It also indicates internal errors of the rack/station (SUBN1ERR, SUBN2ERR), and of the preferred channel (SUBN1ACT, SUBN2ACT) if there are active DP slaves at its outputs. The output structure RAC_DIAG contains the geographic address of the rack, and the group error information RACK_ERR.
If RACK_ERR = 1, the corresponding rack is not available.

The block is installed in the OBs listed above once at each station or local I/O device. The SUBNET block enables the runtime group that contains the RACK block. Start and diagnostic information is read from the CPU_DIAG IN_OUT structure, which is interconnected with the CPU_DIAG structure of the OB_BEGIN block. The RACK block has one enable output for each rack (station) slot.

The RACK block generates the number of a corresponding message (see "Message Response") on the basis of the start information of the calling OBs if the current block is affected.

The block evaluates error events, and uses the diagnostic address DADDR of the DP slave to determine the currently active preferred channel (SUBN1ACT, SUBN2ACT) of redundant PROFIBUS DP interface circuits.

Note: If you want to change the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs online, you must set input ACC_ID = TRUE. to update the output values.

Redundancy

In H systems with distributed I/Os, the RACK block supports redundancy of the DP Master systems. If you want to use this function, you must configure the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs of the RACK block with the numbers of the redundant DP master systems. If there is no redundancy, the remaining input must be set to the (default) value 16#FF.

Note

With redundant CPU racks, the two RACK blocks inserted in the system chart are only responsible for enabling lower-level block chains. Their maintenance status MS is therefore irrelevant. The "Good" and "Not redundant" state is always shown in the associated faceplate and block icon because the bits 0 to 16 of the MS are always "0" in this case.

Error handling

Error handling for the block is limited to the evaluation of the error information of ALARM_8P.

You will find additional information about this in "Error information of output parameter MSG_STAT (Page 530)".

Startup characteristics

The RACK block initializes ALARM_8P messages. It checks availability of the station and, in H systems, determines the preferred channel of the station.

The SUB_DIAG.V1_MODE structure (0 = compatibility mode, 1 = DPV1 mode) is transferred to the RAC_DIAG.V1_MODE structure.

Overload behavior

The RACK block counts the OB 86 calls (except in the case of a DP master system failure; see SUBNET block). The counter is reset in OB1. If more than two OB 86 events occur in succession before the cycle control point (OB 1) is reached, these will be rejected and the message "Station...: Multiple failure" is output. When an OB 86 call is rejected, the rack (station) is registered as having failed.

Time response

See "Message Response"

Message response

After it is called by OB 70, OB 72, OB 85 or OB 86, the block analyzes the status of its assigned CPU, DP master and DP slave. If the rack (station) loses redundancy or fails, the block outputs the corresponding messages by broadcasting an ALARM_8P. The message function can be disabled by setting EN_MSG = FALSE.

The block generally reports only the events that were originally generated in the rack that it monitors. Redundancy loss and station failures which are caused by the failure of a DP master or CPU are initially neither signaled nor indicated at the SUBN1ERR and SUBN2ERR outputs.

The DELAY input is used to delay the outputting of error messages for an outgoing, higher-priority error. For example, if the RACK block recognizes an outgoing error at an interconnected DP master, it initially assumes that there is a faulty assigned DP slave in the rack it monitors, and sets the corresponding output SUBNxERR. The error status is not reset until the DP slave returns (in this case: OB 86, OB 70). The RACK blocks suppress the potential slave failure states for DELAY seconds so as not to trigger a surge of messages from DP slaves which are not yet synchronized when the master returns. An error message is only output to the OS when the DP slave has not reported its return before this delay time has expired.

Note: Do not set the value of DELAY too high, since messages reporting faulty DP slaves or their removal during a master failure will be output too late to the OS after the DP master returns.

The RACK block generates the following messages in the OBs listed below:

OB	Start event	Message
OB 1	Cyclic processing	Repeat the update of ALARM_8P outputs/messages, if necessary
OB 70	Redundancy loss	Station redundancy loss/return
OB 81	Power supply error	
OB 85	Program execution error	Station failure, incoming/outgoing
OB 86	Rack failure	Station failure, incoming/outgoing
OB 100	Restart	Initialization of ALARM_8P

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of RACK (Page 437)

Maintenance status MS (Page 533)

6.82.2 I/Os of RACK

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnostic address of the DP slave	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
DELAY	Interrupt delay (s)	INT	15
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number	DWORD	0
MS	Maintenance status	DWORD	0
RACK_NO	Rack number	BYTE	0
SUBN_TYP	1 = external DP interface	BOOL	0
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
EN_Mxx	1 = Enable module xx (xx = 0 - 63)	BOOL	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
QRACKF	1 = higher-level error	BOOL	0

I/O (parameter)	Meaning	Data type	Default
RAC_DIAG	System structure	STRUCT	
SUBN1ACT	1 = Slave 1 is active	BOOL	0
SUBN1ERR	1 = Error in slave 1	BOOL	0
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN2ERR	1 = Error in slave 2	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics (system structure)	STRUCT	
SUB_DIAG	OB start information	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of RACK (Page 437)

Maintenance status MS (Page 533)

6.82.3 Message texts and associated values of RACK

Assignment of message text and message class

Message no.	Default message text	Message class
1	Station @1%d@/ @3%d@: Redundancy loss	PLC Process Control Message - Error
2	Station @2%d@/ @3%d@: Redundancy loss	PLC Process Control Message - Error
3	Station @1%d@/ @3%d@: Failure	PLC Process Control Message - Failure
4	Station @2%d@/ @3%d@: Failure	PLC Process Control Message - Failure
5		No message
6		No message
7		No message
8	Station @1%d@/ @3%d@: Multiple failure	PLC Process Control Message - Failure

Assignment of associated values

Associated value	Block parameters
1	ID of the primary DP master system (SUBN1_ID)
2	ID of the redundant DP master system (SUBN2_ID)
3	Rack/station number (RACK_NO)

See also

Message Classes (Page 531)

6.83 RACK_CFU: PROFINET CFU function block

6.83.1 Description of RACK_CFU

Object name (type + number)

FB 425

- I/Os of RACK_CFU (Page 439)

Area of application

The RACK_CFU block monitors the status of a CFU unit, and reports the associated error events and releases the downstream spur blocks when they are affected.

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The RACK_CFU block is installed in the run sequence downstream of the SUBNET_PN block.
- The RACK_NO, DADDR, SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The EN input is interconnected with the output of an AND block. whose inputs are interconnected to the EN_SUBx output of the OB BEGIN_HPN block, and to the EN_Rxxx output of the SUBNET_PN block.
- The CPU_DIAG_PN OUT structure of the OB_BEGIN_HPN block and SUB_DIAG of the SUBNET_PN block are interconnected with the IN_OUT structures of the same name of the RACK_CFU block.

Startup characteristics

The RACK_CFU block initializes ALARM_8P messages. It checks availability of the station, and in H systems, determines the preferred channel of the station.

Error handling

Error handling for the block is limited to the evaluation of the error information of ALARM_8P.

Block functions

The RACK_CFU block generates a process control error message for the OS in the event of connection losses and rack/station failures. It also indicates internal errors of the rack/station (SUBN1ERR, SUBN2ERR(FALSE for S1/S2 header)), and of the preferred channel (SUBN1ACT, SUBN2ACT (FALSE for S1/S2 header)) if there are active PN slaves at its outputs. The output structure RAC_DIAG contains the geographic address of the rack, and the group error information RACK_ERR.
If RACK_ERR = 1, the corresponding rack is not available.

The block is installed in the OBs (OB1, OB70, OB72, OB81, OB82, OB83, OB85, OB86, OB100) once at each station or local I/O device. The SUBNET_PN block enables the runtime group that contains the RACK_CFU block.

Start and diagnostic information is read from the CPU_DIAG_PN IN_OUT structure, which is interconnected with the CPU_DIAG_PN structure of the OB_BEGIN_HPN block.

The RACK_CFU block has one enable output for each rack (station) slot. The RACK_CFU block generates the number of a corresponding message on the basis of the start information of the calling OBs if the current block is affected.

Additional information

Additional information is available in the section:

Message texts and associated values of RACK_CFU (Page 441)

6.83.2 I/Os of RACK_CFU

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnose address of PN-IO device	INT	0
DADDR_DIDO	Diagnostic Address of DI-DO Slot	INT	0
DADDR_PA_M	Diagnostic Address of PA Master	INT	0
DELAY	Alarm delay (s)	INT	15
DIAG_BUF	1= CPU Diagnostic Buffer entry on (relevant for service personnel)	BOOL	0
EN_MSG	1 = Message enable	BOOL	1

I/O (parameter)	Meaning	Data type	Default
EV_ID	Message number ALARM_8P (configured by ES)	DWORD	0
EV_ID1	Message number ALARM_8P (configured by ES)	DWORD	0
FEATURE	Features of hardware (reserve)	WORD	0
PN_REDUNDANCY_LEV-EL	PN redundancy level S1=16#1; S2=16#2; R1=16#4; R2=16#8	BYTE	0
MODE_xx	MODE parameter (xx: 00-15)	DWORD	0
MS	Maintenance status	DWORD	0
MS_REQ	Maintenance Release Request	BOOL	0
PNIO_ADR	Diagnostic address of PN-IO Interface	INT	0
PORT1_ADR	Diagnostic address of PORT1	INT	0
PORT1_CONNECT	Port1 connection status	BYTE	0
PORT2_ADR	Diagnostic address of PORT2	INT	0
PORT2_CONNECT	Port2 connection status	BYTE	0
RACK_NO	Rack number	BYTE	0
SUBN_TYP	1 = External PN interface	BOOL	0
SUBN1_ID	PN-IO System 1 ID (100 – 115)	BYTE	255
SUBN2_ID	PN-IO System 2 ID (100 – 115)	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CH_EXIST	Channel exist	DWORD	0
CH_ACTIVE	Channel active	DWORD	0
CH_OK	Channel OK	DWORD	0
DIAG_INF	Diagnostic information	STRUCT	
DIAG_INF_DI_DO	Diagnostic information	STRUCT	
DIAG_INF_PA_M	Diagnostic information	STRUCT	
DXCHG_xx	Data exchange	DWORD	0
DXCHG1_xx	Data exchange	DWORD	0
EN_Mxx	1 = Enable module (xx = 0 – 63)	BOOL	0
EXT_STAT	Extended status	DWORD	0
EXT_STAT_A	Extended status	DWORD	0
FS_ACTIVE	Flutter suppress active	DWORD	0
MS_XCHG_xx	MS exchange (xx: 0..15)	DWORD	0
MSGSTATx	STATUS of ALARM_8P_x (x = 1 – 2)	WORD	0
MSG_ACKx	ACK of ALARM_8P_x (x = 1 – 2)	WORD	0
OMODE_xx	Mode channel xx (xx: 0..15)	DWORD	0
O_MS	Maintenance status	DWORD	0
O_MS_x	Maintenance status (x=0..15) of device	DWORD	0

I/O (parameter)	Meaning	Data type	Default
PA_DIAG_x	PA- Slave Diagnostic- Information	DWORD	0
QERR	1=Runtime Error	BOOL	1
QMSGERx	Message ERROR of ALARM_8P_x (x = 1 – 2)	BOOL	0
QRACKF	1 = higher-level error	BOOL	0
RAC_DIAG	System structure	STRUCT	-
SUBN1ACT	1 = PN-IO-Device 1 active	BOOL	-0
SUBN1ERR	1 = error in PN-IO device 1	BOOL	-0
SUBN2ACT	1 = PN-IO-Device 2 active	BOOL	-0
SUBN2ERR	1 = Error in PN-IO device 2	BOOL	-0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = Accept MODE settings	BOOL	0
CPU_DIAG_PN	System structure: CPU diagnostics	STRUCT	-
SUB_DIAG	System structure: Subnet diagnostics	STRUCT	-

6.83.3 Message texts and associated values of RACK_CFU

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message number	Default message text	Message class
1	Station @4%d@/@3%d@: Maintenance alarm	PLC Process Control Message - Failure
2	Station @4%d@/@3%d@: Maintenance demanded	PLC Process Control Message - Error
3	Station @4%d@/@3%d@: Maintenance required	Preventative Maintenance - Standard
4	Station @4%d@/@3%d@: Multiple diagnostic failure	PLC Process Control Message - Failure
5		No message
6		No message
7	Station @4%d@/@3%d@: Maintenance demanded (Extern)	PLC Process Control Message - Error
8	Station @4%d@/@3%d@: Maintenance required (Extern)	Preventative Maintenance - Standard

Note

- Maintenance alarm will also be reported when both ports report an error.
- Maintenance demand will also be reported in the following cases:
  - when the device reports redundancy loss, or
  - when only one of the ports report an error, or
  - when the PN-IO Interface reports an error

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message number	Default message text	Message class
1	Station @4%d@/@3%d@/0: Port 1 error	PLC Process Control Message - Error
2	Station @4%d@/@3%d@/0: Port 2 error	PLC Process Control Message - Error
3	Station @4%d@/@3%d@/0: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
4	Station @4%d@/@3%d@/0: Maintenance required (PN-IO)	Preventative Maintenance - Standard
5		No message
6		No message
7		No message
8		No message

Associated values of ALARM_8P with EV_ID and EV_ID1:

Associated value	Block parameter	Data type
1	Primary PN-IO system number (SUBN1_ID)	BYTE
2	Redundant PN-IO system number (SUBN2_ID)	BYTE
3	Rack number (RACK_NO)	BYTE
4	PN-IO System number	BYTE

6.84 RACK_PN: Rack monitoring

6.84.1 Description of RACK_PN

Object name (type + number)

FB 90

- I/Os of RACK_PN (Page 443)

Area of application

The RACK_PN block monitors the status of a rack, and reports the associated error events.

Additional information

For additional information, refer to the following sections:

Message texts and associated values of RACK_PN (Page 445)

Maintenance status MS (Page 533)

6.84.2 I/Os of RACK_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR	Diagnostics address of the PN IO device	INT	0
DELAY	Interrupt delay (s)	INT	15
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number ALARM_8P (assigned by the ES)	DWORD	0
EV_ID1	Message number ALARM_8P (assigned by the ES)	DWORD	0
FEATURE_01	Property of the hardware parameter 01	WORD	0
PN_REDUNDANCY_LEVEL	PN redundancy level S1=16#1; S2=16#2; R1=16#4; R2=16#8	BYTE	0
MS	Maintenance status	DWORD	0
PNIO_ADR	Diagnostic address of the PN-IO interface	INT	0

I/O (parameter)	Meaning	Data type	Default
PORT1_ADR	Diagnostic address of PORT 1	INT	0
PORT1_CONNECT	Port 1 Connection Status	BYTE	0
PORT2_ADR	Diagnostic address of PORT 2	INT	0
PORT2_CONNECT	Port 2 Connection Status	BYTE	0
RACK_NO	Rack number	BYTE	0
SUBN_TYP	1 = External PN-IO-System	BOOL	0
SUBN1_ID	ID of primary PN-IO-System	BYTE	255
SUBN2_ID	ID of redundant PN-IO-System	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
EN_Mxx	1 = Enable rack xx (xx = 0 - 63)	BOOL	0
MSGSTATx	Status output of ALARM_8P_x (x = 1-2)	WORD	0
O_MS	Maintenance status	DWORD	0
QMSGERx	ERROR message of ALARM_8P_x (x = 1 - 2)	BOOL	0
QRACKF	1 = higher-level error	BOOL	0
RAC_DIAG	System structure	STRUCT	
SUBN1ACT	1 = Slave 1 is active	BOOL	0
SUBN1ERR	1 = Error in slave 1	BOOL	0
SUBN2ACT	1 = Slave 2 is active	BOOL	0
SUBN2ERR	1 = Error in slave 2	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	CPU diagnostics (system structure)	STRUCT	
SUB_DIAG	OB start information	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of RACK_PN (Page 445)

Maintenance status MS (Page 533)

6.84.3 Message texts and associated values of RACK_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message number	Default message text	Message class
1	Station @1%d@/ @3%d@: Redundancy loss	PLC Process Control Message - Error
2	Station @2%d@/ @3%d@: Redundancy loss	PLC Process Control Message - Error
3	Station @1%d@/ @3%d@: Failure	PLC Process Control Message - Failure
4	Station @2%d@/ @3%d@: Failure	PLC Process Control Message - Failure
5		No message
6		No message
7		No message
8	Station @1%d@/ @3%d@: Multiple failure	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID

Associated value	Block parameter	Data type
1	ID of the primary PN IO system (SUBN1_ID)	BYTE
2	ID of the redundant PN IO system (SUBN2_ID)	BYTE
3	Rack/station number (RACK_NO)	BYTE

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message number	Default message text	Message class
1	Station @4%d@/ @3%d@/0: Port 1 error	PLC Process Control Message - Error
2	Station @4%d@/ @3%d@/0: Port 2 error	PLC Process Control Message - Error
3	Station @4%d@ @3%d@/0: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
4	Station @4%d@/ @3%d@/0: Maintenance required (PN-IO)	Preventative Maintenance - Standard
5		No message
6		No message
7		No message
8		No message

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	ID of the primary PN IO system (SUBN1_ID)	BYTE
2	ID of the redundant PN IO system (SUBN2_ID)	BYTE
3	Rack/station number (RACK_NO)	BYTE
4	ID of the PN IO system	WORD

You can find additional information in the section: Message Classes (Page 531).

6.85 RACK_PN1: PROFINET RACK Function Block - R1 Device

6.85.1 Description of RACK_PN1

Object name (type + number)

FB 415

- I/Os of RACK_PN1 (Page 448)

Area of application

The block RACK_PN1 monitors the status of a PN-IO rack and reports the associated error events.

Calling OBs

The block must be installed in the following OBs (performed automatically in CFC):

OB 1	Cyclic program
OB 81	Power failure
OB 82	Diagnostic alarm
OB 85	Program sequence error
OB 86	Module failure
OB 100	New start (Warm start)

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The RACK_PN1 block is installed in the run sequence downstream of the SUBNET block.
- The RACK_NO, DADDR, SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.

- The EN input is interconnected with the output of an AND block, whose inputs are interconnected to the EN_SUBx output of the OB_BEGIN_HPN block, and to the EN_Rxxx output of the SUBNET block.
- The CPU_DIAG_PN OUT structure of the OB_BEGIN_HPN block and SUB_DIAG_PN of the SUBNET_PN block are interconnected with the IN_OUT structures of the same name of the RACK_PN1 block.

Startup characteristics

The RACK_PN block initializes ALARM_8P messages. It checks availability of the station and, in H systems, determines the preferred channel of the station.

Error handling

Error handling for the block is limited to the evaluation of the error information of ALARM_8P.

Block functions

The RACK_PN1 block generates a process control error message for the OS in the event of redundancy losses and rack/station failures. It also indicates internal errors of the rack/station (SUBN1ERR, SUBN2ERR), and of the preferred channel (SUBN1ACT, SUBN2ACT) if there are active DP slaves at its outputs. The output structure RAC_DIAG contains the geographic address of the rack, and the group error information RACK_ERR.

If RACK_ERR = 1, the corresponding rack is not available.The block is installed in the OBs listed above once at each station or local I/O device. The SUBNET_PN block enables the runtime group that contains the RACK_PN1 block. Start and diagnostic information is read from the CPU_DIAG_PN IN_OUT structure, which is interconnected with the CPU_DIAG_PN structure of the OB_BEGIN_HPN block.

The RACK_PN1 block has one enable output for each rack (station) slot. The RACK_PN1 block generates the number of a corresponding message on the basis of the start information of the calling OBs if the current block is affected. The block evaluates error events, and uses the diagnostic address DADDR of the PN-IO device to determine the currently active preferred channel (SUBN1ACT, SUBN2ACT) of redundant PROFINET PN interface circuits.

Note

If you want to change the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs online, you must set input ACC_ID = TRUE to update the output values.

Redundancy

In H systems with distributed I/Os, the RACK_PN1 block supports redundancy of the PN-IO systems. If you want to use this function, you must configure the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs of the RACK_PN1 block with the numbers of the redundant DP master systems. If there is no redundancy, the remaining input must be set to the (default) value 16#FF.

Additional information

Additional information is available in the section:

Message texts and associated values of RACK_PN1 (Page 449)

6.85.2 I/Os of RACK_PN1

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
SUBN_TYP	1=External PN IO-System	BOOL	0
SUBN1_ID	ID of primary PN-IO-System	BYTE	255
SUBN2_ID	ID of redundant PN-IO-System	BYTE	255
RACK_NO	Rack/station number	BYTE	0
DADDR_L	Diagnostic address of PN slave - left	INT	0
PNIO_L_ADR	Diagnostic address of PN-IO Interface - Left	INT	0
PORT1_L_ADR	Diagnostic address of PORT1 - left	INT	0
PORT1_L_CONNECT	1=Port1 connected - left	BYTE	0
PORT2_L_ADR	Diagnostic address of PORT2 - left	INT	0
PORT2_L_CONNECT	1=Port2 connected - left	BYTE	0
DADDR_R	Diagnostic address of PN slave - right	INT	0
PNIO_R_ADR	Diagnostic address of PN-IO Interface - Right	INT	0
PORT1_R_ADR	Diagnostic address of PORT1 - right	INT	0
PORT1_R_CONNECT	1=Port1 connected - right	BYTE	0
PORT2_R_ADR	Diagnostic address of PORT2 - right	INT	0
PORT2_R_CONNECT	1=Port2 connected - right	BYTE	0
PN_REDUNDANCY_LEV-EL	PN redundancy level S1=16#1; S2=16#2; R1=16#4; R2=16#8	BYTE	0
DELAY	Alarm delay (s)	INT	15
FEATURE_01	Features of hardware parameter 01	WORD	0
EN_MSG	1=Enable alarm	BOOL	1
EV_ID	Message number ALARM_8P (assigned by the ES)	DWORD	0
EV_ID1	Event ID	DWORD	0
MS	Event ID	DWORD	0
DIAG_BUF	1= CPU diagnostic buffer entry on (relevant for service personnel)	BOOL	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = Accept new ID settings	BOOL	0
CPU_DIAG_PN	CPU diagnostics (system structure)	STRUCT	
SUB_DIAG	System structure	STRUCT	

Out parameters

I/O (parameter)	Meaning	Data type	Default
O_MS	Maintenance State	DWORD	0
QRACKF	1 = Higher-level error	BOOL	0
RAC_DIAG	System structure	STRUCT	
SUBN1ERR	1=Slave 1 failure	BOOL	0
SUBN2ERR	1=Slave 2 failure	BOOL	0
SUBN1ACT	1=Slave 1 active	BOOL	0
SUBN2ACT	1=Slave 2 active	BOOL	0
EN_Mxx	1=Enable MODUL xx (xx = 0 - 63)	BOOL	0
MSG_STAT	Message failure	WORD	0
MSG_STAT1	Message failure	WORD	0
QMSGER	1=Message ERROR	BOOL	0
QMSGER1	1=Message ERROR	BOOL	0

Note

The RACK_PNT block is used instead of the RACK_PN1 block when time stamping (SOE) is activated.

6.85.3 Message texts and associated values of RACK_PN1

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message number	Default message text	Message class
1	Station @1%d@/@3%d@: Redundancy loss	PLC Process Control Message - Error
2	Station @2%d@/@3%d@: Redundancy loss	PLC Process Control Message - Error

Message number	Default message text	Message class
3	Station @1%d@/@3%d@: Failure	PLC Process Control Message - Failur
4	Station @2%d@/@3%d@: Failure	PLC Process Control Message - Failure
5	Station @4%d@/@3%d@: Missing or wrong server module	PLC Process Control Message - Error
6		No message
7		No message
8	Station @1%d@/@3%d@: Multiple failure	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID:

Associated value	Block parameter	Data type
1	Primary PN-IO system number (SUBN1_ID)	BYTE
2	Redundant PN-IO system number (SUBN2_ID)	BYTE
3	Rack/station number (RACK_NO)	BYTE

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message number	Default message text	Message class
1	Station @4%d@/ @3%d@/0: Port 1 error	PLC Process Control Message - Error
2	Station @4%d@/ @3%d@/0: Port 2 error	PLC Process Control Message - Error
3	Station @4%d@/ @3%d@/0: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
4	Station @4%d@/ @3%d@/0: Maintenance required (PN-IO)	Preventative Maintenance - Standard
5	Station @4%d@/ @3%d@/1: Port 1 error	PLC Process Control Message - Error
6	Station @4%d@/ @3%d@/1: Port 2 error	PLC Process Control Message - Error
7	Station @4%d@/ @3%d@/1: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
8	Station @4%d@/ @3%d@/1: Maintenance required (PN-IO)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1:

Associated value	Block parameter	Data type
1	Primary PN-IO system number (SUBN1_ID)	BYTE
2	Redundant PN-IO system number (SUBN2_ID)	BYTE
3	Rack/station number (RACK_NO)	BYTE
4	PN-IO System number	WORD

You can find additional information in the section: Message Classes (Page 531)

6.86 RACK_PNT: PROFINET RACK function block - R1 device

6.86.1 Description of RACK_PNT

Object name (type + number)

FB 432

- I/Os of RACK_PNT (Page 452)

Area of application

The block RACK_PNT monitors the status of a PN-IO rack and reports the associated error events.

The block releases the lower-level IM_TS_PN block when a status alarm occurs (OB55).

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB1	Cyclic program
OB55	Status alarm
OB81	Power outage
OB82	Diagnostic alarm
OB85	Program sequence error
OB86	Rack failure
OB100	New start (warm start)

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The RACK_PNT block is installed in the run sequence downstream of the SUBNET block.
- The RACK_NO, DADDR, SUBN1_ID, SUBN2_ID, and SUBN_TYP inputs are configured.
- The EN input is interconnected with the output of an AND block. whose inputs are interconnected to the EN_SUBx output of the OB BEGIN_HPN block, and to the EN_Rxxx output of the SUBNET block.
- The CPU_DIAG_PN OUT structure of the OB_BEGIN_HPN block and SUB_DIAG_PN of the SUBNET_PN block are interconnected with the IN_OUT structures of the same name of the RACK_PNT block.

Startup characteristics

The RACK_PNT block initializes ALARM_8P messages. It checks availability of the station and, in H systems, determines the preferred channel of the station.

6.86.2 I/Os of RACK_PNT

Quintessence

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DADDR_L	Diagnostic address of the PN_IO) Device - left	INT	0
DADDR_R	Diagnostic address of the PN_IO) Device - right	INT	0
DELAY	Alarm delay	INT	15
DIAG_BUF	Entry in the diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	Message release	BOOL	1
EV_ID	Message number ALARM_8P (assigned by ES)	DWORD	0
EV_ID1	Message number ALARM_8P (assigned by ES)	DWORD	0
EV_ID2	Message number ALARM_8P (assigned by ES)	DWORD	0
EV_ID3	Message number ALARM_8P (assigned by ES)	DWORD	0
FEATURE_01	Property of the hardware parameter 01	WORD	0

I/O (parameter)	Meaning	Data type	Default
PN_REDUNDANCY_LEVEL	PN redundancy level S1=16#1; S2=16#2; R1=16#4; R2=16#8	BYTE	0
MS	Maintenance status	DWORD	0
PNIO_L_ADR	Diagnostic address of PN-IO Interface - Left	INT	0
PNIO_R_ADR	Diagnostic address of PN-IO Interface - Right	INT	0
PORT1_L_ADR	Diagnostic address of PORT 1 - left	INT	0
PORT1_R_ADR	Diagnostic address of PORT 1 - right	INT	0
PORT1_L_CONNECT	Port 1 Connection Status - left	BYTE	0
PORT1_R_CONNECT	Port 1 Connection Status - right	BYTE	0
PORT2_L_ADR	Diagnostic address of PORT 2 - left	INT	0
PORT2_R_ADR	Diagnostic address of PORT 2 - right	INT	0
PORT2_L_CONNECT	Port 2 Connection Status - left	INT	0
PORT2_R_CONNECT	Port 2 Connection Status - right	INT	0
RACK_NO	Rack number	BYTE	0
SUBN_TYP	1 = External PN-IO-System	BOOL	0
SUBN1_ID	ID of primary PN-IO-System	BYTE	255
SUBN2_ID	ID of redundant PN-IO-System	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
EN_Mxx	1= Enable MODUL xx (xx = 0 - 63)	BOOL	0
MSGSTATx	Status output of ALARM_8P_x (x = 1-2)	WORD	0
O_MS	Maintenance status	DWORD	0
QMSGERx	Message error for the ALARM_8P_x x = 1 - 2)	BOOL	0
RAC_DIAG	System structure	STRUCT	0
QRACKF	1 = Higher-level error	BOOL	0
SUBN1ACT	1 = Slave 1 active	BOOL	0
SUBN1ERR	1 = Error Slave 1	BOOL	0
SUBN2ACT	1 = Slave 2 active	BOOL	0
SUBN2ERR	1 = Error Slave 2	BOOL	0

I/O (parameter)	Meaning	Data type	Default

RACK_TS_XCHG	Data exchange	STRUCT
		RET: WORD;
		PERAF: BOOL; // 1=Module I/O Access Failure
		PARF: BOOL; // 1=Parameter Assignment Error Module
		BUFOV : BOOL; //Buffer overflow
		DIOF: BOOL; //Digital input observer failure
		BSOF : BOOL; //Buffer status observer failure
		TSOF: BOOL; //Time status observer failure
		SRLOF: BOOL; //System redundancy layer observer failure
		SIOF: BOOL; //Source identification observer failure
		BPARF: BOOL; // 1=Parameter Assignment Error Block
		TS_NCON : BOOL; // 1=TS_xxx is not connected
		SICH : BOOL; // Source identification channel
		TMSTAT_NO_SYNC : BOOL; // Time status
		TMSTAT_JITTER : BOOL; // Time status
		SRLS : BOOL; // Redundancy status
		MSG_BUSY : BOOL; // reserve
		RESV1 : BOOL; // reserve
		SUBNET: BYTE; RACK: BYTE;
		SLOT: BYTE;
		CHANNEL: BYTE;
			0

SaS_TS_00	Time stamp	STRUCT BYTE0: BYTE; .... BYTE65:BYTE; END_STRUCT	-
SaS_TS_01	Time stamp	STRUCT BYTE0: BYTE; .... BYTE65:BYTE; END_STRUCT	-

Input/Output parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = Accept new ID settings	BOOL	0
CPU_DIAG_PN	CPU-diagnosis (system structure)	STRUCT	-

I/O (parameter)	Meaning	Data type	Default
SUB_DIAG	System structure	STRUCT	-
CPU_OB_5X_PN	OB_5x-Start information	STRUCT	-

6.86.3 Message texts and associated values of RACK_PNT

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message number	Default message text	Message class
1	Station @7%d@ / @3%d@: Loss of redundancy	PLC Process Control Message - Error
2	Station @10%d@/@3%d@: Missing or wrong server module	PLC Process Control Message - Error
3	Station @7%d@/ @3%d@: Failure	PLC Process Control Message - Failure
4	Station @8%d@/@9%d@: Output TS_xxx von S_CHxx: Slot=@5%d@channel=@6%d@is not interconnected	PLC Process Control Message - Failure
5	Station @1%d@/@3%d@: I/O access error: Ret_Val@4%d@	PLC Process Control Message - Failure
6	Station @1%d@/@3%d@: Parameter assignment error LADDR	PLC Process Control Message - Failure
7	Station @1%d@/@2%d@: Parameter assignment error slot=@5%d@, channel=@6%d@	PLC Process Control Message - Failure
8	Station @1%d@/ @3%d@: Multiple failure	PLC Process Control Message - Failure

Associated values of ALARM_8P with EV_ID:

Associated value	Block parameter	Data type
1	Primary PN-IO-System – Number (SUBN1_ID)	BYTE
2	Redundant PN-IO-System – Number (SUBN2_ID)	BYTE
3	Rack or station number (RACK_NO)	BYTE
4	Return value	BOOL
5	Slot number	BYTE
6	Channel number	BYTE
7	Subnet ID	WORD
8	Subnet ID	WORD
9	Rack number	BYTE
10	Subnet ID	WORD

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message number	Default message text	Message class
1	Station @4%d@/ @3%d@/0: Port 1 error	PLC Process Control Message - Error
2	Station @4%d@/ @3%d@/0: Port 2 error	PLC Process Control Message - Error
3	Station @4%d@/ @3%d@/0: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
4	Station @4%d@/ @3%d@/0: Maintenance required (PN-IO)	Preventative Maintenance - Standard
5	Station @4%d@/ @3%d@/1: Port 1 error	PLC Process Control Message - Error
6	Station @4%d@/ @3%d@/1: Port 2 error	PLC Process Control Message - Error
7	Station @4%d@/ @3%d@/1: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
8	Station @4%d@/ @3%d@/1: Maintenance required (PN-IO)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1:

Associated value	Block parameter	Data type
1	Primary PN-IO-System – Number (SUBN1_ID)	BYTE
2	Primary PN-IO-System – Number (SUBN2_ID)	BYTE
3	Rack or station number (RACK_NO)	BYTE
4	PN-IO-System - Number	WORD

The process control messages of ALARM_T with EV_ID2 are assigned as follows:

Message number	Default message text	Message class
1	Station @1%d@/@2%d Maintenance demanded (buffer overflow)	PLC Process Control Message - Error
2	Station @1%d@/@2%d@/@3%d@/@4%d@: Maintenance alarm (stop time stamping functionality)	PLC Process Control Message - Failure
3	Station @1%d@ @2%d@: Maintenance alarm (buffer status observer failure)	PLC Process Control Message - Failure
4	Station @1%d@/@2%d@: Maintenance alarm (time status observer failure)	PLC Process Control Message - Failure
5	Station @1%d@/@2%d@: Maintenance alarm (redundancy layer (SRL) observer failure)	PLC Process Control Message - Failure
6	Station @1%d@/@2%d@: Maintenance alarm (source identification observer failure)	PLC Process Control Message - Failure

Message number	Default message text	Message class
7		No message
8		No message

Associated values of ALARM_T with EV_ID2:

Associated value	Block parameter	Data type
1	Primary PN-IO-System – Number (SUBN1_ID)	BYTE
2	Primary PN-IO-System – Number (SUBN2_ID)	BYTE
3	Rack number	BYTE
4	Subnet ID	BYTE

The process control messages of ALARM_T with EV_ID3 are assigned as follows:

Message number	Default message text	Message class
1	Station @1%d@/@2%d@/@3%d@/@4%d@: Maintenance required (start-up information)	Preventative Maintenance - Standard
2	Station @1%d@/@2%d@: Maintenance required (time-of-day frame failure, status=@3%d@, Sec=@4%d@, nSec=@5%d@)	Preventative Maintenance - Standard
3	Station @1%d@/@2%d@: Maintenance required (switch in case of redundancy incoming)	Preventative Maintenance - Standard
4	Station @1%d@/@2%d@: Maintenance required (time difference between message frame and internal clock may impair accuracy)	Preventative Maintenance - Standard
5	Station @1%d@/@2%d@: Maintenance required (switch in case of redundancy outgoing)	Preventative Maintenance - Standard
6		No message
7		No message
8		No message

Associated values of ALARM_T with EV_ID3:

Associated value	Block parameter	Data type
1	Timestamp	ARRAY
2	PN-IO-System - Number	BYTE
3	Rack	BYTE
4	Slot	BYTE
5	Channel	BYTE

You can find additional information in the section: Message Classes (Page 531).

6.87 RED_AI: Status processing of redundant AI modules

6.87.1 Description of RED_AI

Object name (type + number)

FB 444

- I/Os of RED_AI (Page 459)

Area of application

Diagnosis of the redundant analog output module pair.

Configuration

The following are automatically executed with the "Generate module driver" CFC function:

- The OB_BEGIN block's OUT-Structure CPU_DIAG/CPU_DIAG_80 is interconnected with the identically named IN_OUT-Structure of the RED_xxx-block.
- The OUT-Structure MOD_INF of the upstream MOD-block is interconnected with the MOD_INF1/MOD_INF2 IN_OUT-Structure of the RED_xxx-block.
- The input parameters LADDR_Mas, LADDR_Slv, PER_TYPE, PAR_PROI, CHAN_NUM, CHAN_BITS, DIS_TIME, VAL_UNIT, DIS_PERC, CHAN_MAS, EXEC_TIM, CHAN01..08_S are parameterised with the values set in HW config.
- The input parameters MODF1, MODF2, MODE1_00..07, MODE2_00..07 are interconnected with the correspondent output parameters of the previous block.

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 3x	Cyclic interrupt OB (Channel OB)
OB 100	New restart
OB 72	CPU-Redundancy Error (only in H-Systems)
OB 80	"Time error-OB" (only in Single-Mode)
OB 85	Program sequence error

Error handling

The plausibility of input parameters is not checked.

Block functions

The RED_AI block processes the status of all channels cyclically based on the outputs OMODE_xx or the MOD_x blocks and then forms the information on redundancy of the OR blocks.

Message response

Not available

6.87.2 I/Os of RED_AI

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_Mas	Master address: 1 = Channel x active	DWORD	0
CH_INF_Slv	Slave address: 1 = Channel x active	DWORD	0
LADDR_Mas	Master module address	INT	0
LADDR_Slv	Slave module address	INT	0
MODF1	1=Module 1 pulled / out of order	BOOL	0
MODF2	1=Module 2 pulled / out of order	BOOL	0
QI_INFO	1= Quality info active	BYTE	0
PER_TYPE	Reserve	BYTE	0
PAR_PROI	Process image partition	BYTE	0
CHAN_NUM	Total number of channels -1	BYTE	0
CHAN_BIT	Reserve	BYTE	0
DIS_TIME	Reserve	WORD	0
RESERVE1	Reserve 1	BYTE	0
VAL_UNIT	Reserve	BYTE	0
RESERVE2	Reserve 1	BYTE	0
DIS_PERC	Reserve	BYTE	0
CHAN_MAS	Reserve	WORD	0
EXEC_TIM	Reserve	WORD	0
CHANxx_S	Reserve (xx = 01 - 16)	WORD	0
MODE1_xx	Module 1 mode channel xx (xx = 00 - 15)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 15)	DWORD	0
FEATURE	Features of the hardware parameters	DWORD	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure	STRUCT	-
CPU_DIAG_80	Time error OB start information	STRUCT	-
MOD_INF1	Module 1 information structure	STRUCT	-
MOD_INF2	Module 2 information structure	STRUCT	-
DIAG_INF_1	Module Diagnostic Information Structure	STRUCT	-
DIAG_INF_2	Module Diagnostic Information Structure	STRUCT	-
ACC_MODE	1 = Accept new mode settings	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QACTIV_L	1=Low Module Active	BOOL	0
QACTIV_H	1=High Module Active	BOOL	0
QPASS	1=At least one module or one channel is passivized	BOOL	0
QMOD_CH_L	Status of the channels of the 1st module	BOOL	0
QMOD_CH_H	Status of the channels of the 2nd module	BOOL	0
QLADDR_L	Lower address (address that the user uses)	WORD	0
QLADDR_H	Higher address (address of the redundant module)	WORD	0
QCH_INF_L	Status of the channels of the 1st module	DWORD	0
QCH_INF_H	Status of the channels of the 2nd module	DWORD	0
QUN_OV_L	Underflow / overflow status of the channels of the L module	DWORD	0
QUN_OV_H	Underflow / overflow status of the channels of the H module	DWORD	0
QDIS_EXPIRE	Reserve	DWORD	0
QCH_DISCREP	Reserve	DWORD	0
QPER_TYPE	Reserve	BYTE	0
QPAR_PROI	Partial process image	BYTE	0
QCHAN_NUM	Total number of channels -1	BYTE	0
QCHAN_BIT	Reserve	BYTE	0
QDIS_TIME	Reserve	WORD	0
QVAL_UNIT	Reserve	BYTE	0
QDIS_PERC	Reserve	BYTE	0
QCHAN_MAS	Reserve	WORD	0
QEXEC_TIM	Reserve	WORD	0
MODUL_STATUS	MODUL_STATUS of RED_AI	DWORD	0
DEPASS_RED	Depassivation	BOOL	0

I/O (parameter)	Meaning	Data type	Default
RETURN_VAL	Return Value	INT	0
QCH_VAL_xx	Active channel value (xx = 00 - 15)	BYTE	0
QVALxx_L	Reserve (xx = 00 - 15)	WORD	0
QVALxx_H	Reserve (xx = 00 - 15)	WORD	0
QCH_LV_VAL_xx	Reserve (xx = 00 - 15)	WORD	0
QMODF1	1 = Module 1 Removed / Out of Order	BOOL	0
QMODF2	1 = Module 2 Removed / Out of Order	BOOL	0

6.88 RED_AIH: Status processing of redundant AI HART modules (<= 8 CHANNELS)

6.88.1 Description of RED_AIH

Object name (type + number)

FB 447

- I/Os of RED_AIH (Page 462)

Area of application

Diagnosis of the HART Analog input module pair.

Configuration

The following are automatically executed with the "Generate module driver" CFC function:

- The OB_BEGIN block's OUT-Structure CPU_DIAG/CPU_DIAG_80 is interconnected with the identically named IN_OUT-Structure of the RED_xxx-block.
- The OUT-Structure MOD_INF of the upstream MOD-block is interconnected with the MOD_INF1/MOD_INF2 IN_OUT-Structure of the RED_xxx-block.
- The input parameters LADDR_Mas, LADDR_Slv, PER_TYPE, PAR_PROI, CHAN_NUM, CHAN_BITS, DIS_TIME, VAL_UNIT, DIS_PERC, CHAN_MAS, EXEC_TIM, CHAN01..08_S are parameterised with the values set in HW config.
- The input parameters MODF1, MODF2, MODE1_00..07, MODE2_00..07 are interconnected with the correspondent output parameters of the previous block

Calling OBs

The block must be installed in the run sequence in the following OBs:

OB 3x	Cyclic interrupt OB (Channel OB)
OB 100	New restart
OB 72	CPU-Redundancy Error (only in H-Systems)
OB 80	"Time error-OB" (only in Single-Mode)
OB 85	Program sequence error

Error handling

The plausibility of input parameters is not checked.

Block functions

The RED_AIH block processes the status of all channels cyclically based on the outputs OMODE_xx or the MOD_x blocks and then forms the information on redundancy of the OR blocks.

Message response

Not available

6.88.2 I/Os of RED_AIH

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_Mas	Master address: 1 = Channel x active	DWORD	0
CH_INF_Slv	Slave address: 1 = Channel x active	DWORD	0
LADDR_Mas	Master module address	INT	0
LADDR_Slv	Slave module address	INT	0
MODF1	1=Module 1 pulled / out of order	BOOL	0
MODF2	1=Module 2 pulled / out of order	BOOL	0
QI_INFO	1= Quality info active	BYTE	0
PER_TYPE	Reserve	BYTE	0
PAR_PROI	Process image partition	BYTE	0
CHAN_NUM	Total number of channels -1	BYTE	0

I/O (parameter)	Meaning	Data type	Default
CHAN_BIT	Reserve	BYTE	0
DIS_TIME	Reserve	WORD	0
RESERVE1	Reserve 1	BYTE	0
VAL_UNIT	Reserve	BYTE	0
RESERVE2	Reserve 1	BYTE	0
DIS_PERC	Reserve	BYTE	0
CHAN_MAS	Reserve	WORD	0
EXEC_TIM	Reserve	WORD	0
CHANxx_S	Reserve (xx = 01 - 08)	WORD	0
CHAN_AV	Reserve	INT	0
ADDL_AV	Reserve	INT	0
ADDH_AV	Reserve	INT	0
MODE1_xx	Module 1 mode channel xx (xx = 00 - 07)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 07)	DWORD	0
FEATURE	Features of the hardware parameters	DWORD	0
HART8_VAR	1 = 8 HART	BOOL	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure	STRUCT	-
CPU_DIAG_80	Time error OB start information	STRUCT	-
MOD_INF1	Module 1 information structure	STRUCT	-
MOD_INF2	Module 2 information structure	STRUCT	-
DIAG_INF_1	Module Diagnostic Information Structure	STRUCT	-
DIAG_INF_2	Module Diagnostic Information Structure	STRUCT	-
ACC_MODE	1 = Accept new mode settings	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QACTIV_L	1=Low Module Active	BOOL	0
QACTIV_H	1=High Module Active	BOOL	0
QPASS	1=At least one module or one channel is passivized	BOOL	0
QMOD_CH_L	Status of the channels of the 1st module	BOOL	0
QMOD_CH_H	Status of the channels of the 2nd module	BOOL	0
QLADDR_L	Lower address (address that the user uses)	WORD	0

I/O (parameter)	Meaning	Data type	Default
QLADDR_H	Higher address (address of the redundant module)	WORD	0
QCH_INF_L	Status of the channels of the 1st module	DWORD	0
QCH_INF_H	Status of the channels of the 2nd module	DWORD	0
QUN_OV_L	Underflow / overflow status of the channels of the L module	DWORD	0
QUN_OV_H	Underflow / overflow status of the channels of the H module	DWORD	0
QDIS_EXPIRE	Reserve	DWORD	0
QCH_DISCREP	Reserve	DWORD	0
QPER_TYPE	Reserve	BYTE	0
QPAR_PROI	Partial process image	BYTE	0
QCHAN_NUM	Total number of channels -1	BYTE	0
QCHAN_BIT	Reserve	BYTE	0
QDIS_TIME	Reserve	WORD	0
QVAL_UNIT	Reserve	BYTE	0
QDIS_PERC	Reserve	BYTE	0
QCHAN_MAS	Reserve	WORD	0
QEXEC_TIM	Reserve	WORD	0
MODUL_STATUS	MODUL_STATUS	DWORD	0
QDEPASS_RED_PCS7	Depassivation	BOOL	0
RETURN_VAL	Return Value	INT	0
QCUR_L_xx	Reserve (xx = 00 - 07)	WORD	0
QCUR_H_xxx	Reserve (xx = 00 - 07)	WORD	0
CH_INF_Mas_AUX_0	Master address aux value 0..31: 1 = active	DWORD	0
CH_INF_Slv_AUX_0	Slave address aux value 0..31: 1 = active	DWORD	0
QMODF1	1 = Module 1 Removed / Out of Order	BOOL	0
QMODF2	1 = Module 2 Removed / Out of Order	BOOL	0

6.89 RED_AQ: Status processing of redundant AQ modules

6.89.1 Description of RED_AQ

Object name (type + number)

FB 445

- I/Os of RED_AQ (Page 465)

Area of application

Diagnosis of the redundant analog output module pair.

Configuration

The following are automatically executed with the "Generate module driver" CFC function:

- The OB_BEGIN block's OUT-Structure CPU_DIAG/CPU_DIAG_80 is interconnected with the identically named IN_OUT-Structure of the RED_xxx-block.
- The OUT-Structure MOD_INF of the upstream MOD-block is interconnected with the MOD_INF1/MOD_INF2 IN_OUT-Structure of the RED_xxx-block.
- The input parameters LADDR_Mas, LADDR_Slv, PER_TYPE, PAR_PROI, CHAN_NUM, CHAN_BITS, DIS_TIME, VAL_UNIT, DIS_PERC, CHAN_MAS, EXEC_TIM, CHAN01..08_S are parameterised with the values set in HW config.
- The input parameters MODF1, MODF2, MODE1_00..07, MODE2_00..07 are interconnected with the correspondent output parameters of the previous block.

Calling OBs

The block must be installed in the following OBs (performed automatically in CFC):

OB 3x	Cyclic interrupt OB (Channel OB)
OB 100	New restart
OB 72	CPU-Redundancy Error (only in H-Systems)
OB 80	"Time error-OB" (only in Single-Mode)
OB 85	Program sequence error

Error handling

The plausibility of input parameters is not checked.

Block functions

The RED_AQ block processes the status of all channels cyclically based on the outputs OMODE_xx or the MOD_x blocks and then forms the information on redundancy of the OR blocks.

Message response

Not available

6.89.2 I/Os of RED_AQ

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_Mas	Master address: 1 = Channel x active	DWORD	0
CH_INF_Slv	Slave address: 1 = Channel x active	DWORD	0
LADDR_Mas	Master module address	INT	0
LADDR_Slv	Slave module address	INT	0
MODF1	1=Module 1 pulled / out of order	BOOL	0
MODF2	1=Module 2 pulled / out of order	BOOL	0
QI_INFO	1= Quality info active	BYTE	0
PER_TYPE	Reserve	BYTE	0
PAR_PROI	Process image partition	BYTE	0
CHAN_NUM	Total number of channels -1	BYTE	0
CHAN_BIT	Reserve	BYTE	0
CHAN_MAS	Reserve	WORD	0
MASK_CUR	Reserve	WORD	0
MIN_CUR	Reserve	WORD	0
CORR_CUR	Reserve	WORD	0
HALF_CUR	Reserve	BYTE	0
MODE1_xx	Module 1 mode channel xx (xx = 00 - 07)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 07)	DWORD	0
FEATURE	Features of the hardware parameters	DWORD	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure	STRUCT	-
CPU_DIAG_80	Time error OB start information	STRUCT	-
MOD_INF1	Module 1 information structure	STRUCT	-
MOD_INF2	Module 2 information structure	STRUCT	-
DIAG_INF_1	Module Diagnostic Information Structure	STRUCT	-
DIAG_INF_2	Module Diagnostic Information Structure	STRUCT	-
ACC_MODE	1 = Accept new mode settings	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QACTIV_L	1=Low Module Active	BOOL	0
QACTIV_H	1=High Module Active	BOOL	0
QMOD_CH_L	Status of the channels of the 1st module	BOOL	0
QMOD_CH_H	Status of the channels of the 2nd module	BOOL	0
QLADDR_L	Lower address (address that the user uses)	WORD	0
QLADDR_H	Higher address (address of the redundant module)	WORD	0
QCH_INF_L	Status of the channels of the 1st module	DWORD	0
QCH_INF_H	Status of the channels of the 2nd module	DWORD	0
QPER_TYPE	Reserve	BYTE	0
QPAR_PROI	Partial process image	BYTE	0
QCHAN_NUM	Total number of channels -1	BYTE	0
QCHAN_BIT	Reserve	BYTE	0
QCHAN_MAS	Reserve	WORD	0
QMASK_CUR	Reserve	WORD	0
QMIN_CUR	Reserve	WORD	0
QCORR_CUR	Reserve	WORD	0
MODUL_STATUS	MODUL_STATUS	DWORD	0
DEPASS_RED	Depassivation	BOOL	0
RETURN_VAL	Return Value	INT	0
QCUR_L_xx	Reserve (xx = 00 - 07)	WORD	0
QCUR_H_xx	Reserve (xx = 00 - 07)	WORD	0
QMODF1	1 = Module 1 Removed / Out of Order	BOOL	0
QMODF2	1 = Module 2 Removed / Out of Order	BOOL	0

6.90 RED_AQH: Status processing of redundant AQ HART modules (<= 8 Channels)

6.90.1 Description of RED_AQH

Object name (type + number)

FB 448

- I/Os of RED_AQH (Page 468)

Area of application

Diagnosis of the redundant HART Analog output module pairs.

Configuration

The following are automatically executed with the "Generate module driver" CFC function:

- The OB_BEGIN block's OUT-Structure CPU_DIAG/CPU_DIAG_80 is interconnected with the identically named IN_OUT-Structure of the RED_xxx-block.
- The OUT-Structure MOD_INF of the upstream MOD-block is interconnected with the MOD_INF1/MOD_INF2 IN_OUT-Structure of the RED_xxx-block.
- The input parameters LADDR_Mas, LADDR_Slv, PER_TYPE, PAR_PROI, CHAN_NUM, CHAN_BITS, DIS_TIME, VAL_UNIT, DIS_PERC, CHAN_MAS, EXEC_TIM, CHAN01..08_S are parameterised with the values set in HW config.
- The input parameters MODF1, MODF2, MODE1_00..07, MODE2_00..07 are interconnected with the correspondent output parameters of the previous block.

Calling OBs

The block must be installed in the following OBs (performed automatically in CFC):

OB 3x	Cyclic interrupt OB (Channel OB)
OB 100	New restart
OB 72	CPU-Redundancy Error (only in H-Systems)
OB 80	"Time error-OB" (only in Single-Mode)
OB 85	Program sequence error

Error handling

The plausibility of input parameters is not checked.

Block functions

The RED_AQH block processes the status of all channels cyclically based on the outputs OMODE_xx or the MOD_x blocks and then forms the information on redundancy of the OR blocks.

Message response

Not available

6.90.2 I/Os of RED_AQH

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_Mas	Master address: 1 = Channel x active	DWORD	0
CH_INF_Slv	Slave address: 1 = Channel x active	DWORD	0
LADDR_Mas	Master module address	INT	0
LADDR_Slv	Slave module address	INT	0
MODF1	1=Module 1 pulled / out of order	BOOL	0
MODF2	1=Module 2 pulled / out of order	BOOL	0
QI_INFO	1= Quality info active	BYTE	0
PER_TYPE	Reserve	BYTE	0
PAR_PROI	Process image partition	BYTE	0
CHAN_NUM	Total number of channels -1	BYTE	0
CHAN_BIT	Reserve	BYTE	0
CHAN_MAS	Reserve	WORD	0
MASK_CUR	Reserve	WORD	0
CHAN_AV	Reserve	INT	0
ADDL_AV	Reserve	INT	0
ADDH_AV	Reserve	INT	0
CUR_ACTV	Reserve	WORD	0
MIN_CUR	Reserve	WORD	0
CORR_CUR	Reserve	WORD	0
HALF_CUR	Reserve	BYTE	0
MODE1_xx	Module 1 mode channel xx (xx = 00 - 07)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 07)	DWORD	0
FEATURE	Features of the hardware parameters	DWORD	0
HART8_VAR	1 = 8 HART	BOOL	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure	STRUCT	-
CPU_DIAG_80	Time error OB start information	STRUCT	-
MOD_INF1	Module 1 information structure	STRUCT	-
MOD_INF2	Module 2 information structure	STRUCT	-
DIAG_INF_1	Module Diagnostic Information Structure	STRUCT	-
DIAG_INF_2	Module Diagnostic Information Structure	STRUCT	-
ACC_MODE	1 = Accept new mode settings	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QACTIV_L	1=Low Module Active	BOOL	0
QACTIV_H	1=High Module Active	BOOL	0
QMOD_CH_L	Status of the channels of the 1st module	BOOL	0
QMOD_CH_H	Status of the channels of the 2nd module	BOOL	0
QLADDR_L	Lower address (address that the user uses)	WORD	0
QLADDR_H	Higher address (address of the redundant module)	WORD	0
QCH_INF_L	Status of the channels of the 1st module	DWORD	0
QCH_INF_H	Status of the channels of the 2nd module	DWORD	0
QPER_TYPE	Reserve	BYTE	0
QPAR_PROI	Partial process image	BYTE	0
QCHAN_NUM	Total number of channels -1	BYTE	0
QCHAN_BIT	Reserve	BYTE	0
QCHAN_MAS	Reserve	WORD	0
QMASK_CUR	Reserve	WORD	0
QMIN_CUR	Reserve	WORD	0
QCORR_CUR	Reserve	WORD	0
MODUL_STATUS	MODUL_STATUS	DWORD	0
DEPASS_RED	Depassivation	BOOL	0
RETURN_VAL	Return Value	INT	0
QCUR_L_xx	Reserve (xx = 00 - 07)	WORD	0
QCUR_H_xx	Reserve (xx = 00 - 07)	WORD	0
CH_INF_Mas_AUX_0	Master address aux value 0..31: 1 = active	DWORD	0
CH_INF_Slv_AUX_0	Slave address aux value 0..31: 1 = active	DWORD	0
QMODF1	1 = Module 1 Removed / Out of Order	BOOL	0
QMODF2	1 = Module 2 Removed / Out of Order	BOOL	0

6.91 RED_DI: Status processing of redundant DI modules

6.91.1 Description of RED_DI

Object name (type + number)

FB 442

- I/Os of RED_DI (Page 471)

Area of application

The RED_DI block is used for diagnostics of the redundant digital input module pair.

Configuration

The following are automatically executed with the "Generate module driver" CFC function:

- OUT-Structure CPU_DIAG/CPU_DIAG_80 of the OB_BEGIN-block is interconnected with the IN_OUT-Structure of the RED_xxx-block.
- The upstram MOD block's OUT-Struktur MOD_INF is interconnected with the MOD_INF1/ MOD_INF2 IN_OUT-Structure of the RED_xxx-block.
- The input parameters LADDR_Mas, LADDR_Slv, PER_TYPE, PAR_PROI, CHAN_NUM, CHAN_BITS, DIS_TIME, VAL_UNIT, DIS_PERC, CHAN_MAS, EXEC_TIM, CHAN01..08_S are parameterised with the values set in HW config.
- The input parameters MODF1, MODF2, MODE1_00..07, MODE2_00..07 are interconnected with the correspondent output parameters of the previous block.

Calling OBs

The block must be installed in the following OBs (performed automatically in CFC):

OB 3x	Cyclic interrupt OB (Channel OB)
OB 100	New restart
OB 72	CPU-Redundancy Error (only in H-Systems)
OB 80	"Time error-OB" (only in Single-Mode)
OB 85	Program sequence error

Error handling

The plausibility of input parameters is not checked.

Block functions

The RED_DI block processes the status of all channels cyclically based on the outputs OMODE_xx or the MOD_x blocks and then forms the information on redundancy of the OR blocks.

Message response

Not available

6.91.2 I/Os of RED_DI

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_Mas	Master address: 1 = Channel x active	DWORD	0
CH_INF_Slv	Slave address: 1 = Channel x active	DWORD	0
LADDR_Mas	Master module address	INT	0
LADDR_Slv	Slave module address	INT	0
MODF1	1=Module 1 pulled / out of order	BOOL	0
MODF2	1=Module 2 pulled / out of order	BOOL	0
QI_INFO	1= Quality info active	BYTE	0
PER_TYPE	Reserve	BYTE	0
PAR_PROI	Process image partition	BYTE	0
CHAN_NUM	Total number of channels -1	BYTE	0
CHAN_BIT	Reserve	BYTE	0
DIS_TIME	Reserve	WORD	0
RESERVE1	Reserve	BYTE	0
R_TO_TD	Reserve	BYTE	0
MODE1_xx	Module 1 mode channel xx (xx = 00 - 31)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 31)	DWORD	0
FEATURE	Features of the hardware parameters	DWORD	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure	STRUCT	-
CPU_DIAG_80	Time error OB start information	STRUCT	-
MOD_INF1	Module 1 information structure	STRUCT	-
MOD_INF2	Module 2 information structure	STRUCT	-
DIAG_INF_1	Module Diagnostic Information Structure	STRUCT	-
DIAG_INF_2	Module Diagnostic Information Structure	STRUCT	-
ACC_MODE	1 = Accept new mode settings	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QVAL	Output value	DWORD	0
QACTIV_MAS	1=Master module active	BOOL	0

I/O (parameter)	Meaning	Data type	Default
QACTIV_SLV	1=Slave module active	BOOL	0
QMOD_CH_MAS	Status of the channels of the 1st module	BOOL	0
QMOD_CH_SLV	Status of the channels of the 2nd module	BOOL	0
QLADDR_MAS	Master address (address that the user uses)	INT	0
QLADDR_SLV	Slave address (address of the redundant module)	INT	0
QCH_INF_MAS	Status of the channels of the 1st module	DWORD	0
QCH_INF_SLV	Status of the channels of the 2nd module	DWORD	0
QDIS_EXPIRE	Reserve	DWORD	0
QCH_DISCREP	Reserve	DWORD	0
QPER_TYPE	Reserve	BYTE	0
QPAR_PROI	Process image partition	BYTE	0
QCHAN_NUM	Total number of channels -1	BYTE	0
QCHAN_BIT	Reserve	BYTE	0
QDIS_TIME	Reserve	WORD	0
QR_TO_TD	Reserve	BYTE	0
MODUL_STATUS	MODUL_STATUS	DWORD	0
QDEPASS_RED_ PCS7	1=Depassivation	BOOL	0
RETURN_VAL	Return value	INT	0
QCH_VAL_xx	Reserve (xx = 00 - 31)	BYTE	255
QCH_LV_VAL_xx	Reserve (xx = 00 - 31)	BOOL	0
QMODF1	1 = Module 1 Removed / Out of Order	BOOL	0
QMODF2	1 = Module 2 Removed / Out of Order	BOOL	0

6.92 RED_DQ: Status processing of redundant DQ modules

6.92.1 Description of RED_DQ

Object name (type + number)

FB 443

- I/Os of RED_DQ (Page 474)

Area of application

Diagnosis of the redundant digital output module pairs.

Calling OBs

The block must be installed in the following OBs (performed automatically in CFC):

OB 3x	Cyclic interrupt OB (Channel OB)
OB 100	New restart
OB 72	CPU-Redundancy Error (only in H-Systems)
OB 80	"Time error-OB" (only in Single-Mode)
OB 85	Program sequence error

Configuration

The following are automatically executed with the "Generate module driver" CFC function:

- The OB_BEGIN block's OUT-Structure CPU_DIAG/CPU_DIAG_80 is interconnected with the identically named IN_OUT-Structure of the RED_xxx-block.
- The OUT-Structure MOD_INF of the upstream MOD-block is interconnected with the MOD_INF1/MOD_INF2 IN_OUT-Structure of the RED_xxx-block.
- The input parameters LADDR_Mas, LADDR_Slv, PER_TYPE, PAR_PROI, CHAN_NUM, CHAN_BITS, DIS_TIME, VAL_UNIT, DIS_PERC, CHAN_MAS, EXEC_TIM, CHAN01..08_S are parameterised with the values set in HW config.
- The input parameters MODF1, MODF2, MODE1_00..07, MODE2_00..07 are interconnected with the correspondent output parameters of the previous block.

Error handling

The plausibility of input parameters is not checked.

Block functions

The RED_DQ block processes the status of all channels cyclically based on the outputs OMODE_xx or the MOD_x blocks and then forms the information on redundancy of the OR blocks.

Message response

Not available

6.92.2 I/Os of RED_DQ

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_Mas	Master address: 1 = Channel x active	DWORD	0
CH_INF_Slv	Slave address: 1 = Channel x active	DWORD	0
LADDR_Mas	Master module address	INT	0
LADDR_Slv	Slave module address	INT	0
MODF1	1=Module 1 pulled / out of order	BOOL	0
MODF2	1=Module 2 pulled / out of order	BOOL	0
QI_INFO	1= Quality info active	BYTE	0
PER_TYPE	Reserve	BYTE	0
PAR_PROI	Process image partition	BYTE	0
CHAN_NUM	Total number of channels -1	BYTE	0
CHAN_BIT	Reserve	BYTE	0
MODE1_xx	Module 1 mode channel xx (xx = 00 - 07)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 07)	DWORD	0
FEATURE	Features of the hardware parameters	DWORD	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure	STRUCT	-
CPU_DIAG_80	Time error OB start information	STRUCT	-
MOD_INF1	Module 1 information structure	STRUCT	-
MOD_INF2	Module 2 information structure	STRUCT	-
DIAG_INF_1	Module Diagnostic Information Structure	STRUCT	-
DIAG_INF_2	Module Diagnostic Information Structure	STRUCT	-
ACC_MODE	1 = Accept new mode settings	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QACTIV_L	1=Low Module Active	BOOL	0
QACTIV_H	1=High Module Active	BOOL	0
QMOD_CH_L	Status of the channels of the 1st module	BOOL	0
QMOD_CH_H	Status of the channels of the 2nd module	BOOL	0
QLADDR_L	Lower address (address that the user uses)	WORD	0
QLADDR_H	Higher address (address of the redundant module)	WORD	0
QCH_INF_L	Status of the channels of the 1st module	DWORD	0

I/O (parameter)	Meaning	Data type	Default
QCH_INF_H	Status of the channels of the 2nd module	DWORD	0
QPER_TYPE	Reserve	BYTE	0
QPAR_PROI	Partial process image	BYTE	0
QCHAN_NUM	Total number of channels -1	BYTE	0
QCHAN_BIT	Reserve	BYTE	0
MODUL_STATUS	MODUL_STATUS	DWORD	0
DEPASS_RED	Depassivation	BOOL	0
RETURN_VAL	Return Value	INT	0
QMODF1	1 = Module 1 Removed / Out of Order	BOOL	0
QMODF2	1 = Module 2 Removed / Out of Order	BOOL	0

6.93 RED_F: Status processing of redundant F modules

6.93.1 Description of RED_F

Object name (type + number)

FC 289

- RED_F block I/Os (Page 478)

Area of application

The RED_F block is used to set up redundant F modules in safety mode.

Calling OBs

The block must be installed in the same OB before the OR block. It is also installed in OB 100.

Use in CFC

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The RED_F block is installed before the OR block in its OB.
- MODE1_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the primary module.
- MODE2_xx inputs are interconnected with the OMODE_xx outputs of the MOD_x block in the redundant module.
- The RACKF1 input is interconnected with the QRACKF output of the MOD_x block of the primary module.

- The RACKF2 input is interconnected with the QRACKF output of the MOD_x block of the redundant module.
- The MS1 input is interconnected with the O_MS output of the MOD_x block of the primary module.
- The MS2 input is interconnected with the O_MS output of the MOD_x block of the redundant module.
- The ACTIV_H and ACTIV_L outputs are interconnected with the inputs with the same name in the OR block.
- The CH_INF_H and CH_INF_L outputs are interconnected with the inputs with the same name in the OR block.
- The RETURN_VAL output is interconnected with the RED_STAT input of the OR block.
- The MODUL_STATUS_WORD output is interconnected with the MOD_STAT input of the OR block.

Function and method of operation

The RED_F block processes the status of all channels cyclically based on the outputs OMODE_xx or the MOD_x blocks and then forms the information on redundancy of the OR blocks.

Addressing

Not available

Error handling

Not available

Startup characteristics

Not available

Time response

Not available

Message response

Not available

Operator control and monitoring

The block has no faceplate.

6.93.2 I/Os of RED_F

The factory setting of the block display in CFC is identified in the "I/O" column:
I/O name in **bold** characters = I/O is visible; I/O name in standard characters = I/O is hidden.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
MODE1_xx	Channel mode (xx = 00 – 31) on the primary module	DWORD	0
MODE2_xx	Channel mode (xx = 00 – 31) on the redundant module	DWORD	0
MS1	Maintenance status (MS) 1	BOOL	0
MS2	Maintenance status (MS) 2	BOOL	0
RACKF1	1 = error rack 1	BOOL	0
RACKF2	1 = error rack 2	BOOL	0

Output parameters

I/O (parameter)	Meaning	Data type	Default
ACTIV_H	1 = module with more significant address is active	BOOL	0
ACTIV_L	1 = module with less significant address is active	BOOL	0
CH_INF_H	1 = channel with more significant address is active	DWORD	0
CH_INF_L	1 = channel with less significant address is active	DWORD	0
MODUL_STATUS_WORD	Status information	WORD	0
RETURN_ VAL	Error information	INT	0

Additional information

You will find more information in:

Maintenance status MS (Page 533)

6.94 RED_MF: Status processing of redundant multi function modules

6.94.1 Description of RED_MF

Object name (type + number)

FB 441

- I/Os of RED_MF (Page 480)

Area of application

Diagnosis of the redundant multi function modules.

Calling OBs

The block must be installed in the following OBs (performed automatically in CFC):

OB 3x	Cyclic interrupt OB (Channel OB)
OB 100	New restart
OB 72	CPU-Redundancy Error (only in H-Systems)
OB 80	"Time error-OB" (only in Single-Mode)
OB 85	Program sequence error

Configuration

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The OB_BEGIN block's OUT-Structure CPU_DIAG/CPU_DIAG_80 is interconnected with the identically named IN_OUT-Structure of the RED_xxx-block.
- The OUT-Structure MOD_INF of the upstream MOD-block is interconnected with the MOD_INF1/MOD_INF2 IN_OUT-Structure of the RED_xxx-block.
- The input parameters LADDR_Mas, LADDR_Slv, PER_TYPE, PAR_PROI, CHAN_NUM, CHAN_BITS, DIS_TIME, VAL_UNIT, DIS_PERC, CHAN_MAS, EXEC_TIM, CHAN01..08_S are parameterised with the values set in HW config.
- The input parameters MODF1, MODF2, MODE1_00..07, MODE2_00..07 are interconnected with the correspondent output parameters of the previous block

Error handling

The plausibility of input parameters is not checked.

Block functions

The RED_MF block processes the status of all channels cyclically based on the outputs OMODE_xx or the MOD_x blocks and then forms the information on redundancy of the OR blocks.

Message response

Not available

6.94.2 I/Os of RED_MF

The factory setting of the block display in CFC is identified in the "I/O" column:
I/O name in **bold** characters = I/O is visible; I/O name in standard characters = I/O is hidden.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
CH_INF_Mas	Master address: 1 = Channel x active	DWORD	0
CH_INF_Slv	Slave address: 1 = Channel x active	DWORD	0
LADDR_Mas	Master module address	INT	0
LADDR_Slv	Slave module address	INT	0
LADDR_DQ_Mas	Master Module Address - DQ	WORD	0
LADDR_DQ_Slv	Slave Module Address - DQ	WORD	0
MODF1	1=Module 1 pulled / out of order	BOOL	0
MODF2	1=Module 2 pulled / out of order	BOOL	0
MULTI_CHN	1=Multiple channels	BYTE	0
QI_INFO	1= Quality info active	BYTE	0
PER_TYPE	Reserve	BYTE	0
PAR_PROI	Process image partition	BYTE	0
CHAN_NUM	Total number of channels -1	BYTE	0
CHAN_BIT	Reserve	BYTE	0
DIS_TIME	Reserve	WORD	0
RESERVE1	Reserve 1	BYTE	0
R_TO_TD	Reserve	BYTE	0
VAL_UNIT	Reserve	BYTE	0
RESERVE2	Reserve 2	BYTE	0
DIS_PERC	Reserve	BYTE	0
CHAN_MAS	Reserve	WORD	0
EXEC_TIM	Reserve	WORD	0
CHANxx_S	Reserve (xx = 01 - 16)	WORD	0

I/O (parameter)	Meaning	Data type	Default
CHAN_AV	Reserve	INT	0
ADDL_AV	Reserve	INT	0
ADDH_AV	Reserve	INT	0
MODE1_xx	Module 1 mode channel xx (xx = 00 - 31)	DWORD	0
MODE2_xx	Module 2 mode channel xx (xx = 00 - 31)	DWORD	0
FEATURE	Features of the hardware parameters	DWORD	0
HART8_VAR	1 = 8 HART	BOOL	0

In/Out parameters

I/O (parameter)	Meaning	Data type	Default
CPU_DIAG_PN	System structure	STRUCT	-
CPU_DIAG_80	Time error OB start information	STRUCT	-
MOD_INF1	Module 1 information structure	STRUCT	-
MOD_INF2	Module 2 information structure	STRUCT	-
DIAG_INF_1	Module Diagnostic Information Structure	STRUCT	-
DIAG_INF_2	Module Diagnostic Information Structure	STRUCT	-
ACC_MODE	1 = Accept new mode settings	BOOL	0

Out parameters

I/O (parameter)	Meaning	Data type	Default
QERR	1=Runtime error	BOOL	1
QACTIV_L	1=Low Module Active	BOOL	0
QACTIV_H	1=High Module Active	BOOL	0
QMOD_CH_L	Status of the channels of the 1st module	BOOL	0
QMOD_CH_H	Status of the channels of the 2nd module	BOOL	0
QLADDR_L	Lower address (address that the user uses)	WORD	0
QLADDR_H	Higher address (address of the redundant module)	WORD	0
QCH_INF_L	Status of the channels of the 1st module	DWORD	0
QCH_INF_H	Status of the channels of the 2nd module	DWORD	0
QUN_OV_L	Underflow / overflow status of the channels of the L module	DWORD	0
QUN_OV_H	Underflow / overflow status of the channels of the H module	DWORD	0
QDIS_EXPIRE	Reserve	DWORD	0
QCH_DISCREP	Reserve	DWORD	0
QPER_TYPE	Reserve	BYTE	0
QPAR_PROI	Partial process image	BYTE	0

I/O (parameter)	Meaning	Data type	Default
QCHAN_NUM	Total number of channels -1	BYTE	0
QCHAN_BIT	Reserve	BYTE	0
QDIS_TIME	Reserve	WORD	0
QVAL_UNIT	Reserve	BYTE	0
QDIS_PERC	Reserve	BYTE	0
QCHAN_MAS	Reserve	WORD	0
QEXEC_TIM	Reserve	WORD	0
MODUL_STATUS	MODUL_STATUS	DWORD	0
DEPASS_RED	Depassivation	BOOL	0
RETURN_VAL	Return Value	INT	0
QCH_VAL_xx	Reserve (xx = 00 - 15)	BYTE	255
QCH_LV_VAL_DI_xx	Reserve (xx = 00 - 15)	BOOL	0
QCH_LV_VAL_xx	Reserve (xx = 00 - 15)	WORD	0
QVALxx_L	Reserve (xx = 00 - 15)	WORD	0
QVALxx_H	Reserve (xx = 00 - 15)	WORD	0
CH_INF_Mas_AUX_0	Master address aux value 0..31: 1 = active	DWORD	0
CH_INF_Slv_AUX_0	Slave address aux value 0..31: 1 = active	DWORD	0
QMODF1	1 = Module 1 Removed / Out of Order	BOOL	0
QMODF2	1 = Module 2 Removed / Out of Order	BOOL	0

6.95 SUBNET: DP master system monitoring

6.95.1 Description of SUBNET

Object name (type + number)

FB 106

- SUBNET block I/Os (Page 485)

Area of application

The SUBNET block is used to shorten acyclic OB processing times. Only the blocks that are actually affected can be called in the case of an acyclic event.

Calling OBs

The SUBNET block must be installed in the run sequence in the following OBs:

OB 1	Cyclic program
OB 55	Status interrupt (only if a DP/PA slave is required)

OB 56	Update interrupt (only if a DP/PA slave is required)
OB 57	Vendor-specific alarm (only if a DP/PA slave is required)
OB 70	I/O redundancy error
OB 72	CPU redundancy error
OB 81	Power supply error
OB 82	Diagnostic interrupt
OB 83	Insert/remove module interrupt
OB 85	Program execution error
OB 86	Rack failure
OB 100	Warm restart

Use in CFC

The following actions are executed automatically with the "**Generate module drivers**" CFC function:

- Runtime groups with driver/system blocks are created and organized by rack.
- The SUBN1_ID, SUBN2_ID and SUBN_TYP inputs are configured.
- The EN_Rxxx outputs are interconnected with the relevant blocks (e.g., RACK).
- The IN_OUT structure CPU_DIAG is interconnected with the OUT structure of the OB_BEGIN block.
- The IN_OUT structure SZL_71 is interconnected with the OUT structure of the OB_BEGIN block.
- The OUT structure SUB_DIAG is interconnected with the IN_OUT structures of the affected blocks (such as RACK).

Function and method of operation

The SUBNET block monitors a DP master system, and enables the blocks (such as RACK) for processing the connected DP slaves (such as ET 200M). Corresponding messages are generated, and the SUBN1ERR and SUBN2ERR outputs are set if a DP master system fails or loses redundancy. The SUB_DIAG output structure contains the geographic address of the DP Master system 1 (and of DP Master system 2 in H systems), as well as the group error information SUBN0_ERR (for DP master system 1) and SUBN1_ERR (for DP master system 2). If SUBN0_ERR = 1 or SUBN1_ERR = 1, the corresponding DP master system is **not** available.

The SUBNET block is installed in each connected DP master system or in the OBs listed above once for the local I/O devices. It is enabled by OB_BEGIN. Start and diagnostic information is read from the CPU_DIAG structure. It is interconnected with the CPU_DIAG structure of the OB_BEGIN. The SUBNET block is assigned one enable output for each connectable rack or DP Master system (for each expansion rack for central I/Os). It uses the start information of the calling OB to determine whether the reported event occurred at its DP master (or at the central I/O), and then sets the output for the affected rack or DP master system (EN_Rxxx).

If redundant DP master systems are used (for H CPUs only), a rack (such as ET 200M) is connected to the two DP masters, and is assigned the same station number at both. The SUBNET block has two input parameters (SUBNx_ID), and the type identifier SUBN_TYP for this function. If the

integrated interface of the CPU module is the DP master, SUBN_TYP = FALSE, otherwise SUBN_TYP = TRUE.

The MASTER_0 and MASTER_1 outputs indicate which CPU is currently the master.

If a DP master fails, the system sets all EN_Rxxx = TRUE, and reports a redundancy loss or failure. The return of redundancy or the DP master is reported when a failed DP slave has reestablished the connection.

The status of the DP master system, the set SUBNx_ID and type identifier are saved in the output structure SUB_DIAG.

If a "power supply error" (OB 81) event occurs, the SUBNET block will enable only those RACK blocks that are expansion racks, which is indicated by SUBNx_ID = 0.

Note: If you want to change the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs online, you must set input ACC_ID = TRUE. to update the output values.

Redundancy

The SUBNET block supports redundancy of DP master systems of the 414-H/417-H CPU if distributed I/Os are used. To use this function, you must configure the SUBN1_ID (connection to CPU 0) and SUBN2_ID (connection to CPU 1) inputs with the numbers of the redundant DP master systems. If there is no redundancy, the remaining input must be assigned the value 16#FF (default).

Error handling

Error handling for the block is limited to the evaluation of the error information of ALARM_8P. You will find additional information about error handling in the "Error information of output parameter MSG_STAT (Page 530)" section.

Startup/initial startup behavior

The SUBNET block initializes the messages of ALARM_8P.

The operating mode of the DP Master system is checked, and entered in the SUB_DIAG.V1_MODE structure with SSL 0X90H (0 = compatibility mode, 1 = DPV1 mode). If DPV1 mode is active, the CPU_DIAG.MODE_V1 structure is also set to TRUE.

Overload behavior

The SUBNET block counts the OB 86 calls (failures only). The counter is reset in OB1. If more than two OB 86 failure events occur in succession before the cycle control point (OB1) is reached, these are rejected and a message "Failure OB 86 DP master system:x" is output. If an OB 86 call is rejected, the DP master system is registered as having failed.

Time response

Not available

Message response

After being called by an OB 86, OB 70 and OB 72, the block analyzes the status of its assigned DP master system, and generates the relevant messages for redundancy loss or DP master system failure by broadcasting an ALARM_8P.
The message function can be disabled by setting EN_MSG = FALSE.

The SUBNET block generally reports only events triggered in the DP master system it monitors.

Exception: If a CPU fails in the H system, the following messages are generated:

- in a non-redundant DP master system: “DP master failure” message
- in a redundant DP master system: “DP master redundancy loss” message

Operator control and monitoring

If asset management is used in the project and the diagnostic screens have been generated, the faceplate can be called via its block icon.

For additional information, refer to the "Process Control System PCS 7; Maintenance Station" manual.

Additional information

For additional information, refer to the sections:

Message texts and associated values of SUBNET (Page 487)

Maintenance status MS (Page 533)

6.95.2 I/Os of SUBNET

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	Default
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number	DWORD	0
FEATURE	Hardware feature parameter	WORD	0
MS	Maintenance status	DWORD	0
SUBN_TYP	1 = external DP interface	BOOL	0

I/O (parameter)	Meaning	Data type	Default
SUBN1_ID	ID of the primary DP master system	BYTE	255
SUBN2_ID	ID of the redundant DP master system	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CPU0LED1	LED 1 set on CPU 0	DWORD	0
CPU0LED2	LED 2 set on CPU 0	DWORD	0
CPU0LED3	LED 3 set on CPU 0	DWORD	0
CPU0LED4	LED 4 set on CPU 0	DWORD	0
CPU0LED5	LED 5 set on CPU 0	DWORD	0
CPU1LED1	LED 1 set on CPU 1	DWORD	0
CPU1LED2	LED 2 set on CPU 1	DWORD	0
CPU1LED3	LED 3 set on CPU 1	DWORD	0
CPU1LED4	LED 4 set on CPU 1	DWORD	0
CPU1LED5	LED 5 set on CPU 1	DWORD	0
EN_Rxxx	1 = Enable rack (xxx = 0 - 127)	BOOL	0
MASTER_0	1 = Master CPU in rack 0	BOOL	0
MASTER_1	1 = Master CPU in rack 1	BOOL	0
MSG_STAT	Message error information	WORD	0
O_MS	Maintenance status	DWORD	0
SUB_DIAG	System structure: CPU diagnostics	STRUCT	
SUBN1ERR	1 = Error in DP master system 1	BOOL	0
SUBN2ERR	1 = Error in DP master system 2	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG	CPU diagnostics	STRUCT	
CPU_OB_5X	OB_5x startup information	STRUCT	
READ_LED	1 = Reading LED status	BOOL	0
SZL_71	System structure SZL71	STRUCT	

Note

The maximum number of racks is determined by the address volume of PROFIBUS. All available CPUs can thus be used. The entire address volume is used by the CPU 417-4.

Additional information

For additional information, refer to the sections:

Message texts and associated values of SUBNET (Page 487)
Maintenance status MS (Page 533)

6.95.3 Message texts and associated values of SUBNET

Assignment of message text and message class

Message no.	Default message text	Message class
1	DP master @1%d@: Redundancy loss	PLC Process Control Message - Error
2	DP master @2%d@: Redundancy loss	PLC Process Control Message - Error
3	DP master @1%d@: Failure	PLC Process Control Message - Failure
4	DP master @2%d@: Failure	PLC Process Control Message - Failure
5	DP master @2%d@: Multiple failure	PLC Process Control Message - Failure
6	CPU loss of redundancy in rack @4%d@	PLC Process Control Message - Error
7		No message
8		No message

Assignment of associated values

Associated value	Block parameters
1	ID of the primary DP master system (SUBN1_ID)
2	ID of the redundant DP master system (SUBN2_ID)
3	Multiple failure, ID of DP master system
4	CPU rack number

See also

Message Classes (Page 531)

6.96 SUBNET_PN: Monitoring of the PN IO system

6.96.1 Description of SUBNET_PN

Object name (type + number)

FB 82

- I/Os of SUBNET_PN (Page 488)

Area of application

The SUBNET_PN block is used to reduce acyclic OB processing times. Only the blocks that are actually affected can be called in the case of an acyclic event.

6.96.2 I/Os of SUBNET_PN

The factory setting of the block display in the CFC is identified in the "I/O" column:
I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O (parameter)	Meaning	Data type	De-fault
DADDR	Diagnostic address of the PN IO device - primary subnet	INT	0
DADDR_1	Diagnostic address of the PN IO device - redundant subnet	INT	0
DIAG_BUF	Entry in diagnostic buffer (relevant for maintenance personnel)	BOOL	0
EN_MSG	1 = enable message	BOOL	1
EV_ID	Message number ALARM_8P (assigned by the ES)	DWORD	0
EV_ID1	Message number ALARM_8P (assigned by the ES)	DWORD	0
FEATURE	Hardware feature parameter	WORD	0
MS	Maintenance status	DWORD	0
PNIO_ADR	Diagnostic address of the PN-IO interface - Primary subnet	INT	0
PORT1_ADR	Diagnostics address of the first port - Primary subnet	INT	0
PORT2_ADR	Diagnostics address of the second port - Primary subnet	INT	0
PORT3_ADR	Diagnostics address of the third port - Primary subnet	INT	0
PORT1_CONNECT	Connection status of the first port - Primary subnet	BYTE	0
PORT2_CONNECT	Connection status of the second port - Primary subnet	BYTE	0

I/O (parameter)	Meaning	Data type	Default
PORT3_CONNECT	Connection status of the third port - Primary subnet	BYTE	0
PNIO_ADR_1	Diagnostic address of the PN-IO interface - Redundant subnet	INT	0
PORT1_ADR_1	Diagnostics address of the first port - Redundant subnet	INT	0
PORT1_CONNECT_1	Connection status of the first port - Redundant subnet	BYTE	0
PORT2_ADR_1	Diagnostics address of the second port - Redundant subnet	INT	0
PORT2_CONNECT_1	Connection status of the second port - Redundant subnet	BYTE	0
SUBN_TYP	1 = external PN interface	BOOL	0
SUBN1_ID	ID of the Primary subnet	BYTE	255
SUBN2_ID	ID of the Redundant subnet	BYTE	255

Output parameters

I/O (parameter)	Meaning	Data type	Default
CPU0LED1	LED 1 set on CPU 0	DWORD	0
CPU0LED2	LED 2 set on CPU 0	DWORD	0
CPU0LED3	LED 3 set on CPU 0	DWORD	0
CPU0LED4	LED 4 set on CPU 0	DWORD	0
CPU0LED5	LED 5 set on CPU 0	DWORD	0
CPU1LED1	LED 1 set on CPU 1	DWORD	0
CPU1LED2	LED 2 set on CPU 1	DWORD	0
CPU1LED3	LED 3 set on CPU 1	DWORD	0
CPU1LED4	LED 4 set on CPU 1	DWORD	0
CPU1LED5	LED 5 set on CPU 1	DWORD	0
EN_Rxxx	1 = Enable rack (xxx = 0 - 255)	BOOL	0
MASTER_0	1 = Master CPU in rack 0	BOOL	0
MASTER_1	1 = Master CPU in rack 1	BOOL	0
MSGSTATx	STATUS output of ALARM_8P_x (x = 1 - 2)	WORD	0
O_MS	Maintenance status	DWORD	0
QMSGERx	ERROR message of ALARM_8P_x (x = 1 - 2)	BOOL	0
SUB_DIAG	System structure: CPU diagnostics	STRUCT	
SUBN1ERR	1 = Subnet 1 failure	BOOL	0
SUBN2ERR	1 = Subnet 2 failure	BOOL	0

In/out parameters

I/O (parameter)	Meaning	Data type	Default
ACC_ID	1 = accept MODE settings	BOOL	0
CPU_DIAG_PN	CPU diagnostics system structure	STRUCT	
CPU_OB_5X_PN	Start information OB 55, OB 56, OB 57	STRUCT	
READ_LED	1 = Reading LED status	BOOL	0
SZL_71	System structure SZL71	STRUCT	
CPU_OB_5X_PN	OB_5x-Startinformation	STRUCT	

Additional information

For additional information, refer to the sections:

Message texts and associated values of SUBNET_PN (Page 490)

Maintenance status MS (Page 533)

6.96.3 Message texts and associated values of SUBNET_PN

Assignment of message text and message class

The process control messages of ALARM_8P with EV_ID are assigned as follows:

Message number	Default message text	Message class
1	PN IO system @1%d@: Redundancy loss	PLC Process Control Message - Error
2	PN IO system @2%d@: Redundancy loss	PLC Process Control Message - Error
3	PN IO system @1%d@: Failure	PLC Process Control Message - Failure
4	PN IO system @2%d@: Failure	PLC Process Control Message - Failure
5	PN IO system @2%d@: Multiple failure	PLC Process Control Message - Failure
6	CPU loss of redundancy in rack @4%d@	PLC Process Control Message - Error
7	PN-IO system @3%d@: Port 3 Error	PLC Process Control Message - Error
8	PN-IO system @1%d@/@2%d@: Communication error (AR)	PLC Process Control Message - Error

Associated values of ALARM_8P with EV_ID

Associated value	Block parameter	Data type
1	ID of the primary PN IO system (SUBN1_ID)	BYTE
2	ID of the redundant PN IO system (SUBN2_ID)	BYTE
3	ID of the multiple failure PN IO system	BYTE
4	CPU rack number	BYTE

The process control messages of ALARM_8P with EV_ID1 are assigned as follows:

Message number	Default message text	Message class
1	PN IO system @1%d@: Port 1 error	PLC Process Control Message - Error
2	PN IO system @1%d@: Port 2 error	PLC Process Control Message - Error
3	PN IO system @1%d@: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
4	PN IO system @1%d@: Maintenance required (PN-IO)	Preventative Maintenance - Standard
5	PN IO system @2%d@: Port 1 error	PLC Process Control Message - Error
6	PN IO system @2%d@: Port 2 error	PLC Process Control Message - Error
7	PN IO system @2%d@: Maintenance demanded (PN-IO)	PLC Process Control Message - Error
8	PN IO system @2%d@: Maintenance required (PN-IO)	Preventative Maintenance - Standard

Associated values of ALARM_8P with EV_ID1

Associated value	Block parameter	Data type
1	ID of the primary PN IO system (SUBN1_ID)	BYTE
2	ID of the redundant PN IO system (SUBN2_ID)	BYTE
3	ID of the PN IO system	WORD

You can find additional information in the section: Message Classes (Page 531).

6.97 WRDS_CO: Coordinates WRREC DS128 for MRC

6.97.1 Description of WRDS_CO

Object name (type + number)

FB 147

- I/Os of WRDS_CO (Page 492)

Area of application

This function block coordinates the requests for new Measuring Range Center (MRC) values from different instances of the APL channel block Pcs7AITC.

Configuration

The WRDS_CO function block is used in PROFIBUS DP and PROFINET environment.

The following actions are executed automatically with the "Generate module drivers" CFC function:

- The function block is installed in OB1, OB100 and OB72 (if available).
- The MODExx (xx=channel number 0...7) input parameter is interconnected with the OMODE_xx output parameter of the MOD function block.
- The following diagnostic structures are automatically interconnected:
  - CPU_DIAG (PROFIBUS DP) or CPU_DIAG_PN (PROFINET)
  - RAC_DIAG and SUB_DIAG.
- The WRDS_CO function block is also connected to the QRACKF and QMODF output parameters with its input parameter RACKF and MODF as it is additionally used with the MOD function block.
- The MRC_XCHG output parameter is interconnected with MRC_XCHG of the Pcs7AITC instances that belong to the same module.
- The LADDR input parameter is parameterized with the logical input address of the module.
- The CHAN_NUM input parameter is parameterized with the highest channel number. For example: If it is parameterized with 3, that means there are 0...3 channels or 4 channels in whole.

Error handling

The output parameter QERR displays a runtime error.

Block functions

The WRDS_CO function block coordinates the MRC requests from different Pcs7AITC instances. The WRDS_CO function block along with Pcs7AITC ensures that in each case, the MRC values in the module and in the channel blocks remain the same.

6.97.2 I/Os of WRDS_CO

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

Parameter name	Data type	Initial value	Description
LADDR	INT	-1	Logical base adress master module
CHAN_NUM	INT	0	Total number of channels -1

Parameter name	Data type	Initial value	Description
RACKF	BOOL	0	1 = Higher - level error
MODF	BOOL	0	1 = Module removed / Out of Order
MODExx	DWORD	0	Channel xx mode (xx = 00...07)
DIAG_BUF	DWORD	0	1=CPU Diagnostic Buffer entry on (relevant for service personnel)
FEATURE	DWORD	0	Hardware information (Reserved)
CPU_DIAG	CPU_DIAG		
CPU_DIAG_PN	CPU_DIAG_PN		

Output parameters

Parameter name	Data type	Initial value	Description
QERR	BOOL	0	Error
QERR_INF	INT	0	Error information
MRC_XCHG	MRC_XCHG		Coordinates WRREC DS128 with new 'measuring range center'

In_Out parameters

Parameter name	Data type	Initial value	Description
SUB_DIAG	SUB_DIAG		
RAC_DIAG	RAC_DIAG		
ACC_MODE	BOOL	0	1=Accept new mode settings

Family: @PAM

7

7.1 FB_DB_CD: Interface FB for DB_PAM_CD

7.1.1 Description of FB_DB_CD

Object name (type + number)

FB 27

- I/Os of FB_DB_CD (Page 497)

Functions

The FB_DB_CD block acts as an interface to transfer data from the user program in the package unit to the DB_PAM_CD block.

How it works

The FB_DB_CD block acts as an interface to transfer data from the user program in the package unit to the DB_PAM_CD block. It can be used if CFC configuration is available in the package unit.

The various input values are:

- Identity (LID)
- Global Part (GP)
- Detail Diagnosis (DD)
- Status information (STAT)
- Analog Values (PV)

The input "Identity" contains the following information:

- bit1 OKZ string
- bit2 Connection Point (CP)
- bit3 Object Type (OT)

The input "Global Part" contains the following information:

- bit1 Maintenance alarm
- bit2 Maintenance demand
- bit3 Maintenance request
- bit4 Out of order
- bit5 Passivated

- bit6 Function control
- bit7 Configuration changed
- bit8 Unknown
- bit9 Redundancy error
- bit10-16 Reserve

The input "Detail Diagnosis" contains the following information:

- bit1-bit16 single information (bool, is directly proportional to the position in the text library).

The input "Status Information" contains the following information:

- Pos. 01 Application/device with define shut down
- Pos. 02 Archive/save function active
- Pos. 03 08 single information

The input "Analog Values" contains the following information:

- bit1 Value 1
- bit 2 State 1
- bit3 Unit 1
- bit4 Value 2
- bit5 State
- bit6 Unit 2
- bit7 Value 3
- bit8 State 3
- bit9 Unit 3

Configuration

You must enter the value of the destination data block to which the values are to be transferred at the input parameter DBNO.

Error handling

The value of `QERR` = 1 represents a runtime error.

The `ERR_NUM` I/O is used to obtain the following errors in output:

Error number	Meaning of the error number
-1	Predefined value when inserting the block; block is not processed.
0	There is no error.
1	The value entered at input parameter DBNO is not correct. DB length <> 160 bytes.
2	A date block with the value entered at input parameter DBNO does not exist. (DBNO = 0 is not allowed).

Startup characteristics

The operation is suppressed after startup for the number of cycles set at RunUpCyc.

Modes

Not available

Time response

Not available

Message response

Not available

Opearator control and monitoring

Not available

7.1.2 I/Os of FB_DB_CD

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O Parameter	Meaning	Type	Default
LID	LID	STRING[64]	''
CP	Connection point	STRING[64]	''
GP	Global part	WORD	16#0000
DD	Detail diagnosis	WORD	16#0000
STAT	Status information	BYTE	0
PV0_VALUE	Process value 0	REAL	99.99
PV0_ST	State of Process value 0	BYTE	0
PV0_UNIT	Unit of Process value 0	INT	1
PV1_VALUE	Process value 1	REAL	99.99
PV1_ST	State of Process value 1	BYTE	0
PV1_UNIT	Unit of Process value 1	INT	1
PV2_VALUE	Process value 2	REAL	99.99
PV2_ST	State of Process value 2	BYTE	0

I/O Parameter	Meaning	Type	Default
PV2_UNIT	Unit of Process value 2	INT	1
RUNUPCYC	Number of Run Up Cycles	INT	1
DIAG_BUF	1= CPU Diagnostic Buffer entry on (relevant for service personnel)	BOOL	1
FEATURE	Feature parameter	DWORD	16#00000000
DBNO	DB number	INT	1

Output parameters

I/O Parameter	Meaning	Type	Default
QERR	1 = Runtime error	BOOL	1
WR_BUSY	BUSY of WRIT_DBL	BOOL	1
RET_VAL2	Return value of WRIT_DBL	INT	1
ERR_NUM	Error Number	INT	1

In/Out parameters

I/O Parameter	Meaning	Type	Default
ACC_MODE	1 = Accept new settings	BOOL	1

7.2 FB_DB_CPU: Interface FB for DB_PAM_CPU

7.2.1 Description of FB_DB_CPU

Object name (type + number)

FB 132

- I/Os of FB_DB_CPU (Page 500)

Functions

The FB_DB_CPU block acts as an interface to transfer data from the user program in the package unit to the DB_PAM_CPU block.

How it works

The FB_DB_CPU block acts as an interface to transfer data from the user program in the package unit to the DB_PAM_CPU block. It can be used if CFC configuration is available in the package unit.

The various input values are:

- Identity (LID)
- Global Part (GP)
- Detail Diagnosis (DD)
- Analog values (PV)

The input "Identity" contains the following information:

- bit1 OKZ string
- bit2 Connection Point (CP)
- bit3 Object Type (OT)

The input "Global Part" contains the following information:

- bit1 Maintenance alarm
- bit2 Maintenance demand
- bit3 Maintenance request
- bit4 Reserved
- bit5 Reserved
- bit6 Function control
- bit7 Configuration changed
- bit8 Unknown
- bit9 Redundancy error
- bit10 Productinfo Single/Red
- bit11 Productinfo Rack 0/1
- bit12-16 Reserve (Status Information)

The input "Detail Diagnosis" contains the following information:

- bit1-bit16 single information (bool, is directly proportional to the position in the text library).

The input "Analog Values" contains the following information:

- bit1 Value 1
- bit 2 State 1
- bit3 Unit 1
- bit4 Value 2
- bit5 State
- bit6 Unit 2
- bit7 Value 3

- bit8 State 3
- bit9 Unit 3

Configuration

You must enter the value of the destination data block to which the values are to be transferred at the input parameter DBNO.

Error handling

The `ERR_NUM` I/O is used to obtain the following errors in output:

Error number	Meaning
-1	Predefined value when inserting the block; block is not processed.
0	There is no error.
1	The value entered at input parameter DBNO is not correct. The length of data block <> 160 Bytes.
2	A data block with the value entered at input parameter DBNO does not exist. (DBNO = 0 is not allowed).

Startup characteristics

The operation is suppressed after startup for the number of cycles set at RunUpCyc.

Modes

Not available

Time response

Not available

Message response

Not available

Opearator control and monitoring

Not available

7.2.2 I/Os of FB_DB_CPU

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O Parameter	Meaning	Type	Default
LID	LID	STRING[64]	”
CP	Connection point	STRING[64]	”
GP	Global part	WORD	16#0000
DD	Detail diagnosis	WORD	16#0000
PV0_VALUE	Process value 0	REAL	99.99
PV0_ST	State of Process value 0	BYTE	1
PV0_UNIT	Unit of Process value 0	INT	1
PV1_VALUE	Process value 1	REAL	99.99
PV1_ST	State of Process value 1	BYTE	1
PV1_UNIT	Unit of Process value 1	INT	1
PV2_VALUE	Process value 2	REAL	99.99
PV2_ST	State of Process value 2	BYTE	0
PV2_UNIT	Unit of Process value 2	INT	1
RESERVE_00	Reserve	BYTE	0
RUNUPCYC	Number of Run Up Cycles	INT	1
DIAG_BUF	1= CPU Diagnostic Buffer entry on (relevant for service personnel)	BOOL	1
FEATURE	Feature parameter	DWORD	16#00000000
DBNO	DB number	INT	1

Output parameters

Parameter	Meaning	Type	default value
QERR	1 = Runtime error	BOOL	1
WR_BUSY	BUSY of WRIT_DBL	BOOL	1
RET_VAL2	Return value of WRIT_DBL	INT	1
ERR_NUM	Error Number	INT	1

In/Out parameters

I/O Parameter	Meaning	Type	Default
ACC_MODE	1 = Accept new settings	BOOL	1

7.3 FB_DB_IM: Interface FB for DB_PAM_IM

7.3.1 Description of FB_DB_IM

Object name (type + number)

FB 28

- I/Os of FB_DB_IM (Page 504)

Functions

The FB_DB_IM block acts as an interface to transfer data from the user program in the package unit to the DB_PAM_IM block.

How it works

The FB_DB_IM block acts as an interface to transfer data from the user program in the package unit to the DB_PAM_IM block. It can be used if CFC configuration is available in the package unit.

The various input values are:

The various input values are:

- Identity (LID)
- Global Part (GP)
- Detail Diagnosis (DD)
- Status information (STAT)
- Signal Module information (SM)

The input "Identity" contains the following information:

- bit1 OKZ string
- bit2 Connection Point (CP)
- bit3 Object Type (OT)

The input "Global Part" contains the following information:

- bit1 Maintenance alarm
- bit2 Maintenance demand
- bit3 Maintenance request
- bit4 Out of order
- bit5 Passivated
- bit6 Function control
- bit7 Configuration changed
- bit8 Unknown

- bit9 Redundancy error
- bit10 - bit16 Reserve

The input "Detail Diagnosis" contains the following information:

- bit1-bit16 single information (bool, is directly proportional to the position in the text library).

The input "Status Information" contains the following information:

- bit1 Application/device with define shut down
- bit2 Archive/save function active
- bit3-bit8 single information

The input "Signal Module" contains the following information:

- bit3 Signal Module 0-31 error
- bit4 Signal Module 32-63 error

Configuration

You must enter the value of the destination data block to which the values are to be transferred at the input parameter DBNO.

Error handling

The value of `QERR` = 1 represents a runtime error.

The `ERR_NUM` I/O is used to obtain the following errors in output:

Error number	Meaning of the error number
-1	Predefined value when inserting the block; block is not processed.
0	There is no error.
1	The value entered at input parameter DBNO is not correct. DB length <> 160 Bytes.
2	A data block with the value entered at input parameter DBNO does not exist. (DBNO = 0 is not allowed).

Startup characteristics

The operation is suppressed after startup for the number of cycles set at RunUpCyc.

Modes

Not available

Time response

Not available

Message response

Not available

Opearator control and monitoring

Not available

7.3.2 I/Os of FB_DB_IM

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O Parameter	Meaning	Type	Default
LID	LID	STRING[64]	''
CP	Connection point	STRING[64]	''
GP	Global part	WORD	16#00000000
DD	Detail diagnosis	WORD	16#00000000
STAT	Status information	BYTE	0
SM_NOK1	Signal module 0-31 error	DWORD	16#00000000
SM_NOK2	Signal module 32-63 error	DWORD	16#00000000
RESERVE_00	Reserve	DWORD	16#00000000
RESERVE_01	Reserve	WORD	016#0000
PV0_VALUE	Process value 0	REAL	99.99
PV0_ST	State of Process value 0	BYTE	0
PV0_UNIT	Unit of Process value 0	INT	1
RUNUPCYC	Number of Run Up Cycles	INT	1
DIAG_BUF	1= CPU Diagnostic Buffer entry on (relevant for service personnel)	BOOL	1
FEATURE	Feature parameter	DWORD	16#00000000
DBNO	Data block number	INT	1

Output parameters

I/O Parameter	Meaning	Type	Default
QERR	1 = Runtime error	BOOL	1
WR_BUSY	BUSY of WRIT_DBL	BOOL	1
RET_VAL2	Return value of WRIT_DBL	INT	1
ERR_NUM	Error Number	INT	1

In/Out parameters

I/O Parameter	Meaning	Type	Default
ACC_MODE	1 = Accept new settings	BOOL	1

7.4 PAM_IF: Interface block to PAM Diagnostic Blocks

7.4.1 Description of PAM_IF

Object name (type + number)

FB 29

- I/Os of PAM_IF (Page 509)

Functions

The PAM_IF block:

- Transfers upto three analog process variables (`PV0`, `PV1`, and `PV2`) for monitoring purposes.
- Transfers `MS_Ext` for processing and corresponding display in the operator station.

How it works

The PAM_IF block transfers upto three analog values between PAM driver blocks (PAM_CPU / PAM_CD / PAM_IM / PAM_SM) and PAM_IF blocks for further processing. Additionally, you can perform the following using this block:

Limit monitoring with hysteresis

You can define a hysteresis for all the limit monitoring functions (using parameter `PVx_Hyst` (x: 0...2)).

An example to use the hysteresis is to suppress signal flutter. For this, you can enter the hysteresis as a physical variable at the block.

Suppressing messages using the `MsgLock` parameter

You can suppress the messages as follows:

- Bit = 0: Messages are not suppressed.
- Bit = 1: All messages (`MS_Ext`, `PVx` messages) are suppressed.

If `MsgLock` = 1,

- The PV signal status, limits (pending on `Feature.Bit 28`) and `MS_Ext` does not generate any messages in PAM_CPU / PAM_CD / PAM_IM / PAM_SM blocks.
- In the operator station, the signal status and the limit values are displayed in monitoring view.
- The maintenance state of PAM_XX block is only updated by events from PDM Maintenance State and `DIAG_GB`.

You can disable the message function with regard to input from PAM_IF block (`MS_Ext`, `PVx_ST`, and Limit vlaues) by setting `MsgLock` = 0.

Remaining value

The difference between the actual value and the next limit value.

Reset

You can use the reset function by pressing the "Reset" button in faceplate. As a result, a pulse is generated and is available at the block output `P_PVx_Rst` for one block cycle. This pulse is used as the reset signal in a connected block.

Source of Analog Values

You can select via the parameter `PVx_PU_LK`, whether the process values from package unit (`PVx_PU_LK` = 0) or via the linked parameter (`PVx_PU_LK` = 1).

External Maintenance Status

You can connect an external Maintenance Status to this block using `MS_Ext` parameter. This external Maintenance Status is then merged to the Maintenance Status of the PAM_xxx block. The following values of `MS_Ext` are allowed, which generates a message in the higher order blocks:

Value of `MS_Ext`	Meaning
5	maintenance required
6	maintenance demanded
7	maintenance alarm

Application

The parameters `PVx_Out, P_PVx_Rst, PVx_AH_Act, PVx_DH_Act, PVx_RH_Act, PVx_Diff, PVx_OutUnit` etc. can be used either for the further processing or for reporting in a user-specific application.

For example:

- `PVx_Out`, `PVx_Diff`, `PVx_OutUnit` can be used for reporting.
- `P_PVx_Rst` can be used for resetting a counter value.
- `PVx_AH_Act`, `PVx_DH_Act`, `PVx_RH_Act` can be used for the monitoring of various Limits.

Configuration variants

There are two ways to instantiate the PAM_IF block:

1. You can first configure the usage of analog values in "Advanced Diagnosis Settings" dialog. The PAM_IF block is then automatically instantiated during Create/Update Diagnostic screens generation.
2. You can manually instantiate this block in CFC. For this, first you need to parametrize the corresponding `PLT-ID` at the input pin of the block. After Create/Update diagnostic screens are generated, the PAM_xx and PAM_IF block are automatically connected.

Calling OBs

The PAM_IF block is configured during "Create/Update Diagnostic Pictures".

- In the CFC editor, the block is installed automatically by driver generatoronly if it is configured in advanced diagnostic settings, in a cyclic interrupt OB35 in user charts. The block is also installed automatically in the startup OB (OB 100).
- The `PLT-ID` of the linked PDM object of the specific PAM object to be monitored in the parameter `PLT_ID` is automatically entered.
- The interconnections between PAM_CPU / PAM_CD / PAM_IM / PAM_SM, and PAM_IF blocks are created.
- Block can also be installed manually by user. If `PLT`-ID is configured, the connections are automatically created by the driver generator.

Startup characteristics

Based on the number of cycles set at RunUpCyc, the operation is suppressed after startup.

Status word allocation

The signal status of PAM_IF block for field devices represents the following values:

`PVx.ST` (input)	**`PVx.ST` (mapped output)**	**Signal status icon**	**Meaning**
16#00.. 1F, 16#24 .. 27,	16#00		Bad, device related (value not valid)
16#28 .. 2B	16#28		Bad, process related
16#23, 16#3C .. 3F, 16#44 .. 4F 16#60 .. 67, 16#70 .. 77	16#60		Manipulated value (for example, substitute value, simulation, last valid value)

PVx.ST (input)	PVx.ST (mapped output)	Signal status icon	Meaning
16#20 .. 22, 16#2C .. 3B, 16#40 .. 43, 16#50 .. 5F, 16#68 .. 6F, 16#7C .. 7F, 16#9C .. 9F, 16#AC .. FF	16#68		Uncertain, device related
16#78 .. 7B,	16#78		Uncertain, process related
16#80... 9B, 16#A0 .. A3	16#80		Good
16#A4 .. AB	16#A4		Maintenance required

Feature bit allocation

Update acknowledgment and error status of the message call

Number of the Feature bit: 22

You can use the Feature bit to determine if the acknowledgment and error status of the message call at the block output should be updated.

The default setting is 0.

- Bit = 0: The MSG_ERRx, MSG_STATx, and MSG_ACKx block outputs are set to the default settings and are not updated. The block executes faster in this setting.
- Bit = 1: The MSG_ERR, MSG_STATx,and MSG_ACKx block outputs are updated based on the feedback of the lower level message blocks. The lower level message blocks are called every other cycle as long as an acknowledgment is expected or error information is pending.

Note

The output pins MSG_ERRx, MSG_STATx and MSG_ACKx are not available in PAM_IF block. These pins are available at blocks PAM_CPU/PAM_CD etc.

Disabling operating points

Number of the Feature bit: 28

You can use this Feature bit to determine if the operating point function of a limit for disabling the message (MsgLock = 1) should also be disabled.

The default setting is 0.

- Bit = 0: Operating point is not suppressed.
- Bit = 1: Operating point is suppressed.

Note

The above mentioned feature bits are available in the PAM_IF block and the various functionaliies related to PAM are activated at the respective blocks (PAM_CPU, PAM_CD, PAM_IM etc).

Error handling

The `ERR_NUM` I/O can be used to obtain the following errors in output:

Error number	Meaning
-1	Predefined value when inserting the block; block is not processed.
0	There is no error.
4	Value selection for SM from Paclage Unit is not possible.
30	The entered `PVx` Value is not a REAL number.

Modes

Not available

Time response

Not available

See also

General Information About Block Description (Page 15)

7.4.2 I/Os of PAM_IF

The factory setting of the block display in the CFC is identified in the "I/O" column:

I/O name **bold** = I/O visible, I/O name normal = I/O not visible.

You can find explanations and the meaning of abbreviations in the section: "General Information About Block Description (Page 15)".

Input parameters

I/O Parameter	Meaning	Type	Default
PLT_ID	Asset ID for EDD	DWORD	16#00000000
MS_Ext	Ext Maintenance status	DWORD	16#00000000
PVx_Hyst	Hysteresis for PV x (x: 0..2) messages	REAL	99.99
PVx	Process value x (x: 0..2)	STRUCT	0 16#80
PVx_Name	Text of Process value x (x: 0..2)	STRING[16]	''
PVx_Unit	Unit of Process value x (x: 0..2)	INT	1
PVx_OpScale	Range of process value x (x: 0..2)	STRUCT	0 100
PVx_AH	Limit maintenance alarm process value x (x: 0..2)	REAL	99.99
PVx_DH	Limit maintenance demand process value x (x: 0..2)	REAL	99.99
PVx_RH	Limit maintenance request process value x (x: 0..2)	REAL	99.99
PVx_PU_LK	Process value x selection (x: 0..2) – 0= via Package unit / 1= via Link	BOOL	1
MsgLock	Inhibit process message	STRUCT	0 16#80
RunUpCyc	Lag: Number of Run Up Cycles	INT	1
FEATURE	Feature parameter	STRUCT	0

Output parameters

Parameter	Meaning	Type	default value
ErrorNum	Error Number	INT	-1
P_PVx_Rst	1=Reset process value x (x: 0..2) (Pulse output)	STRUCT	0 16#80
PVx_AH_Act	1=Limit maintenance alarm process value x (x: 0..2)	BOOL	1
PVx_DH_Act	1=Limit maintenance demand process value x (x: 0..2)	BOOL	1

Parameter	Meaning	Type	default value
PVx_RH_Act	1=Limit maintenance request process value x (x: 0..2)	BOOL	1
PVx_Diff	Difference value to the next expected Alarm x (x: 0..2)	STRUCT	0 16#80
PVx_Out	Process value x (x: 0..2)	STRUCT	0 16#80
PVx_OutUnit	Unit of Process value x (x: 0..2)	INT	1

In_Out parameters

Parameter	Meaning	Type	default value
Dxchg_PAM	Bidirectional data exchange Channel	STRUCT (UDT283)	0

7.5 DB_PAM_CD: DB of CD data for reading from PAM_Station

7.5.1 Description of DB_PAM_CD

Object name (type + number)

DB4

- Structure of DB_PAM_CD (Page 511)

Area of application

The data block DB_PAM_CD in the package unit contains the user data that is read by the corresponding PAM_CD block of PAM Station.

You can assign (or change) the DB number based on the number of Compact Devices (CD) available for connection.

7.5.2 Structure of DB_PAM_CD

The size of the data block DB_PAM_CD is 160 bytes and the structure is as follows:

Address	Name	Type	Initial value	Comment
0.0	STRUCT			
+0.0	LID	STRING[64]	''	LID

Address	Name	Type	Initial value	Comment
+66.0	CP	STRING[64]	''	Connection point
+132.0	OT	INT	4	Object type (4=Compact device)
+134.0	GP	WORD	W#16#0	Global part
+136.0	DD	WORD	W#16#0	Detail diagnostics
+138.0	PV0_VALUE	REAL	0.000000e+000	PV0 Value
+142.0	PV1_VALUE	REAL	0.000000e+000	PV1 Value
+146.0	PV2_VALUE	REAL	0.000000e+000	PV2 Value
+150.0	PV0_UNIT	INT	0	PV0 Unit
+152.0	PV1_UNIT	INT	0	PV1 Unit
+154.0	PV2_UNIT	INT	0	PV2 Unit
+156.0	PV0_ST	BYTE	B#16#0	PV0 Status
+157.0	PV1_ST	BYTE	B#16#0	PV1 Status
+158.0	PV2_ST	BYTE	B#16#0	PV2 Status
+159.0	STAT	BYTE	B#16#0	Status information
=160.0	END_STRUCT			

7.6 DB_PAM_CPU: DB of CPU data for reading from PAM_Station

7.6.1 Description of DB_PAM_CPU

Object name (type + number)

DB1

- Structure of DB_PAM_CPU (Page 513)

Area of application

The data block DB_PAM_CPU in the package unit contains the user data that is read by the corresponding PAM_CPU block of PAM station.

You can assign (or change) the DB number based on the number of CPUs available for connection.

7.6.2 Structure of DB_PAM_CPU

The size of the data block DB_PAM_CPU is 160 bytes and the structure is as follows:

Address	Name	Type	Initial value	Comment
0.0	STRUCT			
+0.0	LID	STRING[64]	''	LID
+66.0	CP	STRING[64]	''	Connection point
+132.0	OT	INT	1	Object type (1=CPU)
+134.0	GP	WORD	DW#16#0	Global part
+136.0	DD	WORD	DW#16#0	Detail diagnosis
+138.0	PV0_VALUE	REAL	0.000000e+000	PV0 Value
+142.0	PV1_VALUE	REAL	0.000000e+000	PV1 Value
+146.0	PV2_VALUE	REAL	0.000000e+000	PV2 Value
+150.0	PV0_UNIT	INT	0	PV0 Unit
+152.0	PV1_UNIT	INT	0	PV1 Unit
+154.0	PV2_UNIT	INT	0	PV2 Unit
+156.0	PV0_ST	BYTE	B#16#0	PV0 Status
+157.0	PV1_ST	BYTE	B#16#0	PV1 Status
+158.0	PV2_ST	BYTE	B#16#0	PV2 Status
+159.0	RESERVE_00	BYTE	B#16#0	Reserve
=160.0	END_STRUCT			

7.7 DB_PAM_IM: DB of IM data for reading from PAM_Station

7.7.1 Description of DB_PAM_IM

Object name (type + number)

DB2

- Structure of DB_PAM_IM

Area of application

The data block DB_PAM_IM in the package unit contains the user data that is read by the corresponding PAM_IM block of PAM Station.

You can assign (or change) the DB number based on the number of Interface Modules (IM) available for connection.

7.7.2 Structure of DB_PAM_IM

The size of the data block DB_PAM_IM is 160 bytes and the structure is as follows:

Address	Name	Type	Initial value	Comment
0.0	STRUCT			
+0.0	LID	STRING[64]	''	LID
+66.0	CP	STRING[64]	''	Connection point
+132.0	OT	INT	2	Object type (2=IM)
+134.0	GP	WORD	W#16#0	Global part
+136.0	DD	WORD	W#16#0	Detail diagnostics
+138.0	SM_NOK1	DWORD	DW#16#0	Signal modul 0-31 error
+142.0	SM_NOK2	DWORD	DW#16#0	Signal modul 32-63 error
+146.0	RESERVE_00	DWORD	DW#16#0	Reserve
+150.0	RESERVE_01	WORD	W#16#0	Reserve
152.0	PV0_VALUE	REAL	`0.000000e+000`	`PV0 Value`
156.0	PV0_UNIT	INT	0	`PV0 Unit`
+158.0	PV0_ST	BYTE	B#16#0	`PV0 Status`
+159.0	STAT	BYTE	B#16#0	Status information
=160.0	END_STRUCT			

Internal block

8

8.1 ChkREAL: Internal Block

Object name (type + number)

FC260

This block is a system block and is only used internally. There is therefore no help available for it.

8.2 LED_STAT: Processing of LED Status

Object name (type + number)

FC267

This block is a system block and is used exclusively internally. A help is therefore not available.

8.3 QC_CHNG: Internal block

Object name (type + number)

FB 135

This block is a system block and is only used internally. There is therefore no help available for it.

Appendix 9

9.1 MODE settings for FF devices

MODE_xx input parameters are available for up to 32 values of a FF field device.

Block	I/O (parameters) (cyclic data) permitted combinations and sequence	Input (I)/Output (O) (PLS view)	MODE 16#xxyy O=xx, I=yy
Analog input (FbAnIn)	OUT	I	16#0001
Analog output (FbAnOu)	SP	O	16#0100
Discrete input (FbDiIn)	OUT_D	I	16#0002
Discrete output (FbDiOu)	SP_D	O	16#0400

9.2 MODE settings for SM modules

Measuring range coding of the analog input modules

Depending on the measuring-range coding of the analog input modules, the parameter MODE_xx (measuring-range coding) corresponding to the channel must be specified in accordance with the table. When thermocouples are used there are various options for combining the measuring type (coding A) with the measuring range (coding B). In this case, the MODE_xx parameter must be calculated according to the following formula and the result written to the MODE input as an INTEGER value:
Measuring range coding = 256 ∗ coding A + coding B

Please note: The table shows codes **A** and **B** in binary format, and as the result the measuring range coding as a hexadecimal number.

Measuring type	Coding (A)	Measuring range	Code (B)	MODE (256∗A+B)
Deactivated				16#0000
Voltage	2#0001	± 25 mV	2#1010	16#010A
		± 50 mV	2#1011	16#010B
		± 80 mV	2#0001	16#0101
		± 250 mV	2#0010	16#0102
		± 500 mV	2#0011	16#0103
		± 1 V	2#0100	16#0104
		± 2.5 V	2#0101	16#0105
		± 5 V	2#0110	16#0106
		1 to 5 V	2#0111	16#0107

Measuring type	Coding (A)	Measuring range	Code (B)	MODE (256∗A+B)
		0 to 10 V	2#1000	16#0108
		± 10 V	2#1001	16#0109
		± 100 mV	2#1100	16#010C
4-wire measuring transducer	2#0010	±3.2 mA	2#0000	16#0200
		± 5 mA	2#0101	16#0205
		± 10 mA	2#0001	16#0201
		0 to 20 mA	2#0010	16#0202
		4 to 20 mA	2#0011	16#0203
		± 20 mA	2#0100	16#0204
HART interface	2#0111	4 to 20 mA (variant 0) OMODE settings for SM modules (Page 527)	2#1100	16#070C
2-wire measuring transducer	2#0011	0 to 20 mA	2#0010	16#0302
		4 to 20 mA	2#0011	16#0303
		± 20 mA	2#0100	16#0304
		0 to 10 mA	2#0110	16#0306
Resistor 4-wire connection	2#0100	48 Ω	2#0000	16#0400
		150 Ω	2#0010	16#0402
		300 Ω	2#0100	16#0404
		600 Ω	2#0110	16#0406
		1000 Ω	2#0111	16#040E
		3000 Ω	2#0111	16#0407
		6000 Ω	2#1000	16#0408
		PTC	2#1111	16#040F
Resistor 3-wire connection	2#0101	48 Ω	2#0000	16#0500
		150 Ω	2#0010	16#0502
		300 Ω	2#0100	16#0504
		600 Ω	2#0110	16#0506
		1000 Ω	2#0111	16#050E
		3000 Ω	2#0111	16#0507
		6000 Ω	2#1000	16#0508
		PTC	2#1111	16#050F
Resistor 2-wire connection	2#0110	48 Ω	2#0000	16#0600
		150 Ω	2#0010	16#0602
		300 Ω	2#0100	16#0604
		600 Ω	2#0110	16#0606
		1000 Ω	2#0111	16#060E
		3000 Ω	2#0111	16#0607
		6000 Ω	2#1000	16#0608
		PTC	2#1111	16#060F
Thermocouple + linear, 4-wire connection	2#1000	Pt 100 climate range	2#0000	16#0800
		Pt 200 climate range	2#0111	16#0807

Measuring type	Coding (A)	Measuring range	Code (B)	MODE (256∗A+B)
		Pt 500 climate range	2#1000	16#0808
		Pt 1000 climate range	2#1001	16#0809
		Ni 100 climate range	2#0001	16#0801
		Ni 1000/LG-Ni 1000 climatic range	2#1010	16#080A
		Pt 100 standard range	2#0010	16#0802
		Pt 200 standard range	2#0011	16#0803
		Pt 500 standard range	2#0100	16#0804
		Pt 1000 standard range	2#0101	16#0805
		Ni 100 standard range	2#1011	16#080B
		Ni 1000/LG-Ni 1000 standard range	2#0110	16#0806
		Ni 120 standard range	2#1100	16#080C
		Ni 120 climate range	2#1101	16#080D
		Cu 10 climate range	2#1110	16#080E
		Cu 10 standard range	2#1111	16#080F
		Ni 200 standard range	2#10000	16#0810
		Ni 200 climate range	2#10001	16#0811
		Ni 500 standard range	2#10010	16#0812
		Ni 500 climate range	2#10011	16#0813
		Pt 10 GOST climatic	2#10100	16#0814
		Pt 10 GOST standard (TC = 3910)	2#10101	16#0815
		Pt 50 GOST climatic	2#10110	16#0816
		Pt 50 GOST standard (TC = 3910)	2#10111	16#0817
		Pt 100 GOST climatic	2#11000	16#0818
		Pt 100 GOST standard (TC = 3910)	2#11001	16#0819
		Pt 500 GOST climatic	2#11010	16#081A
		Pt 500 GOST standard (TC = 3910)	2#11011	16#081B
		Cu 10 GOST climatic	2#11100	16#081C
		Cu 10 GOST standard (TC = 426)	2#11101	16#081D
		Cu 50 GOST climatic	2#11110	16#081E

Measuring type	Coding (A)	Measuring range	Code (B)	MODE (256∗A+B)
		Cu 50 GOST standard (TC = 426)	2#1111 1	16#081F
		Cu 100 GOST climatic	2#1000 00	16#0820
		Cu 100 GOST standard (TC = 426)	2#1000 01	16#0821
		Ni 100 GOST climatic	2#1000 10	16#0822
		Ni 100 GOST standard	2#1000 11	16#0823
		Pt 10 GOST standard (TC = 3850)	2#1010 101	16#0855
		Pt 50 GOST standard (TC = 3850)	2#1010 111	16#0857
		Pt 100 GOST standard (TC = 3850)	2#1011 001	16#0859
		Pt 500 GOST standard (TC = 3850)	2#1011 011	16#085B
		Cu 10 GOST standard (TC = 428)	2#1001 1101	16#089D
		Cu 50 GOST standard (TC = 428)	2#1001 1111	16#089F
		Cu 100 GOST standard (TC = 428)	2#1010 0001	16#08A1
Thermocouple + linear, 3-wire connection	2#1001	Pt 100 climate range	2#0000	16#0900
		Pt 200 climate range	2#0111	16#0907
		Pt 500 climate range	2#1000	16#0908
		Pt 1000 climate range	2#1001	16#0909
		Ni 100 climate range	2#0001	16#0901
		Ni 1000/LG-Ni 1000 climatic range	2#1010	16#090A
		Pt 100 standard range	2#0010	16#0902
		Pt 200 standard range	2#0011	16#0903
		Pt 500 standard range	2#0100	16#0904
		Pt 1000 standard range	2#0101	16#0905
		Ni 100 standard range	2#1011	16#090B
		Ni 1000/LG-Ni 1000 standard range	2#0110	16#0906
		Ni 120 standard range (variant 0) KTY83/110 (variant 1) OMODE settings for SM modules (Page 527)	2#1100	16#090C

Measuring type	Coding (A)	Measuring range	Code (B)	MODE (256∗A+B)
		Ni 120 climate range (variant 0) KTY84/130 (variant 1) OMODE settings for SM modules (Page 527)	2#1101	16#090D
		Cu10 climate range	2#1110	16#090E
		Cu10 standard range	2#1111	16#090F
		Ni 200 standard range	2#10000	16#0910
		Ni 200 climate range	2#10001	16#0911
		Ni 500 standard range	2#10010	16#0912
		Ni 500 climate range	2#10011	16#0913
		Pt 10 GOST climatic	2#10100	16#0914
		Pt 10 GOST standard (TC = 3910)	2#10101	16#0915
		Pt 50 GOST climatic	2#10110	16#0916
		Pt 50 GOST standard (TC = 3910)	2#10111	16#0917
		Pt 100 GOST climatic	2#11000	16#0918
		Pt 100 GOST standard (TC = 3910)	2#11001	16#0919
		Pt 500 GOST climatic	2#11010	16#091A
		Pt 500 GOST standard (TC = 3910)	2#11011	16#091B
		Cu 10 GOST climatic	2#11100	16#091C
		Cu 10 GOST standard (TC = 426)	2#11101	16#091D
		Cu 50 GOST climatic	2#11110	16#091E
		Cu 50 GOST standard (TC = 426)	2#11111	16#091F
		Cu 100 GOST climatic	2#100000	16#0920
		Cu 100 GOST standard (TC = 426)	2#100001	16#0921
		Ni 100 GOST climatic	2#100010	16#0922
		Ni 100 GOST standard	2#100011	16#0923

Measuring type	Coding (A)	Measuring range	Code (B)	MODE (256∗A+B)
		Pt 10 GOST standard (TC = 3850)	2#1010 101	16#0955
		Pt 50 GOST standard (TC = 3850)	2#1010 111	16#0957
		Pt 100 GOST standard (TC = 3850)	2#1011 001	16#0959
		Pt 500 GOST standard (TC = 3850)	2#1011 011	16#095B
		Cu 10 GOST standard (TC = 428)	2#1001 1101	16#099D
		Cu 50 GOST standard (TC = 428)	2#1001 1111	16#099F
		Cu 100 GOST standard (TC = 428)	2#1010 0001	16#09A1
Thermocouple + linear, 2-wire connection	2#1111	Pt 100 climate range	2#0000	16#0F00
		Pt 200 climate range	2#0111	16#0F07
		Pt 500 climate range	2#1000	16#0F08
		Pt 1000 climate range	2#1001	16#0F09
		Ni 100 climate range	2#0001	16#0F01
		Ni 1000/LG-Ni 1000 climatic range	2#1010	16#0F0A
		Pt 100 standard range	2#0010	16#0F02
		Pt 200 standard range	2#0011	16#0F03
		Pt 500 standard range	2#0100	16#0F04
		Pt 1000 standard range	2#0101	16#0F05
		Ni 100 standard range	2#1011	16#0F0B
		Ni 1000/LG-Ni 1000 standard range	2#0110	16#0F06
		Ni 120 standard range	2#1100	16#0F0C
		Ni 120 climate range	2#1101	16#0F0D
		Cu10 climate range	2#1110	16#0F0E
		Cu10 standard range	2#1111	16#0F0F
		Ni 200 standard range	2#1000 0	16#0F10
		Ni 200 climate range	2#1000 1	16#0F11
		Ni 500 standard range	2#1001 0	16#0F12
		Ni 500 climate range	2#1001 1	16#0F13
Thermocouple, linear, reference temperature 0 °C / no reference point	2#1010	Type B [PtRh-PtRh]	2#0000	16#0A00
		Type N [NiCrSi-NiSi]	2#0001	16#0A01
		Type E [NiCr-CuNi]	2#0010	16#0A02

Measuring type	Coding (A)	Measuring range	Code (B)	MODE (256∗A+B)
		Type R [PtRh-Pt]	2#0011	16#0A03
		Type S [PtRh-Pt]	2#0100	16#0A04
		Type J [Fe-CuNi IEC]	2#0101	16#0A05
		Type L [Fe-CuNi DIN]	2#0110	16#0A06
		Type T [Cu-CuNi IEC]	2#0111	16#0A07
		Type K [NiCr-Ni]	2#1000	16#0A08
		Type U [Cu-CuNi DIN]	2#1001	16#0A09
		Type C	2#1010	16#0A0A
		Type TXK/XK(L)	2#1011	16#0A0B
Thermocouple, linear, reference temperature 50 °C	2#1011	Type B [PtRh-PtRh]	2#0000	16#0B00
		Type N [NiCrSi-NiSi]	2#0001	16#0B01
		Type E [NiCr-CuNi]	2#0010	16#0B02
		Type R [PtRh-Pt]	2#0011	16#0B03
		Type S [PtRh-Pt]	2#0100	16#0B04
		Type J [Fe-CuNi IEC]	2#0101	16#0B05
		Type L [Fe-CuNi DIN]	2#0110	16#0B06
		Type T [Cu-CuNi IEC]	2#0111	16#0B07
		Type K [NiCr-Ni]	2#1000	16#0B08
		Type U [Cu-CuNi DIN]	2#1001	16#0B09
		Type C	2#1010	16#0B0A
		Type TXK/XK(L)	2#1011	16#0B0B
Thermocouple, fixed ref. temp	2#1100	Type B [PtRh-PtRh]	2#0000	16#0C00
		Type N [NiCrSi-NiSi]	2#0001	16#0C01
		Type E [NiCr-CuNi]	2#0010	16#0C02
		Type R [PtRh-Pt]	2#0011	16#0C03
		Type S [PtRh-Pt]	2#0100	16#0C04
		Type J [Fe-CuNi IEC]	2#0101	16#0C05
		Type L [Fe-CuNi DIN]	2#0110	16#0C06
		Type T [Cu-CuNi IEC]	2#0111	16#0C07
		Type K [NiCr-Ni]	2#1000	16#0C08
		Type U [Cu-CuNi DIN]	2#1001	16#0C09
		Type C	2#1010	16#0C0A
		Type TXK/XK(L)	2#1011	16#0C0B
Thermocouple, linear, internal compensation / internal reference point	2#1101	Type B [PtRh-PtRh]	2#0000	16#0D00
		Type N [NiCrSi-NiSi]	2#0001	16#0D01
		Type E [NiCr-CuNi]	2#0010	16#0D02
		Type R [PtRh-Pt]	2#0011	16#0D03
		Type S [PtRh-Pt]	2#0100	16#0D04
		Type J [Fe-CuNi IEC]	2#0101	16#0D05
		Type L [Fe-CuNi DIN]	2#0110	16#0D06

Measuring type	Coding (A)	Measuring range	Code (B)	MODE (256*A+B)
		Type T [Cu-CuNi IEC]	2#0111	16#0D07
		Type K [NiCr-Ni]	2#1000	16#0D08
		Type U [Cu-CuNi DIN]	2#1001	16#0D09
		Type C	2#1010	16#0D0A
		Type TXK/XK(L)	2#1011	16#0D0B
Thermocouple, linear, external compensation / reference point RTD(0)	2#1110	Type B [PtRh-PtRh]	2#0000	16#0E00
		Type N [NiCrSi-NiSi]	2#0001	16#0E01
		Type E [NiCr-CuNi]	2#0010	16#0E02
		Type R [PtRh-Pt]	2#0011	16#0E03
		Type S [PtRh-Pt]	2#0100	16#0E04
		Type J [Fe-CuNi IEC]	2#0101	16#0E05
		Type L [Fe-CuNi DIN]	2#0110	16#0E06
		Type T [Cu-CuNi IEC]	2#0111	16#0E07
		Type K [NiCr-Ni]	2#1000	16#0E08
		Type U [Cu-CuNi DIN]	2#1001	16#0E09
		Type C	2#1010	16#0E0A
		Type TXK/XK(L)	2#1011	16#0E0B
Thermocouple, dynamic ref. temp	2#0111	Type B [PtRh-PtRh] (variant 1) OMODE settings for SM modules (Page 527)	2#0000	16#0700
		Type N [NiCrSi-NiSi] (variant 1) OMODE settings for SM modules (Page 527)	2#0001	16#0701
		Type E [NiCr-CuNi] (variant 1) OMODE settings for SM modules (Page 527)	2#0010	16#0702
		Type R [PtRh-Pt] (variant 1) OMODE settings for SM modules (Page 527)	2#0011	16#0703
		Type S [PtRh-Pt] (variant 1) OMODE settings for SM modules (Page 527)	2#0100	16#0704
		Type J [Fe-CuNi IEC] (variant 1) OMODE settings for SM modules (Page 527)	2#0101	16#0705
		Type L [Fe-CuNi DIN] (variant 1) OMODE settings for SM modules (Page 527)	2#0110	16#0706
		Type T [Cu-CuNi IEC] (variant 1) OMODE settings for SM modules (Page 527)	2#0111	16#0707
		Type K [NiCr-Ni] (variant 1) OMODE settings for SM modules (Page 527)	2#1000	16#0708

Effect of the temperature coefficients on the measuring range

- Setting TC = 3850 at GOST Standard Pt10, Pt50, Pt100, Pt500 sets Bit 7 in the measuring range byte (0x40)
- Setting TC = 428 at GOST Standard Cu10, Cu50, Cu100 sets Bit 8 in the measuring range byte (0x80)

Measuring range coding of the analog output modules

Depending on the measuring-range coding of the analog output modules, the parameter MODE_xx (measuring-range coding) corresponding to the channel must be specified in accordance with the table.

Measuring type	Measuring range	MODE
Voltage	± 5 V	16#0106
	1 to 5 V	16#0107
	0 to 10 V	16#0108
	± 10 V	16#0109
Current	0 to 20 mA	16#0202
	4 to 20 mA	16#0203
	± 20 mA	16#0204
	0 to 10 mA	16#0206
HART interface	4 to 20 mA	16#070C

Mode: Celsius and Fahrenheit

Variant	x	y	Measuring range
0	0, 1 (depending on the other variant IDs)	0,1,2,4	Celsius
1	8, 9 (depending on the other variant IDs)	0,1,2,4	Fahrenheit

Mode: 16#090C and variant

Variant	x	y	Measuring range
0	0	0,1,2,4	Ni 120 standard range
1	1	0,1,2,4	KTY84/110

Mode: 16#090D and variant

Variant	x	y	Measuring range
0	0	0,1,2,4	Ni 120 climate range
1	1	0,1,2,4	KTY84/130

Mode: 16#07 (Coding A) and variant

Variant	x	y	Measuring range
0	0	0,1,2,4	HART interface
1	1	0,1,2,4	Thermocouple, dynamic reference temperature

MODE: 16#08, 16#0A, 16#0B, 16#0D, 16#0E (coding A) and variant

Table 9-1 PCS 7 as of V8.1: MODE parameter variant

Variant	x	y	Measuring range
0	0	0,1,2,4	S7-300 module
1	3	0,1,2,4	S7-300, ET 200M Ex I/O module

Table 9-2 PCS 7 V7.x: MODE parameter variant

Variant	Mode	Measuring range
0	16#08, 16#0A, 16#0B, 16#0D, 16#0E	S7-300 module
1	16#18, 16#1A, 16#1B, 16#1D, 16#1E	S7-300, ET 200M Ex I/O module

Measuring-Range Coding of the Digital Input and Output Modules

With digital input modules and digital output modules, there is no measuring type and no measuring range:
MODE = 16#FFFF (with DI)
MODE = 16#FFFE (with DO)

MODE: 1oo1 / 1oo2 evaluation for F-modules

Variant	x	y	Measuring range
0	0	0,1,2,4	1oo1 (1v1) evaluation
1	4	0,1,2,4	1oo2 (2v2) evaluation

Measuring range coding of the controller module

There is no measuring type and no measuring range for controller modules:

MODE = 16#FFFD

Measuring range coding of the communication module

There is no measuring type and no measuring range for communication modules:

MODE = 16#0001

Measuring range encoding of the ET 200SP Analog Input Energy Meter module

There is no measuring type and no measuring range for Analog Input Energy Meter modules:

MODE = 16#200C

9.3 OMODE settings for SM modules

OMODE structure

The table below shows the structure and meaning of the outputs OMODE_xx of data type DWORD:

Byte 3:	16#80: Value status "valid value" 16#85 Value status "valid value" 16#00: Value status "invalid value" 16#40: Value status "invalid value"	 (IO redundancy warning) (Channel error) (Higher-level error)
Byte 2:	16#01: Restart (OB 100) has been carried out 16#02: Measuring-range overshoot 16#04: Measuring range low limit exceeded 16#xy: Variant identifier at multiple MODE_ assignment (see below)	 (Channel-error diagnostics) (Channel-error diagnostics)
Byte 1, 0 (low word):	MODE (see above)	

Example:

16#80010203 = value status "valid value", restart has been carried out, current 4 mA to 20mA

9.4 MODE settings for field devices

MODE_xx input parameters are available for a maximum of 32 slots of a PA/FF field device. Their initial value is zero (no read/write access). You must set the combination selected from the options of the PROFIBUS PA 3.0 profile at the MODE_xx input of each slot channel xx:

Block	**I/O (parameters) (cyclic data)** **permissible combi-nation and sequence**	**Input (I)/Output (O)** **(PLS view)**	**MODE 16#xxyy, O=xx I=yy**	**Configuration possible with field device**
Analog input (PA_AI/ FbAnIn)	OUT	I	16#0001	PA + FF
Totalizer (PA_TOT/ FbAnTot)	TOTAL	I	16#000F	PA
Totalizer (PA_TOT/ FbAnTot)	TOTAL SET_TOT	I O	16#070F	PA
Totalizer (PA_TOT/ FbAnTot)	TOTAL SET_TOT MODE_TOT	I O O	16#080F	PA
Analog output (PA_AO/FbAnOu)	SP	O	16#0100	PA + FF
Analog output (PA_AO/FbAnOu)	SP READBACK POS_D	O I I	16#0103	PA
Analog output (PA_AO/FbAnOu)	SP CHECK_BACK	O I	16#0104	PA
Analog output (PA_AO/FbAnOu)	SP READBACK POS_D CHECK_BACK	O I I I	16#0105	PA
Analog output (PA_AO/FbAnOu)	RCAS_IN, RCAS_OUT	O I	16#0206	PA
Analog output (PA_AO/FbAnOu)	RCAS_IN, RCAS_OUT, CHECK_BACK	O I I	16#0207	PA
Analog output (PA_AO/FbAnOu)	SP RCAS_IN READBACK RCAS_OUT POS_D CHECK_BACK	O O I I I I	16#0308	PA
Discrete input (PA_DI/ FbDiIn)	OUT_D	I	16#0002	PA + FF
Discrete output (PA_DO/FbDiOu)	SP_D	O	16#0400	PA + FF
Discrete output (PA_DO/FbDiOu)	SP_D READBACK_D	O I	16#0409	PA
Discrete output (PA_DO/FbDiOu)	SP_D CHECKBACK_D	O I	16#040A	PA

Block	I/O (parameters) (cyclic data) permissible combi-nation and sequence	Input (I)/Output (O) (PLS view)	MODE 16#xxyy, O=xx I=yy	Configuration possible with field device
Discrete output (PA_DO/FbDiOu)	SP_D READBACK_D CHECK_BACK_D	O I I	16#040B	PA
Discrete output (PA_DO/FbDiOu)	RCAS_IN_D RCAS_OUT_D	O I	16#050C	PA
Discrete output (PA_DO/FbDiOu)	RCAS_IN_D RCAS_OUT_D CHECK_BACK_D	O I I	16#050D	PA
Discrete output (PA_DO/FbDiOu)	SP_D RCAS_IN_D READBACK_D RCAS_OUT_D CHECK_BACK_D	O O I I I	16#060E	PA

PA/FF device variant identifier

Variant	x	y	Field device
0	0	0	PA device
1	1	0	FF device

9.5 OMODE settings for field devices

OMODE Structure

The table below shows the structure and meaning of the outputs OMODE_xx of data type DWORD:

Byte 3:	16#80: Value status "valid value" 16#00: Value status "invalid value" 16#40: Value status "invalid value"	 (Channel error) (Higher-level error)
Byte 2:	16#xy: Variant identifier at multiple MODE_ assignment (see MODE settings for field devices (Page 528))	
Byte 1, 0 (low word):	MODE (see above)	

Example:

16#80000001 corresponds to the value status "valid value", analog input, whereby parameter `Out` supplies the cyclic data.

9.6 Error Information of Output Parameter MSG_STAT

The messages can be disabled by setting input EN_MSG = FALSE (output MSG_STAT(_x) remains unchanged).

Block ALARM8_P(_x) is called in the acyclic OBs and in OB1 if message suppression is not enabled. Error information of ALARM_8P(_x) - messages cannot be output - is indicated at output parameter MSG_STAT(_x).

Details on the error information of output parameter MSG_STAT and on the acknowledgment word MSG_ACK(_x) of ALARM_8P are found in the Online Help of SF B35 (ALARM_8P).

9.7 Addressing

Rules

If you do not use the CFC function “Generate module drivers”, you must set the logical basic address of the module created with HW Config at the LADDR input parameter. If input SUBN_TYP = FALSE, the RACK of the module is connected to an integrated DP interface (distributed I/O device interface) of the CPU module by means of a line. Otherwise, you must set SUBN_TYP = TRUE.

The following points are generally to be observed for all SM, PA and FF blocks:

- The basic address of modules equipped only with inputs, i.e., modules which only write data to the input range of the CPU process image, can be fetched directly from HW Config;
  for example: The module SM 331 AI 8x12Bit 6ES7 331-7KF01-0AB0:

Address input range (HW Config)	Address output range (HW Config)	LADDR (decimal/hex)
512	-	512 / 16#0200

- The MSB (most significant bit) must be set in the basic address fetched from HW Config for modules equipped only with outputs, which means modules which only read data from the output range of the CPU process image;
  for example, module SM 332 AO 4x12Bit 6ES7 332-5HD01-0AB0:

Address input range (HW Config)	Address output range (HW Config)	LADDR (decimal/hex)
-	512	-32256 / 16#8200

- The basic address of the input range must be set at input LADDR and the basic address of the output range from HW Config must be set at input LADDR1 for mixed modules, which means modules that write data to the input range and read data from the output range of the CPU process image;
  for example, module SM 323 DI/O 8x24V/05A 6ES7 323-1BH81-0AA0:

Address input range (HW Config)	Address output range (HW Config)	LADDR (decimal/hex)	LADDR1 (decimal/hex)
12	12	12 / 16# 000C	12 / 16# 000C

- For FF devices which only write data to the input range of the CPU process image, the lowest input address should be fetched from HW Config.
- For FF devices which only write data to the output range of the CPU process image, the lowest output address from HW Config should be set.
- For FF devices which write the data in the input range of the CPU process image and read from the output range of the CPU process image, you must set the lowest address of the input/output range from HW Config at the DADDR input.

Address input range (HW Config)	Address output range (HW Config)	DADDR (decimal/hex)
512	-	512
	512	16896 (16384 + 512)/ 16#4200
512	516	512
512	512	512
516	512	16896 (16384 + 512) / 16#4200

9.8 Message Classes

Message classes

Message classes are used to group messages according to their cause. The following message classes are used in the SIMATIC process control system:

- Process messages triggered when process-specific monitoring values (for example, alarms, warnings, high/low tolerances, general process messages) are reached or exceeded.
- Process control messages which are output by the control system (system messages) or the I/O units (errors in the field), or for preventive maintenance.
- Requests for operator input which, in the case of certain operation sequences, draw the operator's attention to the necessity of an operator intervention (for example, request to acknowledge a stepping operation manually in order to enable transition) or operation logs.

Table of message classes and their meaning

Message class	Meaning	With acknowledgment
AH	Alarm high (High High Alarm)	Yes
AL	Alarm low (Low Low Alarm)	Yes
WH	Warning high (High Alarm)	Yes
WL	Warning low (Low Alarm)	Yes
TH	Tolerance high (Tolerance High)	Yes
TL	Tolerance low (Tolerance Low)	Yes
F	AS process control message (error)	Yes
S	AS process control message (fault)	Yes
S*	OS process control message (fault)	Yes
M	Preventive maintenance (Maintenance)	Yes

Message class	Meaning	With acknowledg-ment
PM	Process message (Process Message)	Yes
PM	Operating message	No
OR	Operator request (Operator Request)	No
OM *1)	Operator message (Operation Message)	No
SA	Status AS	No
SO	Status OS	No

*1) If the block is used for operation messages, the inputs I_1, ... have to be supplied with pulses. Assignment of the static value "1" would lead to multiple messages.

See also

Message texts and associated values of MOD_CENTRAL (Page 136)

9.9 Dependencies

Dependency on the FM_CO block

The FM_CO block (PCS 7 Basic Library) coordinates the reading of data records for the FM_CNT, FMCS_PID, FMT_PID, and READ355P blocks. Therefore, when installing these blocks you must ensure that the driver generator installs FM_CO in the fastest cyclic-interrupt OB of one of the blocks named above. This OB must not run slower than 30 s or faster than 25 ms.

Notes on reading data records

In an ET 200M with n controller blocks, reading of data records is activated every n+1 cycles (ideally, when the installation sequence tallies with the interconnection).

This means that, in the worst case, a setpoint changed by means of a faceplate will only be viewed by the operator after n+1 cycles (e.g. this would amount to 17 s for OB 32 (1,000 ms) with 4 controller modules and 16 blocks).

The same applies for position feedback for the step controller. At the time of changeover (manual/auto), the manipulated variable LMN is set to an out-of-date value.

Changing the visualization time

You can reduce the visualization time as follows:

- Install the controller blocks in a faster OB
  or
- Distribute the controller modules over several ET 200 stations.

9.10 Status displays

9.10.1 Maintenance status MS

Layout of the maintenance status

The maintenance status MS with the DWORD data type has the following layout:

Bit	Explanation
Bit 0 to 7	Display of the maintenance state
Bit 8 to 15	Display of the maintenance state of the redundant partner
Bit 16	1 = Redundant partner available
Bit 17	0 = primary partner is master, 1 = redundant partner is master
Bit 18	SIMATIC PDM maintenance state worse than device status
Bit 19 to 20	Coding of cycle time for the cyclic update Bit 19 = 0, Bit 20 = 0; 1 day Bit 19 = 1, Bit 20 = 0; 12 hours Bit 19 = 0, Bit 20 = 1; 1 hour Bit 19 = 1, Bit 20 = 1; 10 minutes
Bit 21	"1" = Device is selected as "Selection for exports" in the maintenance view
Bit 22	SIMATIC PDM has detected a state change
Bit 23	Block takes part in the cyclical updating of SIMATIC PDM
Bit 24 to 27	OS operation
Bit 28 to 29	SIMATIC PDM maintenance state
Bit 30	`OP_OFF`
Bit 31	`OP_PASSIV`

The MS is copied 1:1 to the output O_MS.

For more information, refer to the "*Process Control System PCS 7; Maintenance Station*" manual.

9.10.2 PA field device status and diagnostics information

PA-Field-Device Status

PA Status Limits (Bit 1 + 0 irrelevant)		Meaning of PA Status	Message	Coding MS
Quality (bit 7 + 6)	Substatus (bits 5 – 2)		M = Message Q = Must be acknowledged	
10	0000	Good		0
10	0001	Making configuration change	M	0

PA Status Limits (Bit 1 + 0 irrelevant)		Meaning of PA Status	Message	Coding MS
10	0010	Active warning		0
10	0011	Active alarm		0
10	0100	Unacknowledged configuration change		0
10	0101	Unacknowledged warning		0
10	0110	Unacknowledged interrupt		0
10	1000	Device switches to fail-safe position	M	0
10	1001	Maintenance required pending (more diagnostic data available)	Q	5
10	1010	Maintenance demanded pending (more diagnostic data available)	Q	6
10	1111	Self-test in progress		0
01	0000	Not specified	Q	6
01	0001	Last valid value	Q	7
01	0010	Substitute value	Q	7
01	0011	Initial value		0
01	0100	Measured value formation incorrect	Q	6
01	0101	Value outside defined range	Q	6
01	0110	Signal source uncertain	Q	6
01	0111	Configuration error	Q	6
01	1000	Measured value simulated	Q	3
01	1001	Sensor calibration	Q	6
01	1010	Maintenance demanded (more diagnostic data available)	Q	6
01	1100	Simulation started	M	3
01	1101	Simulation completed	M	0
01	1110	Process-related, no maintenance	M	0
00	0000	Not specified	Q	7
00	0001	Configuration error	Q	7
00	0010	Not connected	Q	7
00	0011	Device error	Q	7
00	0100	Sensor error	Q	7
00	0101	No connection - last valid value	Q	7
00	0110	No connection - no valid value	Q	7
00	0111	Out of service	Q	2
00	1000	Out of service (no diagnostic data, passivated)	M	1
00	1001	Maintenance alarm (more diagnostic data available)	Q	7
00	1010	Process-related, no maintenance	M	0
00	1111	Local operation/function check	M	4

You can find additional information about status icons for the maintenance status (MS) in the "Maintenance status MS (Page 533)" section.

Diagnostic information

The structure of the **PA_DIAG** parameter is as follows:

Byte	Bit position	PROFIBUS - diagnostic significance	Message	MS
0	0	Electronic hardware failure	Q	7
	1	Mechanical hardware failure	Q	7
	2	Excess motor temperature	Q	6
	3	Excess temperature at electronic circuit	Q	6
	4	Memory error	Q	7
	5	Measurement failure	Q	7
	6	Device not initialized (no auto-calibration)	Q	0
	7	Auto-calibration error		7
1	0	Zero error (limit position)	Q	6
	1	No power supply (electr. pneum.)	Q	7
	2	Invalid configuration	Q	7
	3	Warm start executed	M	0
	4	Complete restart executed	M	0
	5	Maintenance necessary	Q	5
	6	Invalid identifier	Q	7
	7	Invalid ID number	Q	7
2	0	Device error	Q	7
	1	Maintenance requested	Q	5
	2	Device is in a functional check or in simulation or under local operator control (maintenance)		0
	3	The process conditions do not allow the valid values to be returned; this is set when the quality is “uncertain, process-related, no maintenance” or “bad, process-related, no maintenance”		0
	4 - 7	Reserved for PNO, default 0		
3	0-4	Reserved for PNO use		
	5	= 0: for devices of the corresponding profile		
	6	= 0: for devices of the corresponding profile		
	7	= 0: no further information available = 1: Further diagnostic information available in DIAGNOSIS_EXTENSION		

9.11 Text libraries

9.11.1 Text library for PAM_CPU/ PAM_CD/PAM_IM/PAM_SM/PAM_IF/FB_DB_CPU/ FB_DB_CD/FB_DB_IM

The following table lists the text library message texts and their text numbers for the blocsk PAM_CPU (FB 436), PAM_CD (FB 438),PAM_IM (FB 422), PAM_SM (FB 437), PAM_IF (FB 29), FB_DB_CPU (132), FB_DB_CD (FB 27), FB_DB_IM (FB 28):

Text no.	Message text
1	SIMATIC PDM
2	External station
3	External application
4	Analog value

9.11.2 Text library for MOD_SWT

The following table lists the text library message texts and their text numbers for the block MOD_SWT (FB 149):

Text no.	Message text
1	Running forwards
2	Standstill
3	Running backwards

9.11.3 Text library for FF_MOD32

The following table lists the text library message texts and their text numbers for the block FF_MOD32 (FB 124):

Text no.	Message text
1	Multiple alarm OB83
2	Multiple alarm OB82
3	Configuration error: Name does not match address

9.11.4 Text Library for MOD_PAL0, MOD_PAX0

The following table lists the text-library message texts and their numbers for the blocks MOD_PAL0 (FB99) and MOD_PAX0 (FB112):

Text no.	Message text
1	Warm restart
2	Cold restart
3	PA field device diagnostics
4	Memory error

9.11.5 Text Library for PADP_L00, PADP_L01, PADP_L02

The following table lists the text-library message texts and their numbers for the blocks PADP_L00 (FB 109), PADP_L01 (FB 110), PADP_L02 (FB 111):

Text No.	Message Text
1	Module error
2	Wrong module
3	Module missing

9.11.6 Text Library for DREP, DREP_L

The following table lists the text-library message texts and their numbers for the blocks DREP (FB 113) and DREP_L (FB 125):

Text No.	Message Text
1	Failure
2	Diagnostics

9.11.7 Text library for MOD_1, MOD_2, MOD_3, MOD_64, MOD_D2, MOD_CP

The following table lists the message texts and their text numbers from the text library for the MOD_1 (FB 91) / MOD_2 (FB 92) / MOD_3 (FB 95) / MOD_64 (FB 137) / MOD_D2 (FB 94) / MOD_CP (FB 98) blocks :

Text No.	Message Text	Remark
1	Parameter assignment error	
2	Common mode error	
3	Short-circuit to P	
4	Short circuit to M	
5	Wire break	
6	Reference channel error	

Text No.	Message Text	Remark
7	Measuring range violation low	
8	Measuring range violation high	
9	Load voltage missing	
10	Chassis ground error	
11	Sensor supply missing	
12	Excess temperature	
13	Module OK	
14	Internal error	
15	External error	
16	External auxiliary voltage missing	
17	Front connector missing	
18	No configuration	
19	Wrong module parameters	
20	Wrong/missing user module	
21	Communication error	
22	Operating mode RUN/STOP	RUN: going STOP: coming
23	Timeout	
24	Failure mod. int. supply voltage	
25	Battery depleted	
26	Total backup failure	
27	CPU failure	
28	EPROM error	
29	RAM error	
30	ADC/DAC error	
31	Fuse tripped	
32	Process interrupt lost	
33	Removed	
34	Plugged	
35	Wrong module type plugged	
36	Faulty module inserted	
37	Module inserted (parameter error)	
38	Chatter error	
39	Changeover contact diagnostics	
40		
41		

9.11.8 Text Library for MOD_D1

The following table lists the text-library message texts and their numbers for the block MOD_D1 (FB 93):

Text no.	Message text	Remark
1	Parameter assignment error	
2	Common mode error	
3	Short-circuit to P	
4	Short circuit to M	
5	Wire break	
6	Reference channel error	
7	Measuring range violation low	
8	Measuring range violation high	
9	Load voltage missing	
10	Chassis ground error	
11	Sensor supply missing	
12	Excess temperature	
13	Module OK	
14	Internal error	
15	External error	
16	External auxiliary voltage missing	
17	Front connector missing	
18	No configuration	
19	Wrong parameter in module	
20	Wrong/missing user module	
21	Communication error	
22	Operating mode RUN/STOP	RUN: going STOP: coming
23	Timeout	
24	Failure mod. int. supply volt.	
25	Battery depleted	
26	Total backup failure	
27	CPU failure	
28	EPROM error	
29	RAM error	
30	ADC/DAC error	
31	Fuse tripped	
32	Process interrupt lost	
33	Removed	
34	Plugged	
35	Wrong module type plugged	
36	Faulty module inserted	
37	Module inserted (parameter assignment error)	
38	Chatter error	

Text no.	Message text	Remark
39	Changeover contact diagnostics	
40	Sensor or load voltage loss	
41	Faulty fuse	
42	AI error hardware	
43	AI wire break	
44	AI below measuring range	
45	AI above measuring range	
46	AO wire break	
47	AO short-circuit	
48		
49		
50	Signal A faulty	
51	Signal B faulty	
52	Signal N faulty	
53	Faulty value supplied to the channels	
54	Sensor supply 5.2 V/8.2 V faulty	
55	Sensor supply 24 V faulty	
56	Namur sensor signal line error	
57	Readback error	
58	Power supply 1: Error	
59	Power supply 2: Error	
60	Actuator OFF	
61	Discrepancy error	

9.11.9 Text library for MOD_D3, MOD_D8

The following table lists the text library message texts and their numbers for the blocks MOD_D3 and MOD_D8:

Text no.	Message text	Remark
1	Parameter assignment error	
2	Common mode error	
3	P short circuit	
4	M short circuit	
5	Wire break	
6	Reference channel error	
7	Below measuring range	
8	Above measuring range	
9	Load voltage missing	
10	Mass error	
11	Sensor supply missing	

Text no.	Message text	Remark
12	Excess temperature	
13	Module OK	
14	Internal error	
15	External error	
16	External aux. voltage missing	
17	Front connector missing	
18	No parameter assignment	
19	Wrong parameter in module	
20	Wrong/missing user module	
21	Communication problem	
22	Operating mode RUN/STOP	RUN: going STOP: coming
23	Time monitoring addressed	
24	Module failure int. supply voltage	
25	Battery empty	
26	Total backup battery failure	
27	Process failure	
28	EPROM error	
29	RAM error	
30	ADC/DAC error	
31	Fuse blown	
32	Process interrupt lost	
33	Withdrawn	
34	Plugged	
35	Wrong module type plugged	
36	Faulty module plugged	
37	Module plugged (param. error)	
38	Chatter error	
39	Changeover contact diagnostics	
40	Sensor or load voltage missing	
41	Fuse defective	
42	AI hardware error	
43	AI wire break	
44	AI below measuring range	
45	AI above measuring range	
46	AO wire break	
47	AO short circuit	
48	CiR configuration	
49	CiR configuration not successful	
50	Signal A faulty	
51	Signal B faulty	
52	Signal N faulty	
53	Incorrect value transferred between channels	

Text no.	Message text	Remark
54	Sensor supply 5.2 V/8.2 V faulty	
55	24 V sensor supply faulty	
56	Signal line error Namur sensor	
57	Readback error	
58	Power supply 1: Error	
59	Power supply 2: Error	
60	Actuator switch off	
61	Undervoltage	
62	Overvoltage	
63	Overload	
64	Standby	
65	Hardware interrupt	
66	Actuator alarm	
67	Safety shutdown	
68	Ambiguous error	
69	Error 1 in actuator/sensor	
70	Error 2 in actuator/sensor	
71	Channel temporarily not available	
72	Calibrating channel	
73	Discrepancy error	
74	Overcurrent at output driver	
75	Faulty P output driver	
76	Internal P short circuit	
77	External P short circuit/cross fault	
78	Internal fault in the read circuit/test circuit	
79	Output short circuit to M or faulty output driver	
80	Switching frequency exceeded	
81	PROFIsafe communication error	

9.11.10 Text library for MOD_D8_PN (FB197) / MOD_D16_PN (FB198) / MOD_D24_PN (FB199) / MOD_ENME (FB 419)

The following table lists the message texts and their numbers from the text library for the block MOD_D8_PN (FB197) / MOD_D16_PN (FB198) / MOD_D24_PN (FB199):

Text no.	Message text	Remark
1	Parameter assignment error	
2	Common mode error	
3	Short circuit to P	
4	Short circuit to M	
5	Wire break	

Text no.	Message text	Remark
6	Reference channel error	
7	Measuring range/low limit violated	
8	Measuring range/high limit violated	
9	Load voltage missing	
10	Ground error	
11	Sensor supply missing	
12	Excess temperature	
13	Module OK	
14	Internal error	
15	External error	
16	External auxiliary voltage missing	
17	Front connector missing	
18	Missing parameters	
19	Wrong parameters in module	
20	Wrong/missing user module	
21	Communication error	
22	Operating mode RUN/STOP	RUN: going, STOP: coming
23	Time monitoring addressed	
24	Failure mod. int. supply volt.	
25	Battery depleted	
26	Total backup battery failure	
27	Processor failure	
28	EPROM error	
29	RAM error	
30	ADC/DAC error	
31	Fuse blown	
32	Process interrupt lost	
33	Withdrawn	
34	Plugged	
35	Wrong module type plugged	
36	Faulty module plugged	
37	Module plugged (parameter assignment error)	
38	Chatter error	
39	Changeover contact diagnostics	
40	Front connector missing or sensor/load voltage missing	
41	Fuse defective	
42	AI hardware error	
43	AI wire break	
44	AI below measuring range	
45	AI above measuring range	
46	AO wire break	
47	AO short-circuit	

Text no.	Message text	Remark
48		
49		
50	Signal A faulty	
51	Signal B faulty	
52	Signal N faulty	
53	Incorrect value transferred between channels	
54	Sensor supply 5.2 V/8.2 V faulty	
55	Sensor supply 24 V faulty	
56	Namur sensor signal line error	
57	Readback error	
58	Power supply 1: Error	
59	Power supply 2: Error	
60	Actuator switch off	
61	Undervoltage	
62	Overvoltage	
63	Overload	
64	Reserve	
65	Hardware interrupt	
66	Actuator warning	
67	Safety-related shutdown	
68	Ambiguous error	
69	Error 1 in actuator/sensor	
70	Error 2 in actuator/sensor	
71	Channel / module temporarily not available	
72	Channel is being calibrated	
73	Discrepancy error	
74	Overcurrent at output driver	
75	P-output driver defective	
76	Internal P short-circuit	
77	External P short-circuit / cross-circuit	
78	Internal error in the read circuit/test circuit	
79	Short-circuit of the output to M or output driver defective	
80	Switching frequency exceeded	
81	PROFIsafe communication error	
82	Error	
83	Unknown error	
84	Short-circuit	
85	Wire break	
86	Warning	
87	Shutdown	
88	Unknown error	
89	Fault	

Text no.	Message text	Remark
90	Short-circuit or overload on the external encoder supply	
91	Missing supply voltage	
92	Power switch-off	
93	Undervoltage or overload of power supply	
94	Overvoltage on backplane	
95	Overcurrent	
96	Supply voltage disrupted	
97	Input voltage illegal	
98	Common mode error	

9.11.11 Text library for MOD_ D8_S7P, MOD_ D16_S7P

The following table lists the text library message texts and their numbers for the blocks MOD_D8_S7P and MOD_D16_S7P:

Text no.	Message text	Remark
1	Short circuit	
2	Undervoltage	
3	Overvoltage	
4	Overload	
5	Excess temperature	
6	Wire break	
7	High limit violated	
8	Low limit violated	
9	Error	
10	Simulation running	
11	Unknown error	
12	Unknown error	
13	Unknown error	
14	Unknown error	
15	Missing parameters	
16	Parameter assignment error	
17	No supply voltage	
18	Fuse defective	
19	Communication error	
20	Mass error	
21	Reference channel error	
22	Process interupt lost	
23	Limit warning	
24	Actuator switch off	
25	Safety event	

Text no.	Message text	Remark
26	External Error	
27	General Error	
28	PROFIsafe communication error	
29	Error 1 in actuator/encoder	
30	Error 2 in actuator/encoder	
31	Channel/component temporarily unavailable	
32	Process interrupt lost	
33	Withdrawn	
34	Plugged	
35	Wrong module type plugged	
36	Faulty module plugged	
37	Module plugged (parameter error)	

9.11.12 Text library for MOD_CP_PN (FB201)

The following table lists the message texts and their numbers from the text library for the block MOD_CP_PN (FB201):

Text no.	Message text	Remark
1	Parameter assignment error	
2	Common mode error	
3	Short circuit to P	
4	Short circuit to M	
5	Wire break	
6	Reference channel error	
7	Below measuring range	
8	Above measuring range	
9	Load voltage missing	
10	Ground error	
11	Sensor supply missing	
12	Excess temperature	
13	Module OK	
14	Internal error	
15	External error	
16	External auxiliary voltage missing	
17	Front connector missing	
18	No parameter assignment	
19	Wrong parameters in module	
20	Wrong/missing user module	
21	Communication problem	
22	Operating mode RUN/STOP	

Text no.	Message text	Remark
23	Time monitoring addressed	
24	Failure mod. int. supply volt.	
25	Battery depleted	
26	Total backup battery failure	
27	Processor failure	
28	EPROM error	
29	RAM error	
30	ADC/DAC error	
31	Fuse blown	
32	Process interrupt lost	
33	Withdrawn	
34	Plugged	
35	Wrong module type plugged	
36	Faulty module plugged	
37	Module plugged (parameter assignment error)	
38	Chatter error	
39	Changeover contact diagnostics	
40		
41		
42	Error	

9.11.13 Text Library for MOD_MS

The following table lists the text-library message texts and their numbers for the block MOD_MS (FB 96):

Text No.	Message Text	Remark
1	Parameter assignment error	
2	Common mode error	
3	Short-circuit to P	
4	Short circuit to M	
5	Wire break	
6	Reference channel error	
7	Measuring range violation low	
8	Measuring range violation high	
9	Load voltage missing	
10	Chassis ground error	
11	Sensor supply missing	
12	Excess temperature	
13	Module OK	
14	Internal error	

Text No.	Message Text	Remark
15	External error	
16	External auxiliary voltage missing	
17	Front connector missing	
18	No configuration	
19	Wrong module parameters	
20	Wrong/missing user module	
21	Communication error	
22	Operating mode RUN/STOP	RUN: going STOP: coming
23	Timeout	
24	Failure mod. int. supply volt.	
25	Battery depleted	
26	Total backup failure	
27	CPU failure	
28	EPROM error	
29	RAM error	
30	ADC/DAC error	
31	Fuse tripped	
32	Process interrupt lost	
33	Removed	
34	Plugged	
35	Wrong module type plugged	
36	Faulty module inserted	
37	Module inserted (parameter error)	
38	Chatter error	
39	Changeover contact diagnostics	
40	Sensor or load voltage loss	
41	Faulty fuse	
42	Undervoltage	
43	Overvoltage	
44	Actuator warning	
45	Actuator OFF	
46	Safety-related shutdown	
47	Unknown error	
48	Short-circuit	
49	Error	
50		
51		

9.11.14 Text Library for OB_BEGIN

The following table lists the text-library message texts and their numbers for the block OB_BEGIN (FB 100):

Text No.	Message Text	Remark
1	Nested stack error	Error code B#16#71:
2	Master control relay stack error	Error code B#16#72:
3	Max. nesting depth for synchronous errors exceeded	Error code B#16#73
4	U-stack nesting depth exceeded	Error code B#16#74
5	B-stack nesting depth exceeded	Error code B#16#75
6	Local data allocation error	Error code B#16#76
7	Unknown opcode	Error code B#16#78
8	Code length error	Error code B#16#7A

9.11.15 Text library for OB_BEGIN_PN (FB130) / OB_BEGIN_HPN (FB205)

The following table lists the message texts and their text numbers from the text library for the block OB_BEGIN_PN (FB130) / OB_BEGIN_HPN (FB205):

Text No.	Message Text	Remark
1	Nested stack error	Error code B#16#71:
2	Master control relay stack error	Error code B#16#72:
3	Max. nesting depth for synchronous errors exceeded	Error code B#16#73
4	U-stack nesting depth exceeded	Error code B#16#74
5	B-stack nesting depth exceeded	Error code B#16#75
6	Local data allocation error	Error code B#16#76
7	Unknown opcode	Error code B#16#78
8	Code length error	Error code B#16#7A

9.11.16 Text library for MOD_ENME_S7P

The following table lists the text library message texts and their numbers for the blocks MOD_ENME_S7P:

Text no.	Message text	Remark
1	Parameter assignment error	
2	Common mode error	
3	P short circuit	
4	M short circuit	
5	Wire break	
6	Reference channel error	
7	Measuring range/low limit violated	

Text no.	Message text	Remark
8	Measuring range/high limit violated	
9	Load voltage missing	
10	Mass error	
11	Sensor supply missing	
12	Excess temperature	
13	Module OK	
14	Internal error	
15	External error	
16	External auxiliary voltage missing	
17	Front connector missing	
18	Missing parameters	
19	Wrong parameter in module	
20	Simulating running	
21	Communication error	
22	Operating mode RUN/STOP	RUN: going STOP: coming
23	Time monitoring addressed	
24	Module failure int. supply voltage	
25	Battery empty	
26	Total backup battery failure	
27	Process failure	
28	EPROM error	
29	RAM error	
30	ADC/DAC error	
31	Fuse blown	
32	Process interrupt lost	
33	Withdrawn	
34	Plugged	
35	Wrong module type plugged	
36	Faulty module plugged	
37	Module plugged (param. error)	
38	Chatter error	
39	Changeover contact diagnostics	
40	Front connector missing or sensor/load voltage missing	
41	Fuse defective	
42	AI hardware error	
43	AI wire break	
44	AI below measuring range	
45	AI above measuring range	
46	AO wire break	
47	AO short circuit	
48	Limit warning	
49	General error	

Text no.	Message text	Remark
50	Signal A faulty	
51	Signal B faulty	
52	Signal N faulty	
53	Incorrect value transferred between channels	
54	Sensor supply 5.2 V/8.2 V faulty	
55	24 V sensor supply faulty	
56	Signal line error Namur sensor	
57	Readback error	
58	Power supply 1: Error	
59	Power supply 2: Error	
60	Actuator switch off	
61	Under voltage	
62	Over voltage	
63	Overload	
64	Standby	
65	Hardware interrupt	
66	Actuator alarm	
67	Safety event	
68	Ambiguous error	
69	Error 1 in actuator/sensor	
70	Error 2 in actuator/sensor	
71	Channel/module temporarily unavailable	
72	Calibrating channel	
73	Discrepancy error	
74	Over current at output driver	
75	Faulty P output driver	
76	Internal P short circuit	
77	External P short circuit/cross fault	
78	Internal fault in the read circuit/test circuit	
79	Output short circuit to M or faulty output driver	
80	Switching frequency exceeded	
81	PROFIsafe communication error	
82	Error	
83	Unknown error	
84	Short circuit	
85	Wire break	
86	Warning	
87	Shutdown	
88	Unclear error	
89	Faulty	
90	Faulty	
91	No supply voltage	

Text no.	Message text	Remark
92	Power switch-off	
93	Under voltage or overload of the power supply	
94	Over voltage of the bus circuit board	
95	Overcurrent	
96	Supply voltage faulty	
97	Input voltage illegal	
98	Common mode error	

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