



DSC FIELDBUS MODULES



Installation and use

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INTRODUCTION

This technical sheet describes the operation of the fieldbus modules of the DSC series: MBP (PROFIBUS DP-V1), MBD (DeviceNet), MBC (CANOpen), MBEC (ETHERCAT), MBEI (ETHERNET/IP), MBEP (PROFINET), MBEM (Modbus TCP), MBMR (Modbus RTU), MBCCL (CC-Link), MBU (USB).

ELECTRICAL CONNECTIONS

Each module is provided with four connectors (Figure 1):

- 1) 5 way connector MSC --> to the system DSC
- 2) USB miniB connect --> to the PC
- 3) BUS connector --> to the fieldbus (not present on MBU)
- 4) Front terminal --> power supply

TERMINAL BLOCK (SIDE A - TOP)		TERMINAL BLOCK (SIDE B - BOTTOM)	
TERMINAL	SIGNAL	TERMINAL	SIGNAL
1	+24VDC \pm 20%	5	-
2	-	6	Serial line RS-485 -(A)
3	-	7	GND
4	GND	8	Serial line RS-485 +(B)

Table 1

- Install safety units in an enclosure with a protection class of at least IP54.
- The supply voltage to the units must be 24Vdc \pm 20% (PELV, in compliance with the standard EN 60204-1).
- Do not use DSC to supply external devices.
- The same ground connection (0VDC) must be used for all system components.

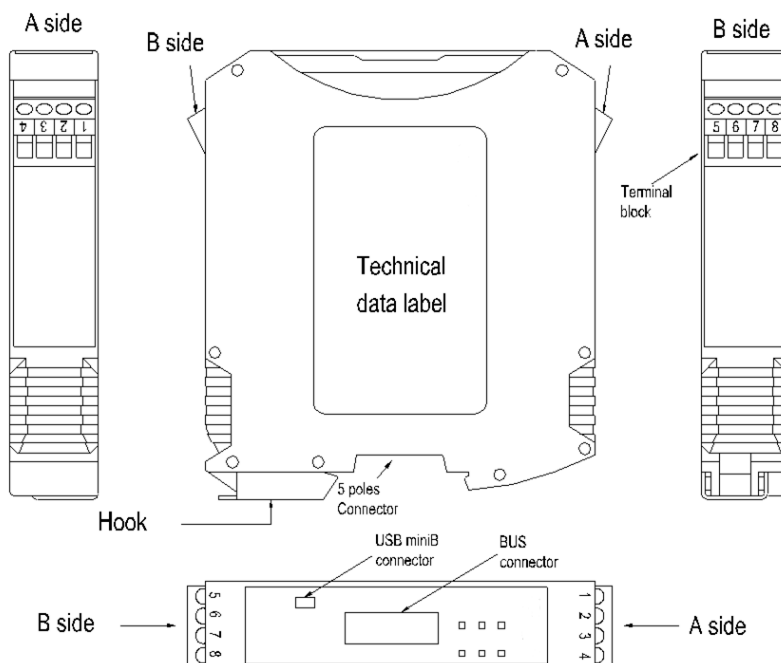


Figure 1
Figure 1

SIGNALS AND PINOUT

MEANING	LED					
	ON	RUN	IN FAIL	EXT FAIL	LED1	LED2
Startup - Initial test	GREEN	GREEN	RED	RED	RED/GREEN	RED/GREEN
Waiting for configuration from Master	ON	OFF	OFF	OFF	ON	ON
Received configuration from Master	ON	ON	OFF	OFF	see the modules tables	

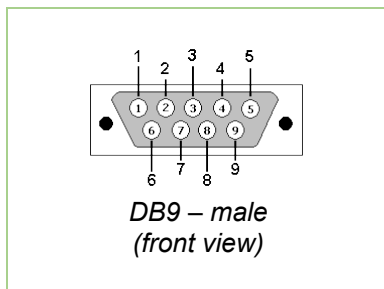
Table 2 - Initial/ dynamic view.

Module MBC



The image does not show the specific model

Pin	Signal
1	-
2	CAN_L
3	CAN_GND
4	-
5	CAN_SHIELD
6	-
7	CAN_H
8	-
9	-
Housing	CAN_SHIELD



LED OPR		
STATUS	INDICATION	DESCRIPTION
GREEN	OPERATIONAL	OPERATIONAL status
GREEN blinking slow	PRE-OPERATIONAL	PRE-OPERATIONAL status
GREEN 1 flash	STOPPED	STOPPED status
GREEN blinking fast	Autobaud	Baud rate detection
RED	EXCEPTION	EXCEPTION status

LED ERR		
STATUS	INDICATION	DESCRIPTION
OFF	-	Normal operation
RED 1 flash	Warning level	A bus error counter has reached the warning level
RED blinking fast	LSS	LSS service operative
RED 2 flashes	Event Control	Detected Node Guarding (NMT master or slave) or Heartbeat (Consumer)
RED	Lack of BUS	BUS not working

Module MBD



The image does not show the specific model

Pin	Signal	Description
1	V-	Negative BUS power supply
2	CAN_L	CAN low bus line
3	SHIELD	Cable shield
4	CAN_H	CAN high bus line
5	V+	Positive BUS power supply

LED NET		
STATUS	INDICATION	DESCRIPTION
GREEN	On-line connected	1 or more connections established
GREEN blinking (1Hz)	On-line non connected	No connection established
RED	Critical connection error	MBD unable to communicate
RED blinking (1Hz)	Time-out of 1 or more connection	One or more I/O device in time-out
GREEN/RED alternate	TEST	MBD in Test

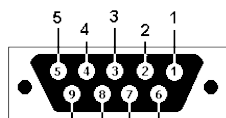
LED STS		
STATUS	INDICATION	DESCRIPTION
GREEN	-	Normal operation
GREEN blinking (1Hz)	Pending	Configuration incomplete, MBD waiting for activation
RED	Fatal error	One or more unrecoverable errors detected
RED blinking (1Hz)	Error	One or more recoverable errors detected
GREEN/RED alternate	TEST	MBD in Test

Module MBP



The image does not show the specific model

Pin	Signal	Description
1	-	-
2	-	-
3	B-line	Positive RxD/TxD, RS485 level
4	RTS	Request to send
5	GND Bus	0VDC (isolated)
6	5V	+5VDC (isolated/short circuit protected)
7	-	-
8	A-line	Negative RxD/TxD, RS485 level
9	-	-
Housing	Cable shield	Internally connected to the Anybus protective earth via cable shield filters according to the PROFIBUS standard.



DB9 – female
(front view)

LED MODE		
STATUS	INDICATION	DESCRIPTION
GREEN	On-line	data exchange
GREEN blinking	On-line	CLEAR
RED blinking (1 flash)	Parameterization error	rif. IEC 61158-6
RED blinking (2 flashes)	PROFIBUS configuration error	configuration data MASTER or MBP wrong
LED STS		
STATUS	INDICATION	DESCRIPTION
OFF	MBP not initialized	Status SETUP o NW_INIT
GREEN	Initialized	End of initialization NW_INIT
GREEN blinking	Initialized with diagnostic active	EXTENDED DIAGNOSTIC bit set
RED	Exception error	EXCEPTION status

Module MBEC



The image does not show the specific model

LED STS		
STATUS	INDICATES	DESCRIPTION
OFF	INIT	INIT or no power
Green	OPERATIONAL	OPERATIONAL state
Green blinking	PRE-OPERATIONAL	PRE-OPERATIONAL state
Green blinking (1 flash)	SAFE-OPERATIONAL	SAFE-OPERATIONAL state
Red	(Fatal Event)	System locked
LED ERR		
STATUS	INDICATES	DESCRIPTION
OFF	No error	No error or no power
RED blinking (1 flash)	Configuration not valid	Status change requested by master not possible
RED blinking (2 flashes)	Watchdog timeout	Synch manager watchdog timeout
Red	Controller fault	Anybus module in EXCEPTION state

Module MBEI



The image does not show the specific model

LED NET	
STATE	INDICATES/DESCRIPTION
OFF	No power or no IP address
GREEN	On-line, connected
GREEN blinking	On-line, not connected
RED	Duplicate IP address
RED blinking	Connection timeout

LED STS		
STATE	INDICATES	DESCRIPTION
OFF	No power	-
GREEN	RUN state	-
GREEN blinking	Not configured	-
RED	Fatal error	One or more non-recoverable errors detected
RED blinking	Error	One or more recoverable errors detected

Module MBEP



The image does not show the specific model

LED NET		
STATE	INDICATES	DESCRIPTION
OFF	Offline	<ul style="list-style-type: none"> No power Connection with IO controller not present
GREEN	Online (RUN)	<ul style="list-style-type: none"> Established connection with IO controller IO controller in RUN state
GREEN blinking (1 flash)	Online (STOP)	<ul style="list-style-type: none"> Established connection with IO Controller IO Controller in STOP state or IO data bad IRT synchronization not finished
GREEN blinking	Blink	Used to identify the network node
RED	Fatal event	Major internal error (combined with a red module STS led)
RED blinking (1 flash)	Station Name error	Station Name not set
RED blinking (2 flashes)	IP address error	IP address not set
RED blinking (3 flash)	Configuration error	Expected identification differs from real identification

LED STS		
STATE	INDICATES	DESCRIPTION
OFF	Not initialized	No power or Module in SETUP or NW_INIT state
GREEN	Normal operation	Module has shifted from the NW_INIT state
GREEN blinking (1 flash)	Diagnostic event (s)	Diagnostic event (s) present
RED	Exception error	Device in state EXCEPTION
	Fatal event	Major internal error (combined with a red NET led module)
Alternating RED/GREEN	Firmware update	Do NOT power off the module. It could cause a permanent damage.

Module MBEM



The image does not show the specific model

LED NET		
STATE	INDICATES/DESCRIPTION	
OFF	No power or no IP address	
GREEN	Module is in Process Active or Idle state	
GREEN blinking	Waiting for connections	
RED	Duplicate IP address, or FATAL event	
RED blinking	Process Active Timeout	
LED STS		
STATE	INDICATES	DESCRIPTION
OFF	No power	-
GREEN	RUN	Normal operation
RED	Fatal error	<ul style="list-style-type: none"> Major fault; module in state EXCEPTION (or fatal event)
RED blinking	Error	<ul style="list-style-type: none"> Minor fault in diagnostic object IP conflict

Module MBCCL



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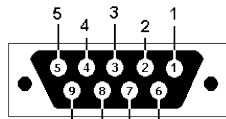
Pin	Signal	Description
1	DA	Positive RS485 RxD/TxD
2	DB	Negative RS485 RxD/TxD
3	DG	Signal Ground
4	SLD	Cable shield
5	FG	Protective Earth

LED NET		
STATUS	DESCRIPTION	
OFF	No network participation, timeout status (no power)	
GREEN	Participating, normal operation	
RED	Major fault (FATAL error)	
LED ERR		
STATUS	INDICATION	DESCRIPTION
OFF	No error (no power)	Normal operation
RED	Major fault	Exception or FATAL event
RED flickering	(Temporary flickering) CRC	CRC Error
RED flashing	(Continuous flashing) PARAMETERS	Station Number or Baud Rate has changed since startup

Module MBMR



The image does not show the specific model



DB9 – female
(front view)

Pin	Direction	Signal	Description
Housing	-	PE	Protective Earth
1	-	GND	Bus polarization 0VDC (isolated)
2	OUT	5V	Bus polarization +5VDC (isolated)
3	IN	PMC	Connect to pin 2 for RS-232 / Leave unconnected for RS-485
4	-	-	-
5	Bidirectional	B-line	RS-485 B-line
6	-	-	-
7	IN	Rx	RS-232 Data Receive
8	OUT	Tx	RS-232 Data Transmit
9	Bidirectional	A-line	RS-485 A-line

LED NET		
STATE	INDICATES	DESCRIPTION
OFF	No power or no data exchange	-
YELLOW	Frame Reception or Transmission	Data exchange
RED	Fatal Error	One or more non-recoverable errors detected
LED STS		
STATE	INDICATES	DESCRIPTION
OFF	Initializing or no power	-
GREEN	Module initialized	Module initialized – no error
RED	Fatal Error	One or more non-recoverable errors detected
RED blinking (1 flash)	Communication fault or configuration error	<ul style="list-style-type: none"> Invalid setting in Network Configuration Object Setting in Network Configuration Object has been changed during operation
RED blinking (2 flashes)	Application diagnostic available	-

Module MBU



The image does not show the specific model

LED CONNECT		
STATE	INDICATES	DESCRIPTION
Green	USB connected	Module connected to Pc via USB
OFF	USB not connected	Module not connected

FAULT DIAGNOSIS						
MEANING	LED					
	ON GREEN	RUN GREEN	IN FAIL RED	EXT FAIL RED	LED1 RED/GREEN	LED2 RED/GREEN
Internal fault microcontroller	ON	OFF	2 flashes*	OFF	see the modules tables	
Internal board fault	ON	OFF	3 flashes*	OFF		
Configuration Error	ON	OFF	5 flashes*	OFF		
BUS communication Error	ON	OFF	5 flashes*	OFF		
BUS communication interruption	ON	OFF	ON	OFF		
Detected an identical module	ON	OFF	5 flashes*	5 flashes		

Table 3

* The LED frequency of flashing is: ON for 300ms and OFF for 400ms, with an interval between two sequences of 1s.

DESCRIPTION

The MBx communication module gives access to various information related to the DSC system and allows to send commands from the PLC.

Each device connected to the DSC inputs is characterized by an ON/OFF status and a possible diagnostic. The processing of the inputs according to the program loaded on the DSC generates the ON/OFF status of the safety outputs which can also have diagnostics.

PROCESS IMAGE

System status and I/O status are available on the cyclic process image, while I/O diagnostics, system errors and the M1/M1S program CRC are accessible as acyclic data.

The process image has a fixed size with subsections for each information group: there are sections showing the status of the DSC inputs, the status of the safety outputs, the status of the probes and, if the dedicated module is present, the value of the analogue measures.

The Fieldbus inputs allows the PLC to cyclically send up to 32 ON/OFF status and are used as unsafe inputs in the DSC program.

The System status bits are described as follows:

1. Bit 0: present DSC presence
2. Bit 1: present diagnostic presence
3. Bit 2: error presence

The acyclic sections for diagnostics or errors report significant data if the relative bit is present in the status byte.

The section dedicated to the **input status** has a size of 16 bytes and allows to know the status of up to 128 inputs. The priority order of the modules is as follows:

- M1/M1S, MI8O2, MI16, MI8, MI12, MV2, MV1, MV0, MI8O4.

The section dedicated to the **safety outputs status** has a size of 4 bytes and allows to know the status of up to 32 outputs. The priority order of the modules is as follows:

- M1/M1S, MI8O2, MO2, MO4, MOR4, MOR4S8, MO4LHCS8, MI8O4.

If two or more modules of the same type are installed the one with the lowest node number is shown first.

Each module with inputs has a number of bits corresponding to the number of physical inputs; thus modules M1/M1S, MI8, MI8O2, MI8O4 will use 1 byte and modules MI12T8 and MI16 2 bytes. Modules MV0, MV1 and MV2 uses 1 byte each.

The status of the probe is represented with 4 bytes.

In fieldbus where the allocation is important (e.g. PROFIBUS, PROFINET), the Fieldbus input bytes must be mapped before the bytes in output.

If there is a fieldbus module in the DSC system, DSDESIGNER will include in the report a table with the I/O index for all inputs, fieldbus inputs, probes and safety outputs in the circuit diagram.

For the process data mapping description for your fieldbus please refer to the Addendum1: [“Process data mapping for MBx Fieldbus expansion modules”](#) annex at the bottom of the present manual.

DIAGNOSTICS

Each input and each safety output can generate a diagnostic code. When the I/O is connected correctly, the diagnostic code is OK and is not exported to the fieldbus; when a problem on the I/O is detected, the system exports 2 bytes to the fieldbus with:

- the index of the I/O in question
- the relative diagnostic code

The "I/O index" field

This field indicates the number used to identify the I/O with a diagnostic code other than OK. The I/O index range depends from the system version used. Refer to the following tables to know these data.

SYSTEM VERSION IN USE (version for M1 fw < 5.0.0)	
TYPE OF SIGNAL	I/O INDEX
Input	1-128
Output	192-255

Table 4

SYSTEM VERSION IN USE (version for M1S fw ≥ 5.0.0)	
TYPE OF SIGNAL	I/O INDEX
Input	1-128
Output	1-32

Table 5

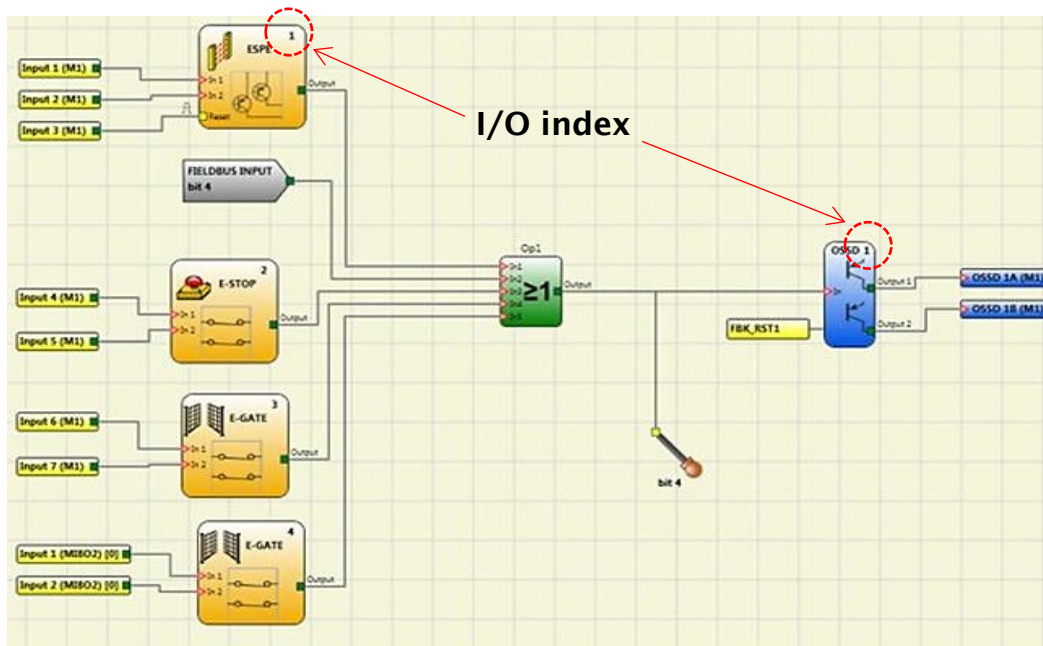


Figure 2 - Index of I/O

The "Diagnostic code" field

The "*Diagnostic code*" field indicates the diagnostics for the I/O. Possible values for this field are shown in the following tables.

Input diagnostics		
CODE	NAME	MEANING
128	Input diagnostics OK	
1	Not passed from zero	Both contacts have not returned to their rest position
2	Simultaneous control failed	The two contacts of a generic two-channel input do not close simultaneously
3	Two hands Simultaneity failed hand 1	Incorrect connection of one side of a two-hand command
4	Two hands Simultaneity failed hand 2	Incorrect connection of one side of a two-hand command
7	Incoherent selector	The selector cannot have more than one active input
8	Disconnected selector	The selector cannot have any active input
10	OUT_TEST error	Presence of diagnostics on an OUT_TEST connected to the input
11	Second input KO	Redundancy check failed on entry
13	Output connected to other inputs	The test output is not connected to the configured input
14	Output OK but input connected to 24DC	Input blocked
15	Short circuit between photocell test and photocell input	The response time of the photocell is too low
16	Photocell does not respond	Test signal on the emitter is not present on the photocell receiver
17	Short circuit between photocells	Test signal is present on two different photocells
18	Safety carpet not connected	One of the two carpet connections is not correct
19	Output not congruent to feedback	Test signal applied to the input is present on more than one OUT_TEST
20	Wrong connection	Test signal is present on more than one input
21	Stucked output	Test signal applied to the input is not present on the OUT_TEST
22	Second OUT_TEST KO	Redundancy check failed on OUT_TEST
23	MVx Proxy resource missing	
24	MVx Encoder resource missing	
25	MVx Resource proxy encoder missing	
26	MVx Resource proxy1 proxy2 missing	
27	MVx Resource encoder1 encoder2 missing	
28	MVx Frequency congruence error	
29	MVx Encoder supply missing	
30	MVx Encoder fault	
40	MA4 Reading out of lower threshold	
41	MA4 Disconnected sensor	
42	MA4 Reading out of upper threshold	
43	MA4 Overload	
44	MA4 Mismatch between channels	
133	Simultaneity two failed hands	The two contacts of a two-handed control do not close at the same time
134	Never started	Input with failed test at startup
137	Waiting for restart	Reset to an input with manual reset has not been activated
133 (0x85) ¹	TWO-HAND concurrent failed	Two-hands switch has to change state simultaneously
134 (0x86) ²	Not started	Start test failed
137 (0x89) ³	Waiting for restart	The input has manual reset and has not been restarted

Table 6

1 The diagnostic 133 does not provide visual error message on the LED DSC
 2 The diagnostic 134 does not provide visual error message on the LED DSC
 3 The diagnostic 137 does not provide visual error message on the LED DSC

Output diagnostics		
CODE	NAME	MEANING
0	Output diagnostics OK	
1	Enable missing	
2	Waiting for OSSD to restart	
3	Feedback K1 K2 missing	
4	Waiting for other micro	Redundancy check failed on the OSSD
5	OSSD power supply missing	
6	Exceeded maximum time restart	
7	Feedback K1 K2 external not congruous	
8	Waiting feedback K1 K2	
9	OSSD output overload	
10	OSSD with load set to 24V	

Table 7

EXAMPLES OF DIAGNOSTICS

Example 1

In the example shown in Figure 3, Input 1 (connected to module M1/M1S) is tested with the M1-T1 test signal. During wiring, the 24Vdc is connected to input 1 instead of the M1-T1 test signal.

- The I/O index and Diagnostic code fields assume the following values: **1 - 20** to indicate the diagnostics on input 1 of module M1/M1S (*Connection error*).

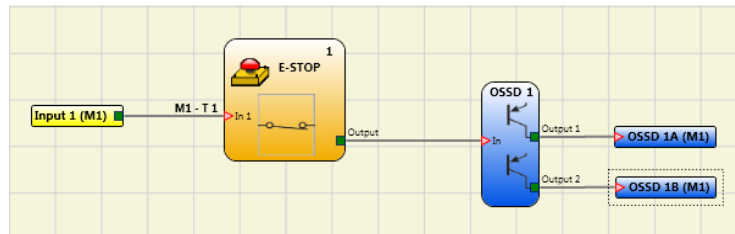


Figure 3

Example 2

In this example, the I/O index corresponds to the logical block and not to the physical terminal on module M1/M1S.

In Figure 4 for example, the two-hand element connected to the Input 1 and Input 2 physical terminals corresponds to I/O index No. 1 and the emergency stop connected to the Input 3 and Input 4 terminals corresponds to I/O index No. 2.

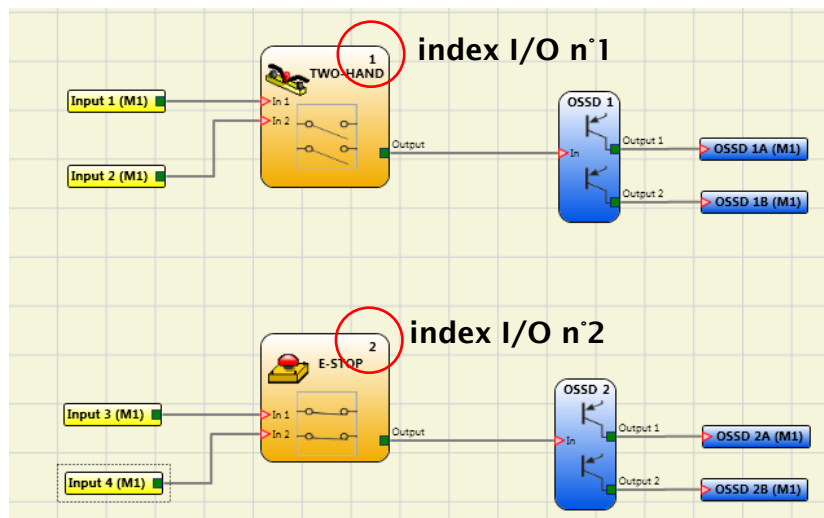


Figure 4

Example 3

The example in Figure 5 is similar to example 1, except in this case Input1 is connected to module MI16 and is tested with the MI16-T1 test signal.

During wiring, the 24Vdc is connected to input 1 instead of the MI16-T1 test signal.

Input 1 has diagnostic code 10 (OUT_TEST error) and OUT_TEST MI16-T1 has diagnostic code 8 (Connection error).

- The I/O index and Diagnostic code fields assume the following values: **1 - 20** to indicate the diagnostics on input 1 of module MI16.

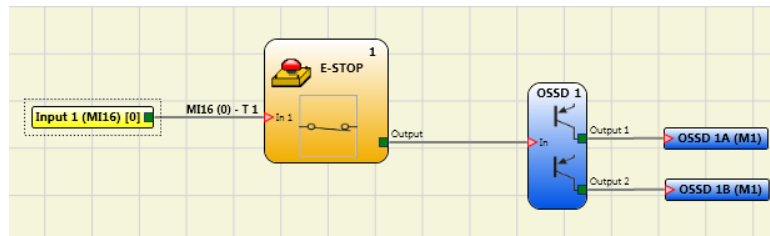


Figure 5

In the example shown in Figure 5 the manual reset function is enabled on OSSD 1. The pushbutton connected to input 1 is pressed without sending a reset command.

Example 4

- The I/O index and Diagnostics code fields assume the following values: **1 - 2**
- to indicate the diagnostics on OSSD 1A/1B (*Table 4: 1 = first output*).
- to indicate the diagnostic code (*Table 7: 2 = Waiting for OSSD to restart*).

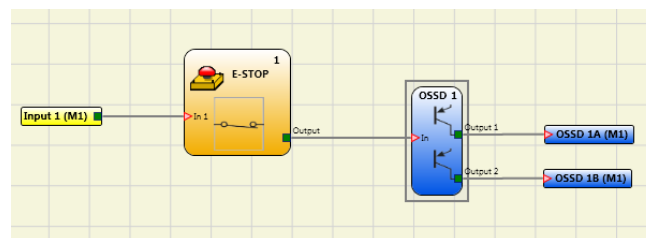


Figure 6

BUS CONFIGURATOR USER INTERFACE

The bus module is configured using the USB miniB interface on the front panel and the “Bus Configurator – User interface” software installed on the DSEDESIGNER CD ROM disk.

This software can be used for configuration/communication of the DSC system with a PC (using an MBU module) or to monitor the data transmitted on the fieldbus (via connection to the USB port of a bus module).

The diagram below is helpful for understanding possible connections:

EXAMPLES OF CONNECTION

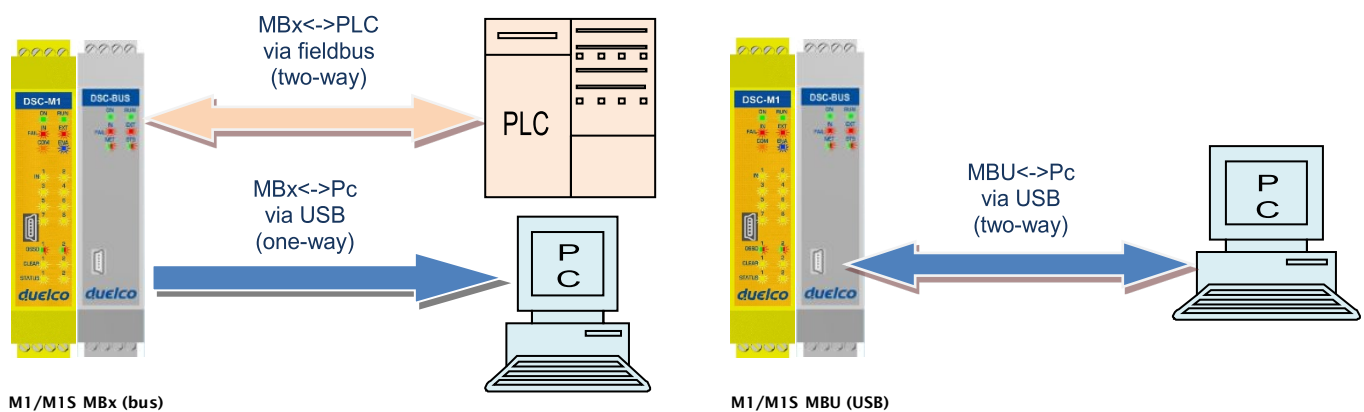


Figure 7

It is important to note that the Bus Configurator behaves differently, depending on whether communication is with an MBx module or an MBU module:

- MBx MODULE: THE SOFTWARE ONLY ALLOWS DATA TRANSMITTED VIA BUS TO BE DISPLAYED.
- MBU MODULE: THE SOFTWARE ALLOWS TWO-WAY DATA TRANSMISSION MBU↔PC (in this case the programmer can set the Fieldbus input directly via computer).

The configuration data depend on the type of the fieldbus module that is connected: the address field range and the baudrate data will adapt to the fieldbus type.

Selecting the checkbox Analog data will enable the data to be present on the Process image, changing its size.

Graphical User Interface

➔ Module configuration must be performed with the system switched off (outputs OFF).

Operator can query module configuration at any time while the module is in use. To configure the MBx module, proceed as follows:

1. connect the module to the 24VDC±20% power supply via the terminal block;
2. connect the USB cable to the PC and to the MBx module;
3. double click on the "**BUS CONFIGURATOR - USER INTERFACE**" desktop icon.

The configuration window is displayed:

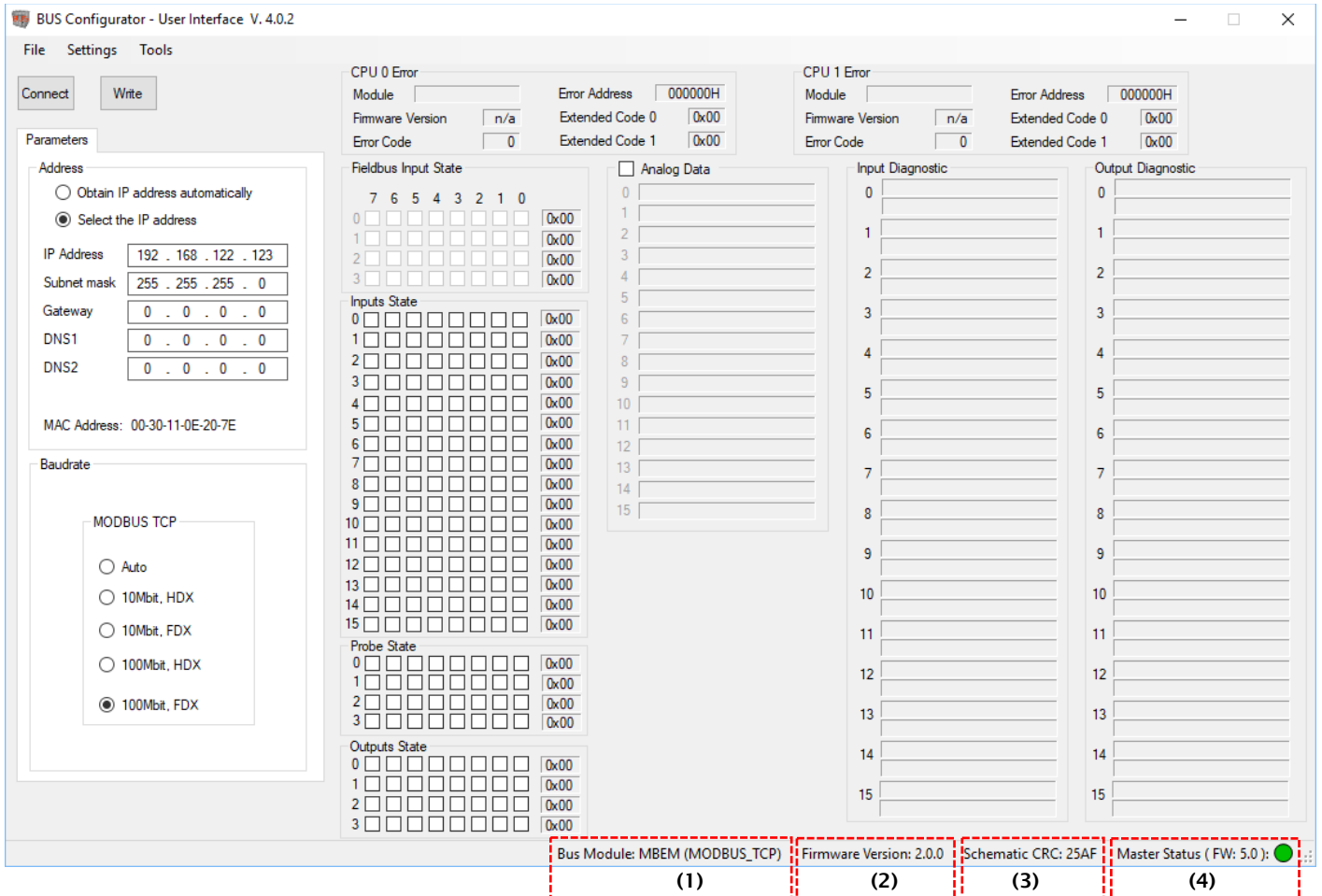


Figure 8

4. Press the “CONNECT” button.

The program recognizes that a MBx bus module is connected (Figure 8); the status bar shows the the MBx fieldbus model (1), the MBx firmware version (2), the schematic CRC (3) and the Master status and firmware version (4):

- ● gray: the MBx is not connected
- ● orange: the MBx is getting/sending the configuration from the Bus configurator
- ● green: the Master is active (RUN)
- ● red: the Master is not active (e.g. communication with Designer)

Once the module is connected it is recognized and the operator can configure the parameters by selecting the different areas shown in Figure 8; press the **WRITE** button to send the configuration data to the module.

As soon as the bus module receives the data, the configurator enters the monitor condition.

The input, output, analog data status and relative diagnostics are illustrated in Figure 8.

Only the first 16 input diagnostics and output diagnostics are shown, if there are more than 16 diagnostics the exceeding one are displayed after the previous one are solved.

The Fieldbus input logical status can be changed by the user only with the MBU module, they are in read only mode for all the other fieldbuses and they'll display the status written by the external PLC.

BACKWARD COMPATIBILITY (VERSION FOR M1 fw < 5.0.0)

Process Image in backward compatibility (version for M1 fw < 5.0.0)

The backward compatibility mode allows the Bus module to use the "old" process image mapping, i.e.: it will adapt to the hardware installed on the system. This allows to replace an existing Bus module without changing the PLC program.

➔ The backward compatibility mode works only if the Bus module is connected to an M1 master module. If a Bus device is set-up in backward compatibility mode and is connected to an M1S the Bus module will go in fault.

System status, I/O status and I/O diagnostics are available on the cyclic process image.

The process image has a variable size depending on which modules are installed in the DSC system.

In the process image there are subsections for each information group: there are sections showing the status of the DSC inputs, the status of the safety outputs, the status of the probes.

The Fieldbus inputs allows the PLC to cyclically send up to 8 ON/OFF status and are used as unsafe inputs in the DSC program.

The System status bits are described as follows:

1. Bit 0: present DSC presence
2. Bit 1: present diagnostic presence

The section for diagnostics reports significant data if the relative bit is present in the status byte.

The section dedicated to the **input status** has a size of 16 bytes and allows to know the status of up to 128 inputs. The priority order of the modules is as follows:

- M1, MI8O2, MI16, MI8, MI12, MV2, MV1, MV0.

The section dedicated to the **safety outputs status** has a size of 1 or 2 bytes and allows to know the status of up to 16 outputs. The priority order of the modules is as follows:

- M1, MI8O2, MO2, MO4, MOR4, MOR4S8, MO4LHCS8.

If two or more modules of the same type are installed the one with the lowest node number is shown first.

Each module with inputs has a number of bits corresponding to the number of physical inputs; thus modules M1, MI8, MI8O2, MI8O4 will use 1 byte and modules MI12T8 and MI16 2 bytes. Modules MV0, MV1 and MV2 uses 1 byte each.

The status of the probe is represented with 2 bytes.

In fieldbus where the allocation is important (e.g. PROFIBUS, PROFINET), the Fieldbus input bytes must be mapped before the bytes in output.

If there is a fieldbus module in the DSC system, DSDESIGNER will include in the report a table with the I/O index for all inputs, fieldbus inputs, probes and safety outputs in the circuit diagram.

The input and output memory maps are described in Figure 10.

Diagnostic elements will use 2 bytes which indicate the number of the I/O with the problem and the value of the diagnostic element. If there is more than one diagnostic element, the relative values alternate every 500ms.

Each set of information:

- input status,
- input diagnostics,
- fieldbus input status,
- probe status,
- safety output status,
- safety output diagnostics

can be enabled/disabled in order to control the information and thus the number of bytes exported to the fieldbus.

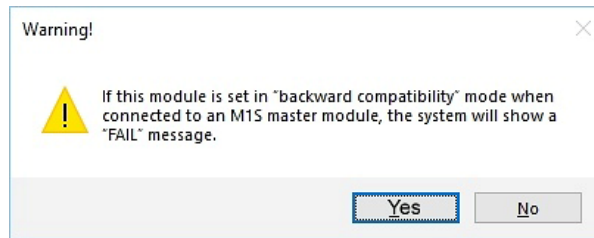
The definition of the process image in the input and output is shown from the point of view of the DSC.

Graphical User Interface, backward compatibility (version for M1 fw < 5.0.0.)

➔ The backward compatibility mode allows the operator to use the DSD software by having an M1 master module with firmware version lower than 5.0.0.

This mode can be enabled from the menu: “**settings -> enable backward compatibility**”

This will bring up a pop-up window with the following message:



The user can choose which subsection must be exported in the fieldbus (refer to Figure 9). Once the configuration data are selected the operator must press the “WRITE” key to send them to the module.

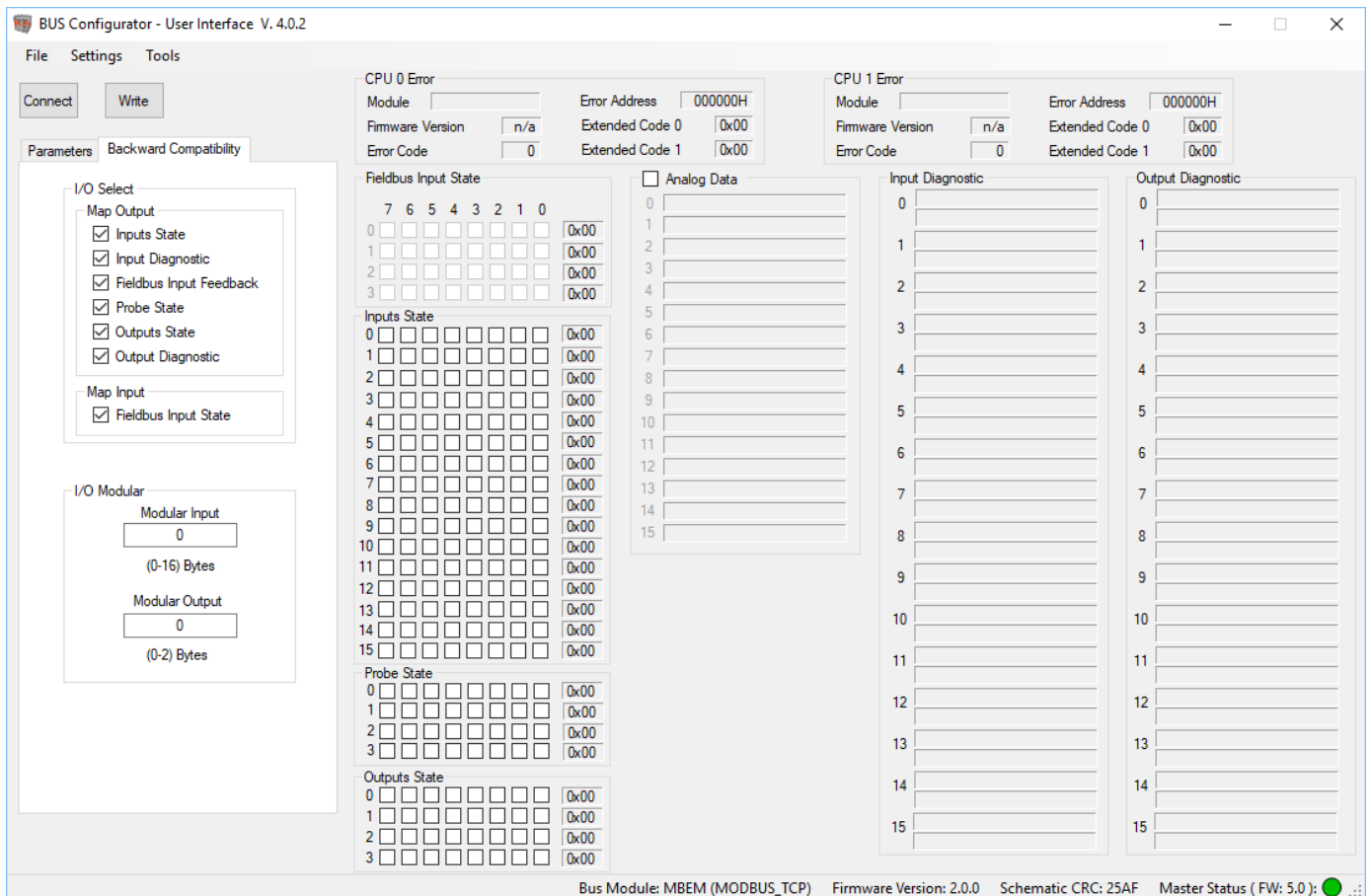


Figure 9 - Backward Compatibility

If more than one I/O has some diagnostic the I/O index and diagnostic code data will cycle every 500ms between all the diagnostics present.

Process image configuration in backward compatibility

The input process image and the output process image can be configured using the Bus Configurator User Interface software.

With this software the user can choose which subsection must be exported in the fieldbus, changing the size of each process image and then the size used in the PLC physical memory. Once the module is connected all the data are showed in the main window of the software.

The screenshot displays the Bus Configurator User Interface software. On the left, a legend shows bit patterns for B7-B0. The main window shows error status for CPU 0 and CPU 1, and various data tables. Numbered callouts (1-6) highlight specific areas:

- 1: CPU 0 Error status
- 2: Analog Data table
- 3: Fieldbus Input State table
- 4: Inputs State table
- 5: Outputs State table
- 6: Input Diagnostic table

At the bottom right, the status bar shows: Bus Module: MODBUS_TCP, Firmware Version: 2.0.0, Schematic CRC: 42EF, Master Status (FW: 5.0): ●

Figure 10 - Data Package Composition in backward compatibility

1

EXAMPLES OF DSD CONFIGURATION AS PRESENTED BY THE BUS CONFIGURATOR

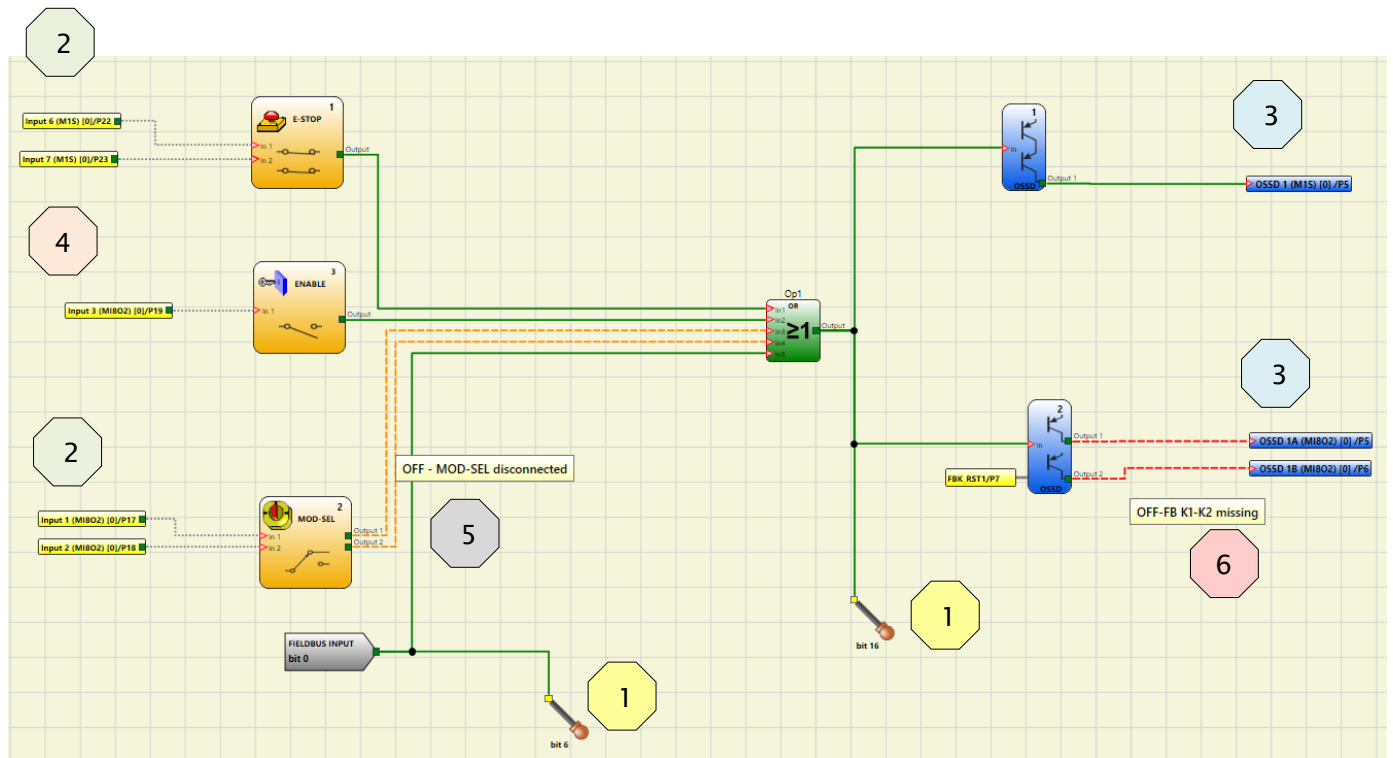


Figure 11 - Example of project on DSD

Connect Write

Parameters

Address

Select Address: n/a

Baudrate

CPU 0 Error

Module: Error Address: 000000H

Firmware Version: n/a Extended Code 0: 0x00

Error Code: 0 Extended Code 1: 0x00

Fieldbus Input State									
	7	6	5	4	3	2	1	0	
0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0x01
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00

Inputs State									
	7	6	5	4	3	2	1	0	
0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x20
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x04
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00

Probe State									
	7	6	5	4	3	2	1	0	
0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x40
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0x01
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00

Outputs State									
	7	6	5	4	3	2	1	0	
0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0x01
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0x00

CPU 1 Error

Module: Error Address: 000000H

Firmware Version: n/a Extended Code 0: 0x00

Error Code: 0 Extended Code 1: 0x00

Input Diagnostic	
Input	Code
0	8
Mod-Sel disconnected	

Output Diagnostic	
Output	Code
0	3
OSSD: 2 - Code: 3	
FB K1-K2 missing	

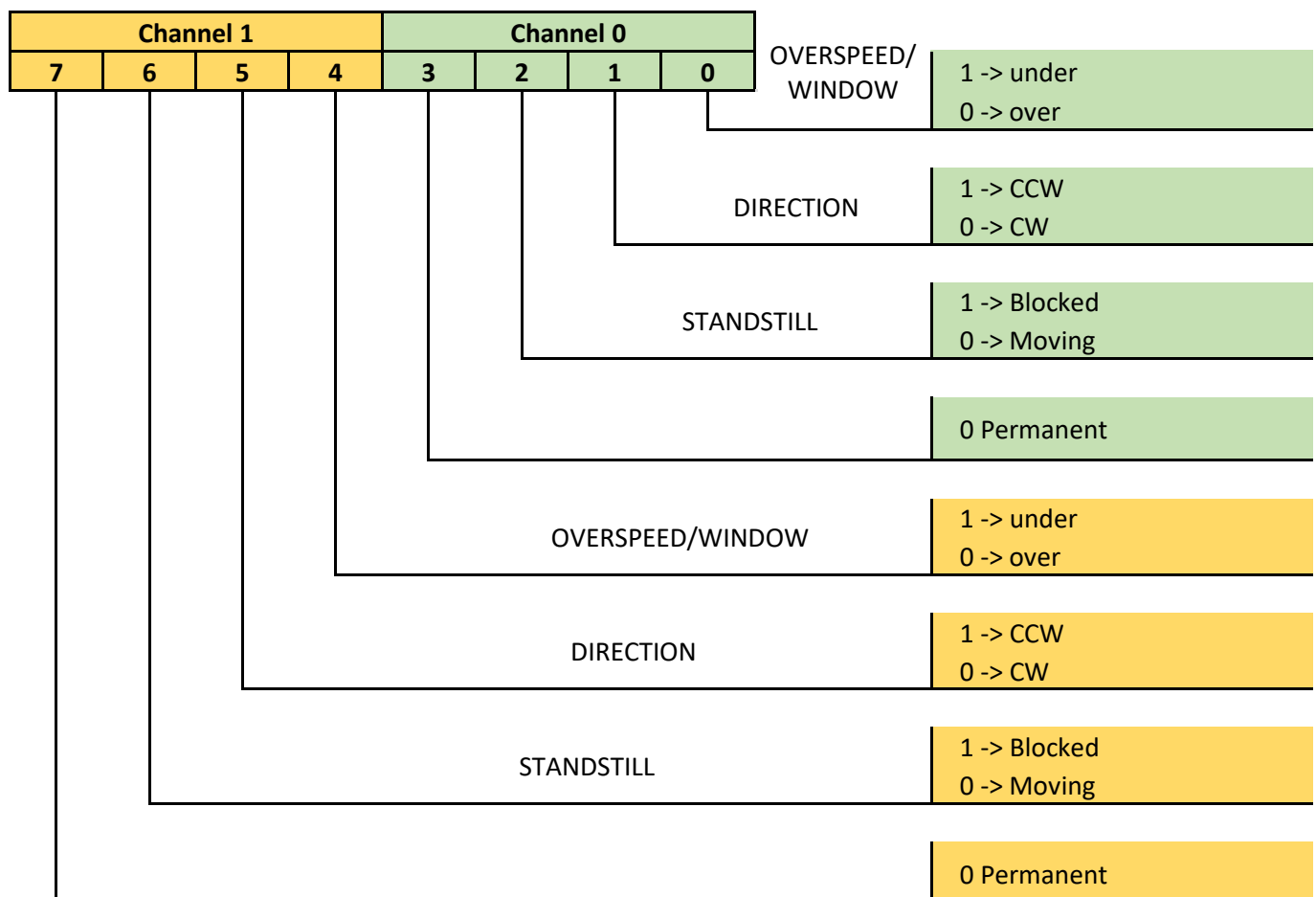
Bus Module: USB-BUS Firmware Version: 2.0.0 Schematic CRC: E962 Master Status (FW: 5.0)

Figure 12

- Input 1 E-STOP is connected to screws 6 and 7 on M1/M1S. Its status (zero or one) is shown on bit 5 of byte 0 reserved for inputs. The bit 6 is always set to zero, it is kept busy to signal that the E STOP occupies two screws on M1/M1S.
- Input 2 ENABLE is connected to screw 8 on M1/M1S. Its status (zero or one) is shown on bit 7 of byte 0 reserved for M1/M1S inputs.
- Input 3 MOD-SEL is connected to screws 1 and 2 on MI802 with a diagnostic signaling that the MOD-SEL is disconnected. Its status is shown on bits 0 and 1 of byte 1 reserved for MI802 inputs. The diagnostic is shown in the section reserved for input diagnostics with the index 2 and the relative diagnostic.
- The probes on bit 6 and bit 8 are green and the relative bits on the Probe section are checked. Probe 8 is shown as bit 0 of the second byte.
- OSSD 1 is ON and connected to the second pair of M1/M1S outputs. Its status is shown on bit 1 of byte 0 reserved for outputs.
- OSSD 2 is OFF with diagnostic indicating wait for restart and is connected to the second pair of MI802 outputs. Its status is shown on bit 2 of byte 0 reserved for outputs. The diagnostic is shown in the section reserved for OSSD diagnostics with the index 3 and the relative diagnostic.
- In the Fieldbus Input section, bit 0 has been selected so the Fieldbus input on bit 0 is green in the DSD project.

MV MODULES INPUT STATUS

In presence of MV modules, the output data (in the "State Inputs" of the Process Image) will follow the diagram:



Duelco A/S

Process data mapping

for MBx Fieldbus expansion modules

V1.1

(Addendum of Technical manual 8540893)

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Version history

Version	Date	Author(s)	Modifications
1.1	12/12/2018	mferrero	Acyclic data: specification for Errors data format
1.0	26/09/2018	mferrero	New mapping for the fieldbus communication modules

General Notes

1. The process data size is fixed, this means that the size and mapping of the process data image of the bus communication devices does not change depending on how many input or output modules are connected to the configurable safety controller.
2. "Reserved"-Bytes are allocated as variables where necessary (e.g., to maintain the inner sub-index structure of the CANopen user defined objects when an object is enlarged beyond 1 byte size)
3. Some data are available only if the communication module is used in a system where the M1 firmware version is greater than a minimum value (i.e., Errors data are only available if M1 firmware version is greater than 5.0, Analog data are available only with M1 greater than 4.0, Project CRC data are available only with M1 greater than 3.0)
4. The Analog data section is optional: it can be turned on or off using the Bus configurator software; if the Analog data checkbox in the software is selected then the bytes are present in the process image, if the box is unchecked the bytes are not present; the process image size will adapt to the actual number of bytes.

EtherCAT (MBEC)

PDO Overview

PDO Designation	Name	Length	Mapping Object
RxPDO 1	RxPDO 1	4 Byte	1600h
TxPDO 1	TxPDO 1	94 Byte	1A00h

Process data mapping (PDO)

RxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1600h	01h	2101h	01h	Fieldbus input byte 0
1600h	02h	2101h	02h	Fieldbus input byte 1
1600h	03h	2101h	03h	Fieldbus input byte 2
1600h	04h	2101h	04h	Fieldbus input byte 3

TxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1A00h	01h	2001h	01h	System status
1A00h	02h	2001h	02h	Reserved
1A00h	03h	2201h	01h	Input status byte 0
1A00h	04h	2201h	02h	Input status byte 1
1A00h	05h	2201h	03h	Input status byte 2
1A00h	06h	2201h	04h	Input status byte 3
1A00h	07h	2201h	05h	Input status byte 4
1A00h	08h	2201h	06h	Input status byte 5
1A00h	09h	2201h	07h	Input status byte 6
1A00h	0Ah	2201h	08h	Input status byte 7
1A00h	0Bh	2201h	09h	Input status byte 8
1A00h	0Ch	2201h	0Ah	Input status byte 9
1A00h	0Dh	2201h	0Bh	Input status byte 10
1A00h	0Eh	2201h	0Ch	Input status byte 11
1A00h	0Fh	2201h	0Dh	Input status byte 12
1A00h	10h	2201h	0Eh	Input status byte 13
1A00h	11h	2201h	0Fh	Input status byte 14
1A00h	12h	2201h	10h	Input status byte 15
1A00h	13h	2181h	01h	Fieldbus input byte 0 feedback
1A00h	14h	2181h	02h	Fieldbus input byte 1 feedback
1A00h	15h	2181h	03h	Fieldbus input byte 2 feedback
1A00h	16h	2181h	04h	Fieldbus input byte 3 feedback
1A00h	17h	2203h	01h	Probe status byte 0
1A00h	18h	2203h	02h	Probe status byte 1
1A00h	19h	2203h	03h	Probe status byte 2
1A00h	1Ah	2203h	04h	Probe status byte 3
1A00h	1Bh	2202h	01h	OSSD status byte 0
1A00h	1Ch	2202h	02h	OSSD status byte 1
1A00h	1Dh	2202h	03h	OSSD status byte 2
1A00h	1Eh	2202h	04h	OSSD status byte 3
1A00h	1Fh	2204h	01h	Analog data float 0
1A00h	20h	2204h	02h	Analog data float 1
1A00h	21h	2204h	03h	Analog data float 2

TxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1A00h	22h	2204h	04h	Analog data float 3
1A00h	23h	2204h	05h	Analog data float 4
1A00h	24h	2204h	06h	Analog data float 5
1A00h	25h	2204h	07h	Analog data float 6
1A00h	26h	2204h	08h	Analog data float 7
1A00h	27h	2204h	09h	Analog data float 8
1A00h	28h	2204h	0Ah	Analog data float 9
1A00h	29h	2204h	0Bh	Analog data float 10
1A00h	2Ah	2204h	0Ch	Analog data float 11
1A00h	2Bh	2204h	0Dh	Analog data float 12
1A00h	2Ch	2204h	0Eh	Analog data float 13
1A00h	2Dh	2204h	0Fh	Analog data float 14
1A00h	2Eh	2204h	10h	Analog data float 15

Vendor specific Objects

Object Index 2001h – System status

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	System status
02h	UNSIGNED8	Reserved

Object Index 2003h – Errors data CPU 0

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Module name
02h	UNSIGNED8	CPU firmware version
03h	UNSIGNED8	Error code
04h	UNSIGNED32	Error address
05h	UNSIGNED8	Extended code 0
06h	UNSIGNED8	Extended code 1

Object Index 2004h – Errors data CPU 1

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Module name
02h	UNSIGNED8	CPU firmware version
03h	UNSIGNED8	Error code
04h	UNSIGNED32	Error address
05h	UNSIGNED8	Extended code 0
06h	UNSIGNED8	Extended code 1

Object Index 2005h – Input diagnostics

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Diagnostic index 0
02h	UNSIGNED8	Diagnostic code 0
03h	UNSIGNED8	Diagnostic index 1
04h	UNSIGNED8	Diagnostic code 1
05h	UNSIGNED8	Diagnostic index 2
06h	UNSIGNED8	Diagnostic code 2
07h	UNSIGNED8	Diagnostic index 3
08h	UNSIGNED8	Diagnostic code 3
09h	UNSIGNED8	Diagnostic index 4
0Ah	UNSIGNED8	Diagnostic code 4
0Bh	UNSIGNED8	Diagnostic index 5
0Ch	UNSIGNED8	Diagnostic code 5
0Dh	UNSIGNED8	Diagnostic index 6
0Eh	UNSIGNED8	Diagnostic code 6
0Fh	UNSIGNED8	Diagnostic index 7
10h	UNSIGNED8	Diagnostic code 7
11h	UNSIGNED8	Diagnostic index 8
12h	UNSIGNED8	Diagnostic code 8
13h	UNSIGNED8	Diagnostic index 9
14h	UNSIGNED8	Diagnostic code 9
15h	UNSIGNED8	Diagnostic index 10
16h	UNSIGNED8	Diagnostic code 10
17h	UNSIGNED8	Diagnostic index 11
18h	UNSIGNED8	Diagnostic code 11
19h	UNSIGNED8	Diagnostic index 12
1Ah	UNSIGNED8	Diagnostic code 12
1Bh	UNSIGNED8	Diagnostic index 13
1Ch	UNSIGNED8	Diagnostic code 13
1Dh	UNSIGNED8	Diagnostic index 14
1Eh	UNSIGNED8	Diagnostic code 14
1Fh	UNSIGNED8	Diagnostic index 15
20h	UNSIGNED8	Diagnostic code 15

A maximum of 16 Input diagnostics are transferred, if more diagnostics are present on the system only the first 16 are available on the fieldbus

Object Index 2006h – OSSD diagnostics

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Diagnostic index 0
02h	UNSIGNED8	Diagnostic code 0
03h	UNSIGNED8	Diagnostic index 1
04h	UNSIGNED8	Diagnostic code 1
05h	UNSIGNED8	Diagnostic index 2
06h	UNSIGNED8	Diagnostic code 2
07h	UNSIGNED8	Diagnostic index 3
08h	UNSIGNED8	Diagnostic code 3
09h	UNSIGNED8	Diagnostic index 4
0Ah	UNSIGNED8	Diagnostic code 4
0Bh	UNSIGNED8	Diagnostic index 5
0Ch	UNSIGNED8	Diagnostic code 5
0Dh	UNSIGNED8	Diagnostic index 6
0Eh	UNSIGNED8	Diagnostic code 6
0Fh	UNSIGNED8	Diagnostic index 7
10h	UNSIGNED8	Diagnostic code 7
11h	UNSIGNED8	Diagnostic index 8
12h	UNSIGNED8	Diagnostic code 8
13h	UNSIGNED8	Diagnostic index 9
14h	UNSIGNED8	Diagnostic code 9
15h	UNSIGNED8	Diagnostic index 10
16h	UNSIGNED8	Diagnostic code 10
17h	UNSIGNED8	Diagnostic index 11
18h	UNSIGNED8	Diagnostic code 11
19h	UNSIGNED8	Diagnostic index 12
1Ah	UNSIGNED8	Diagnostic code 12
1Bh	UNSIGNED8	Diagnostic index 13
1Ch	UNSIGNED8	Diagnostic code 13
1Dh	UNSIGNED8	Diagnostic index 14
1Eh	UNSIGNED8	Diagnostic code 14
1Fh	UNSIGNED8	Diagnostic index 15
20h	UNSIGNED8	Diagnostic code 15

A maximum of 16 OSSD diagnostics are transferred, if more diagnostics are present on the system only the first 16 are available on the fieldbus

Object Index 2007h – Project CRC

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Project CRC High byte
02h	UNSIGNED8	Project CRC Low byte

Object Index 2101h – Fieldbus inputs

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Fieldbus input byte 0
02h	UNSIGNED8	Fieldbus input byte 1
03h	UNSIGNED8	Fieldbus input byte 2
04h	UNSIGNED8	Fieldbus input byte 3

Object Index 2181h – Fieldbus inputs feedback

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Fieldbus input byte 0 feedback
02h	UNSIGNED8	Fieldbus input byte 1 feedback
03h	UNSIGNED8	Fieldbus input byte 2 feedback
04h	UNSIGNED8	Fieldbus input byte 3 feedback

Object Index 2201h – Input status

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Input status byte 0
02h	UNSIGNED8	Input status byte 1
03h	UNSIGNED8	Input status byte 2
04h	UNSIGNED8	Input status byte 3
05h	UNSIGNED8	Input status byte 4
06h	UNSIGNED8	Input status byte 5
07h	UNSIGNED8	Input status byte 6
08h	UNSIGNED8	Input status byte 7
09h	UNSIGNED8	Input status byte 8
0Ah	UNSIGNED8	Input status byte 9
0Bh	UNSIGNED8	Input status byte 10
0Ch	UNSIGNED8	Input status byte 11
0Dh	UNSIGNED8	Input status byte 12
0Eh	UNSIGNED8	Input status byte 13
0Fh	UNSIGNED8	Input status byte 14
10h	UNSIGNED8	Input status byte 15

Object Index 2202h – OSSD status

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	OSSD status byte 0
02h	UNSIGNED8	OSSD status byte 1
03h	UNSIGNED8	OSSD status byte 2
04h	UNSIGNED8	OSSD status byte 3

Object Index 2203h – Probe status

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Probe status byte 0
02h	UNSIGNED8	Probe status byte 1
03h	UNSIGNED8	Probe status byte 2
04h	UNSIGNED8	Probe status byte 3

Object Index 2204h – Analog data

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	REAL32	Analog data float 0
02h	REAL32	Analog data float 1
03h	REAL32	Analog data float 2
04h	REAL32	Analog data float 3
05h	REAL32	Analog data float 4
06h	REAL32	Analog data float 5
07h	REAL32	Analog data float 6
08h	REAL32	Analog data float 7
09h	REAL32	Analog data float 8
0Ah	REAL32	Analog data float 9
0Bh	REAL32	Analog data float 10
0Ch	REAL32	Analog data float 11
0Dh	REAL32	Analog data float 12
0Eh	REAL32	Analog data float 13
0Fh	REAL32	Analog data float 14
10h	REAL32	Analog data float 15

CANopen (MBC)

PDO Overview

PDO	Name	Length	Parameter	Mapping	Remarks
RxPDO 1	Fieldbus inputs	4 Byte	1400h	1600h	Part of the standard communication set
RxPDO 2	Dummy	1 Byte	1401h	1601h	Part of the standard communication set; not used; disabled by default
RxPDO 3	Dummy	1 Byte	1402h	1602h	Part of the standard communication set; not used; disabled by default
RxPDO 4	Dummy	1 Byte	1403h	1603h	Part of the standard communication set; not used; disabled by default
TxPDO 1	Status & diagnostic, feedback	8 Byte	1800h	1A00h	Part of the standard communication set
TxPDO 2	Inputs status 1	8 Byte	1801h	1A01h	Part of the standard communication set
TxPDO 3	Inputs status 2	8 Byte	1802h	1A02h	Part of the standard communication set
TxPDO 4	Outputs & Probes status	8 Byte	1803h	1A03h	Part of the standard communication set; not used; disabled by default

Process data mapping (PDO)

RxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1600h	01h	2101h	01h	Fieldbus input byte 0
1600h	02h	2101h	02h	Fieldbus input byte 1
1600h	03h	2101h	03h	Fieldbus input byte 2
1600h	04h	2101h	04h	Fieldbus input byte 3
1601h	01h	0005h	00h	Dummy entry ¹
1602h	01h	0005h	00h	Dummy entry
1603h	01h	0005h	00h	Dummy entry

TxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1A00h	01h	2001h	01h	System status
1A00h	02h	0005h	00h	Dummy entry
1A00h	03h	0005h	00h	Dummy entry
1A00h	04h	0005h	00h	Dummy entry
1A00h	05h	2181h	01h	Fieldbus input byte 0 feedback
1A00h	06h	2181h	02h	Fieldbus input byte 1 feedback
1A00h	07h	2181h	03h	Fieldbus input byte 2 feedback
1A00h	08h	2181h	04h	Fieldbus input byte 3 feedback
1A01h	01h	2201h	01h	Input status byte 0
1A01h	02h	2201h	02h	Input status byte 1
1A01h	03h	2201h	03h	Input status byte 2
1A01h	04h	2201h	04h	Input status byte 3
1A01h	05h	2201h	05h	Input status byte 4
1A01h	06h	2201h	06h	Input status byte 5
1A01h	07h	2201h	07h	Input status byte 6
1A01h	08h	2201h	08h	Input status byte 7
1A02h	01h	2201h	09h	Input status byte 8
1A02h	02h	2201h	0Ah	Input status byte 9
1A02h	03h	2201h	0Bh	Input status byte 10
1A02h	04h	2201h	0Ch	Input status byte 11
1A02h	05h	2201h	0Dh	Input status byte 12
1A02h	06h	2201h	0Eh	Input status byte 13
1A02h	07h	2201h	0Fh	Input status byte 14
1A02h	08h	2201h	10h	Input status byte 15
1A03h	01h	2203h	01h	Probe status byte 0
1A03h	02h	2203h	02h	Probe status byte 1
1A03h	03h	2203h	03h	Probe status byte 2
1A03h	04h	2203h	04h	Probe status byte 3
1A03h	05h	2202h	01h	OSSD status byte 0
1A03h	06h	2202h	02h	OSSD status byte 1
1A03h	07h	2202h	03h	OSSD status byte 2
1A03h	08h	2202h	04h	OSSD status byte 3

¹ Dummy entries as specified by HMS

Vendor specific Objects

Object Index 2001h – System status

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	System status
02h	UNSIGNED8	Reserved
03h	UNSIGNED8	Reserved
04h	UNSIGNED8	Reserved
05h	UNSIGNED8	Reserved
06h	UNSIGNED8	Reserved
07h	UNSIGNED8	Reserved
08h	UNSIGNED8	Reserved

Object Index 2003h – Errors data CPU 0

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Module name
02h	UNSIGNED8	Error code
03h	UNSIGNED32	Error address
04h	UNSIGNED8	CPU firmware version
05h	UNSIGNED8	Extended code 0
06h	UNSIGNED8	Extended code 1

Object Index 2004h – Errors data CPU 1

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Module name
02h	UNSIGNED8	Error code
03h	UNSIGNED32	Error address
04h	UNSIGNED8	CPU firmware version
05h	UNSIGNED8	Extended code 0
06h	UNSIGNED8	Extended code 1

Object Index 2005h – Input diagnostics

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Diagnostic index 0
02h	UNSIGNED8	Diagnostic code 0
03h	UNSIGNED8	Diagnostic index 1
04h	UNSIGNED8	Diagnostic code 1
05h	UNSIGNED8	Diagnostic index 2
06h	UNSIGNED8	Diagnostic code 2
07h	UNSIGNED8	Diagnostic index 3
08h	UNSIGNED8	Diagnostic code 3
09h	UNSIGNED8	Diagnostic index 4
0Ah	UNSIGNED8	Diagnostic code 4
0Bh	UNSIGNED8	Diagnostic index 5
0Ch	UNSIGNED8	Diagnostic code 5
0Dh	UNSIGNED8	Diagnostic index 6
0Eh	UNSIGNED8	Diagnostic code 6
0Fh	UNSIGNED8	Diagnostic index 7
10h	UNSIGNED8	Diagnostic code 7
11h	UNSIGNED8	Diagnostic index 8
12h	UNSIGNED8	Diagnostic code 8
13h	UNSIGNED8	Diagnostic index 9
14h	UNSIGNED8	Diagnostic code 9
15h	UNSIGNED8	Diagnostic index 10
16h	UNSIGNED8	Diagnostic code 10
17h	UNSIGNED8	Diagnostic index 11
18h	UNSIGNED8	Diagnostic code 11
19h	UNSIGNED8	Diagnostic index 12
1Ah	UNSIGNED8	Diagnostic code 12
1Bh	UNSIGNED8	Diagnostic index 13
1Ch	UNSIGNED8	Diagnostic code 13
1Dh	UNSIGNED8	Diagnostic index 14
1Eh	UNSIGNED8	Diagnostic code 14
1Fh	UNSIGNED8	Diagnostic index 15
20h	UNSIGNED8	Diagnostic code 15

A maximum of 16 Input diagnostics are transferred, if more diagnostics are present on the system only the first 16 are available on the fieldbus

Object Index 2006h – OSSD diagnostics

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Diagnostic index 0
02h	UNSIGNED8	Diagnostic code 0
03h	UNSIGNED8	Diagnostic index 1
04h	UNSIGNED8	Diagnostic code 1
05h	UNSIGNED8	Diagnostic index 2
06h	UNSIGNED8	Diagnostic code 2
07h	UNSIGNED8	Diagnostic index 3
08h	UNSIGNED8	Diagnostic code 3
09h	UNSIGNED8	Diagnostic index 4
0Ah	UNSIGNED8	Diagnostic code 4
0Bh	UNSIGNED8	Diagnostic index 5
0Ch	UNSIGNED8	Diagnostic code 5
0Dh	UNSIGNED8	Diagnostic index 6
0Eh	UNSIGNED8	Diagnostic code 6
0Fh	UNSIGNED8	Diagnostic index 7
10h	UNSIGNED8	Diagnostic code 7
11h	UNSIGNED8	Diagnostic index 8
12h	UNSIGNED8	Diagnostic code 8
13h	UNSIGNED8	Diagnostic index 9
14h	UNSIGNED8	Diagnostic code 9
15h	UNSIGNED8	Diagnostic index 10
16h	UNSIGNED8	Diagnostic code 10
17h	UNSIGNED8	Diagnostic index 11
18h	UNSIGNED8	Diagnostic code 11
19h	UNSIGNED8	Diagnostic index 12
1Ah	UNSIGNED8	Diagnostic code 12
1Bh	UNSIGNED8	Diagnostic index 13
1Ch	UNSIGNED8	Diagnostic code 13
1Dh	UNSIGNED8	Diagnostic index 14
1Eh	UNSIGNED8	Diagnostic code 14
1Fh	UNSIGNED8	Diagnostic index 15
20h	UNSIGNED8	Diagnostic code 15

A maximum of 16 OSSD diagnostics are transferred, if more diagnostics are present on the system only the first 16 are available on the fieldbus

Object Index 2007h – Project CRC

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Project CRC Low byte
02h	UNSIGNED8	Project CRC High byte
03h	UNSIGNED8	Reserved
04h	UNSIGNED8	Reserved
05h	UNSIGNED8	Reserved
06h	UNSIGNED8	Reserved
07h	UNSIGNED8	Reserved
08h	UNSIGNED8	Reserved

Object Index 2101h – Fieldbus inputs

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Fieldbus input byte 0
02h	UNSIGNED8	Fieldbus input byte 1
03h	UNSIGNED8	Fieldbus input byte 2
04h	UNSIGNED8	Fieldbus input byte 3
05h	UNSIGNED8	Reserved
06h	UNSIGNED8	Reserved
07h	UNSIGNED8	Reserved
08h	UNSIGNED8	Reserved

Object Index 2181h – Fieldbus input feedback

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Fieldbus input byte 0 feedback
02h	UNSIGNED8	Fieldbus input byte 1 feedback
03h	UNSIGNED8	Fieldbus input byte 2 feedback
04h	UNSIGNED8	Fieldbus input byte 3 feedback
05h	UNSIGNED8	Reserved
06h	UNSIGNED8	Reserved
07h	UNSIGNED8	Reserved
08h	UNSIGNED8	Reserved

Object Index 2201h – Input status

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Input status byte 0
02h	UNSIGNED8	Input status byte 1
03h	UNSIGNED8	Input status byte 2
04h	UNSIGNED8	Input status byte 3
05h	UNSIGNED8	Input status byte 4
06h	UNSIGNED8	Input status byte 5
07h	UNSIGNED8	Input status byte 6
08h	UNSIGNED8	Input status byte 7
09h	UNSIGNED8	Input status byte 8
0Ah	UNSIGNED8	Input status byte 9
0Bh	UNSIGNED8	Input status byte 10
0Ch	UNSIGNED8	Input status byte 11
0Dh	UNSIGNED8	Input status byte 12
0Eh	UNSIGNED8	Input status byte 13
0Fh	UNSIGNED8	Input status byte 14
10h	UNSIGNED8	Input status byte 15

Object Index 2202h – OSSD status

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	OSSD status byte 0
02h	UNSIGNED8	OSSD status byte 1
03h	UNSIGNED8	OSSD status byte 2
04h	UNSIGNED8	OSSD status byte 3
05h	UNSIGNED8	Reserved
06h	UNSIGNED8	Reserved
07h	UNSIGNED8	Reserved
08h	UNSIGNED8	Reserved

Object Index 2203h – Probe status

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	UNSIGNED8	Probe status byte 0
02h	UNSIGNED8	Probe status byte 1
03h	UNSIGNED8	Probe status byte 2
04h	UNSIGNED8	Probe status byte 3
05h	UNSIGNED8	Reserved
06h	UNSIGNED8	Reserved
07h	UNSIGNED8	Reserved
08h	UNSIGNED8	Reserved

Object Index 2204h – Analog data

Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number Of Entries
01h	REAL32	Analog data float 0
02h	REAL32	Analog data float 1
03h	REAL32	Analog data float 2
04h	REAL32	Analog data float 3
05h	REAL32	Analog data float 4
06h	REAL32	Analog data float 5
07h	REAL32	Analog data float 6
08h	REAL32	Analog data float 7
09h	REAL32	Analog data float 8
0Ah	REAL32	Analog data float 9
0Bh	REAL32	Analog data float 10
0Ch	REAL32	Analog data float 11
0Dh	REAL32	Analog data float 12
0Eh	REAL32	Analog data float 13
0Fh	REAL32	Analog data float 14
10h	REAL32	Analog data float 15

EtherNet/IP (MBEI)

Process data mapping (Class 1 Connection)

Assembly instance 96h (Connection point O->T Consuming Instance)

Byte offset	Size	Name
0	USINT	Fieldbus input byte 0
1	USINT	Fieldbus input byte 1
2	USINT	Fieldbus input byte 2
3	USINT	Fieldbus input byte 3

O->T connection type: Point-to-point

Assembly instance 64h (Connection point T->O Producing Instance)

Byte offset	Size	Name
0	USINT	System status
1	USINT	Reserved
2	USINT	Input status byte 0
3	USINT	Input status byte 1
4	USINT	Input status byte 2
5	USINT	Input status byte 3
6	USINT	Input status byte 4
7	USINT	Input status byte 5
8	USINT	Input status byte 6
9	USINT	Input status byte 7
10	USINT	Input status byte 8
11	USINT	Input status byte 9
12	USINT	Input status byte 10
13	USINT	Input status byte 11
14	USINT	Input status byte 12
15	USINT	Input status byte 13
16	USINT	Input status byte 14
17	USINT	Input status byte 15
18	USINT	Fieldbus input byte 0 feedback
19	USINT	Fieldbus input byte 1 feedback
20	USINT	Fieldbus input byte 2 feedback
21	USINT	Fieldbus input byte 3 feedback
22	USINT	Probe status byte 0
23	USINT	Probe status byte 1
24	USINT	Probe status byte 2
25	USINT	Probe status byte 3
26	USINT	OSSD status byte 0
27	USINT	OSSD status byte 1
28	USINT	OSSD status byte 2
29	USINT	OSSD status byte 3
30	REAL	Analog data float 0
34	REAL	Analog data float 1
38	REAL	Analog data float 2
42	REAL	Analog data float 3
46	REAL	Analog data float 4
50	REAL	Analog data float 5
54	REAL	Analog data float 6
58	REAL	Analog data float 7
62	REAL	Analog data float 8
66	REAL	Analog data float 9
70	REAL	Analog data float 10
74	REAL	Analog data float 11
78	REAL	Analog data float 12
82	REAL	Analog data float 13
86	REAL	Analog data float 14
90	REAL	Analog data float 15

T->O connection type: Point-to-point,Multicast.

Assembly instance 05h (Configuration Data)

Set this instance to size 0

Supported trigger types: Cyclic

Explicit messaging¹

To access Errors data, Input diagnostics, OSSD diagnostic and Project CRC the service 0x0E (Get attribute single) shall be used.

Name	Class	Instance	Attribute	Length (byte)	Access type
Fieldbus inputs	A2h	101h	05h	4	Set/Get
System I/O	A2h	01h	05h	30	Get
Analog data	A2h	204h	05h	64	Get
Errors data CPU 0	A2h	03h	05h	9	Get
Errors data CPU 1	A2h	04h	05h	9	Get
Input diagnostics	A2h	05h	05h	32	Get
OSSD diagnostics	A2h	06h	05h	32	Get
Project CRC	A2h	07h	05h	2	Get

¹ See Acyclic data format for more information

DeviceNet (MBD)

Process data mapping

Assembly instance 96h (Consuming Instance)

Byte offset	Size	Name
0	USINT	Fieldbus input byte 0
1	USINT	Fieldbus input byte 1
2	USINT	Fieldbus input byte 2
3	USINT	Fieldbus input byte 3

Assembly instance 64h (Producing Instance)

Byte offset	Size	Name
0	USINT	System status
1	USINT	Reserved
2	USINT	Input status byte 0
3	USINT	Input status byte 1
4	USINT	Input status byte 2
5	USINT	Input status byte 3
6	USINT	Input status byte 4
7	USINT	Input status byte 5
8	USINT	Input status byte 6
9	USINT	Input status byte 7
10	USINT	Input status byte 8
11	USINT	Input status byte 9
12	USINT	Input status byte 10
13	USINT	Input status byte 11
14	USINT	Input status byte 12
15	USINT	Input status byte 13
16	USINT	Input status byte 14
17	USINT	Input status byte 15
18	USINT	Fieldbus input byte 0 feedback
19	USINT	Fieldbus input byte 1 feedback
20	USINT	Fieldbus input byte 2 feedback
21	USINT	Fieldbus input byte 3 feedback
22	USINT	Probe status byte 0
23	USINT	Probe status byte 1
24	USINT	Probe status byte 2
25	USINT	Probe status byte 3
26	USINT	OSSD status byte 0
27	USINT	OSSD status byte 1
28	USINT	OSSD status byte 2
29	USINT	OSSD status byte 3
30	REAL	Analog data float 0
34	REAL	Analog data float 1
38	REAL	Analog data float 2
42	REAL	Analog data float 3
46	REAL	Analog data float 4
50	REAL	Analog data float 5
54	REAL	Analog data float 6
58	REAL	Analog data float 7
62	REAL	Analog data float 8
66	REAL	Analog data float 9
70	REAL	Analog data float 10
74	REAL	Analog data float 11
78	REAL	Analog data float 12
82	REAL	Analog data float 13
86	REAL	Analog data float 14
90	REAL	Analog data float 15

Explicit messaging¹

To access Errors data, Input diagnostics, OSSD diagnostic and Project CRC the service 0x0E (Get attribute single) shall be used.

Name	Class	Instance	Attribute	Length (byte)	Access type
Fieldbus inputs	A2h	101h	05h	4	Set/Get
System I/O	A2h	01h	05h	30	Get
Analog data	A2h	204h	05h	64	Get
Errors data CPU 0	A2h	03h	05h	9	Get
Errors data CPU 1	A2h	04h	05h	9	Get
Input diagnostics	A2h	05h	05h	32	Get
OSSD diagnostics	A2h	06h	05h	32	Get
Project CRC	A2h	07h	05h	2	Get

¹ See Acyclic data format for more information

Modbus TCP/IP (MBEM)

Modbus Serial (MBMR)

Register mapping

Holding Registers (4x)

Register(s)	Size	Name
000h Low byte	UINT8	Fieldbus input byte 0
000h High byte	UINT8	Fieldbus input byte 1
001h Low byte	UINT8	Fieldbus input byte 2
001h High byte	UINT8	Fieldbus input byte 3
002h-0FFh	-	Reserved1
100h Low byte	UINT8	System status
100h High byte	-	Reserved
101h Low byte	UINT8	Input status byte 0
101h High byte	UINT8	Input status byte 1
102h Low byte	UINT8	Input status byte 2
102h High byte	UINT8	Input status byte 3
103h Low byte	UINT8	Input status byte 4
103h High byte	UINT8	Input status byte 5
104h Low byte	UINT8	Input status byte 6
104h High byte	UINT8	Input status byte 7
105h Low byte	UINT8	Input status byte 8
105h High byte	UINT8	Input status byte 9
106h Low byte	UINT8	Input status byte 10
106h High byte	UINT8	Input status byte 11
107h Low byte	UINT8	Input status byte 12
107h High byte	UINT8	Input status byte 13
108h Low byte	UINT8	Input status byte 14
108h High byte	UINT8	Input status byte 15
109h Low byte	UINT8	Fieldbus input feedback byte 0
109h High byte	UINT8	Fieldbus input feedback byte 1
10Ah Low byte	UINT8	Fieldbus input feedback byte 2
10Ah High byte	UINT8	Fieldbus input feedback byte 3
10Bh Low byte	UINT8	Probe status byte 0
10Bh High byte	UINT8	Probe status byte 1
10Ch Low byte	UINT8	Probe status byte 2
10Ch High byte	UINT8	Probe status byte 3
10Dh High byte	UINT8	OSSD status byte 0
10Dh Low byte	UINT8	OSSD status byte 1
10Eh High byte	UINT8	OSSD status byte 2
10Eh Low byte	UINT8	OSSD status byte 3

¹ All "Reserved" Registers should just be reserved for future extension

Register(s)	Size	Name
10Fh-110h	FLOAT	Analog data float 0
111h-112h	FLOAT	Analog data float 1
113h-114h	FLOAT	Analog data float 2
115h-116h	FLOAT	Analog data float 3
117h-118h	FLOAT	Analog data float 4
119h-11Ah	FLOAT	Analog data float 5
11Bh-11Ch	FLOAT	Analog data float 6
11Dh-11Eh	FLOAT	Analog data float 7
11Fh-120h	FLOAT	Analog data float 8
121h-122h	FLOAT	Analog data float 9
123h-124h	FLOAT	Analog data float 10
125h-126h	FLOAT	Analog data float 11
127h-128h	FLOAT	Analog data float 12
129h-12Ah	FLOAT	Analog data float 13
12Bh-12Ch	FLOAT	Analog data float 14
12Dh-12Fh	FLOAT	Analog data float 15
130h-22Fh	-	Reserved

Register(s)	Size	Name
230h Low byte	UINT8	Error CPU0 – Module
230h High byte	UINT8	Error CPU0 – Error code
231h-232h	UINT32	Error CPU0 – Error address
233h Low byte	UINT8	Error CPU0 – Firmware version
233h High byte	UINT8	Error CPU0 – Extended code 0
234h Low byte	UINT8	Error CPU0 – Extended code 1
235h-23Fh	-	Reserved
240h Low byte	UINT8	Error CPU1 – Module
240h High byte	UINT8	Error CPU1 – Error code
241h-242h	UINT32	Error CPU1 – Error address
243h Low byte	UINT8	Error CPU1 – Firmware version
243h High byte	UINT8	Error CPU1 – Extended code 0
244h Low byte	UINT8	Error CPU1 – Extended code 1
245h-24Fh	-	Reserved

Register(s)	Size	Name
250h Low byte	UINT8	Input diagnostics index 1
250h High byte	UINT8	Input diagnostics code 1
251h Low byte	UINT8	Input diagnostics index 2
251h High byte	UINT8	Input diagnostics code 2
252h Low byte	UINT8	Input diagnostics index 3
252h High byte	UINT8	Input diagnostics code 3
253h Low byte	UINT8	Input diagnostics index 4
253h High byte	UINT8	Input diagnostics code 4
254h Low byte	UINT8	Input diagnostics index 5
254h High byte	UINT8	Input diagnostics code 5
255h Low byte	UINT8	Input diagnostics index 6
255h High byte	UINT8	Input diagnostics code 6
256h Low byte	UINT8	Input diagnostics index 7
256h High byte	UINT8	Input diagnostics code 7
257h Low byte	UINT8	Input diagnostics index 8
257h High byte	UINT8	Input diagnostics code 8
258h Low byte	UINT8	Input diagnostics index 9
258h High byte	UINT8	Input diagnostics code 9
259h Low byte	UINT8	Input diagnostics index 10
259h High byte	UINT8	Input diagnostics code 10
25Ah Low byte	UINT8	Input diagnostics index 11
25Ah High byte	UINT8	Input diagnostics code 11
25Bh Low byte	UINT8	Input diagnostics index 12
25Bh High byte	UINT8	Input diagnostics code 12
25Ch Low byte	UINT8	Input diagnostics index 13
25Ch High byte	UINT8	Input diagnostics code 13
25Dh Low byte	UINT8	Input diagnostics index 14
25Dh High byte	UINT8	Input diagnostics code 14
25Eh Low byte	UINT8	Input diagnostics index 15
25Eh High byte	UINT8	Input diagnostics code 15
25Fh Low byte	UINT8	Input diagnostics index 16
25Fh High byte	UINT8	Input diagnostics code 16

Register(s)	Size	Name
260h Low byte	UINT8	Output diagnostics index 1
260h High byte	UINT8	Output diagnostics code 1
261h Low byte	UINT8	Output diagnostics index 2
261h High byte	UINT8	Output diagnostics code 2
262h Low byte	UINT8	Output diagnostics index 3
262h High byte	UINT8	Output diagnostics code 3
263h Low byte	UINT8	Output diagnostics index 4
263h High byte	UINT8	Output diagnostics code 4
264h Low byte	UINT8	Output diagnostics index 5
264h High byte	UINT8	Output diagnostics code 5
265h Low byte	UINT8	Output diagnostics index 6
265h High byte	UINT8	Output diagnostics code 6
266h Low byte	UINT8	Output diagnostics index 7
266h High byte	UINT8	Output diagnostics code 7
267h Low byte	UINT8	Output diagnostics index 8
267h High byte	UINT8	Output diagnostics code 8
268h Low byte	UINT8	Output diagnostics index 9
268h High byte	UINT8	Output diagnostics code 9
269h Low byte	UINT8	Output diagnostics index 10
269h High byte	UINT8	Output diagnostics code 10
26Ah Low byte	UINT8	Output diagnostics index 11
26Ah High byte	UINT8	Output diagnostics code 11
26Bh Low byte	UINT8	Output diagnostics index 12
26Bh High byte	UINT8	Output diagnostics code 12
26Ch Low byte	UINT8	Output diagnostics index 13
26Ch High byte	UINT8	Output diagnostics code 13
26Dh Low byte	UINT8	Output diagnostics index 14
26Dh High byte	UINT8	Output diagnostics code 14
26Eh Low byte	UINT8	Output diagnostics index 15
26Eh High byte	UINT8	Output diagnostics code 15
26Fh Low byte	UINT8	Output diagnostics index 16
26Fh High byte	UINT8	Output diagnostics code 16

Register(s)	Size	Name
270h Low byte	UINT8	Project CRC High byte
270h High byte	UINT8	Project CRC Low byte

PROFINET (MBEP)

Process data mapping

Module Fieldbus input

Byte offset	Data direction ¹	Size	Name
0	In	UINT8	Fieldbus input byte 0
1	In	UINT8	Fieldbus input byte 1
2	In	UINT8	Fieldbus input byte 2
3	In	UINT8	Fieldbus input byte 3

Module System I/O

Byte offset	Data direction	Size	Name
0	Out	UINT8	System status
1	Out	UINT8	Reserved
2	Out	UINT8	Input status byte 0
3	Out	UINT8	Input status byte 1
4	Out	UINT8	Input status byte 2
5	Out	UINT8	Input status byte 3
6	Out	UINT8	Input status byte 4
7	Out	UINT8	Input status byte 5
8	Out	UINT8	Input status byte 6
9	Out	UINT8	Input status byte 7
10	Out	UINT8	Input status byte 8
11	Out	UINT8	Input status byte 9
12	Out	UINT8	Input status byte 10
13	Out	UINT8	Input status byte 11
14	Out	UINT8	Input status byte 12
15	Out	UINT8	Input status byte 13
16	Out	UINT8	Input status byte 14
17	Out	UINT8	Input status byte 15
18	Out	UINT8	Fieldbus input byte 0 feedback
19	Out	UINT8	Fieldbus input byte 1 feedback
20	Out	UINT8	Fieldbus input byte 2 feedback
21	Out	UINT8	Fieldbus input byte 3 feedback
22	Out	UINT8	Probe status byte 0
23	Out	UINT8	Probe status byte 1
24	Out	UINT8	Probe status byte 2
25	Out	UINT8	Probe status byte 3
26	Out	UINT8	OSSD status byte 0
27	Out	UINT8	OSSD status byte 1
28	Out	UINT8	OSSD status byte 2
29	Out	UINT8	OSSD status byte 3

¹ Direction from the DSC point of view

Module Analog data

Byte offset	Data direction	Size	Name
0	Out	FLOAT	Analog data float 0
4	Out	FLOAT	Analog data float 1
8	Out	FLOAT	Analog data float 2
12	Out	FLOAT	Analog data float 3
16	Out	FLOAT	Analog data float 4
20	Out	FLOAT	Analog data float 5
24	Out	FLOAT	Analog data float 6
28	Out	FLOAT	Analog data float 7
32	Out	FLOAT	Analog data float 8
36	Out	FLOAT	Analog data float 9
40	Out	FLOAT	Analog data float 10
44	Out	FLOAT	Analog data float 11
48	Out	FLOAT	Analog data float 12
52	Out	FLOAT	Analog data float 13
56	Out	FLOAT	Analog data float 14
60	Out	FLOAT	Analog data float 15

Record Data read/write services¹

Name	Slot	Index	Length (byte)	Access type
Fieldbus inputs	01h	01h	4	Set/Get
System I/O	00h	00h	30	Get
Analog data	02h	05h	64	Get
Error data CPU0	00h	02h	9	Get
Error data CPU1	00h	03h	9	Get
Input diagnostics	00h	04h	32	Get
OSSD diagnostics	00h	05h	32	Get
Project CRC	00h	06h	2	Get

PROFIBUS DP (MBP)

Process data mapping

Module Fieldbus input

Byte offset	Data direction ²	Size	Name
0	In	UINT8	Fieldbus input byte 0
1	In	UINT8	Fieldbus input byte 1
2	In	UINT8	Fieldbus input byte 2
3	In	UINT8	Fieldbus input byte 3

Module System I/O

Byte offset	Data direction	Size	Name
0	Out	UINT8	System status
1	Out	UINT8	Reserved
2	Out	UINT8	Input status byte 0

¹ See Acyclic data format

² Direction from the DSC point of view

Byte offset	Data direction	Size	Name
3	Out	UINT8	Input status byte 1
4	Out	UINT8	Input status byte 2
5	Out	UINT8	Input status byte 3
6	Out	UINT8	Input status byte 4
7	Out	UINT8	Input status byte 5
8	Out	UINT8	Input status byte 6
9	Out	UINT8	Input status byte 7
10	Out	UINT8	Input status byte 8
11	Out	UINT8	Input status byte 9
12	Out	UINT8	Input status byte 10
13	Out	UINT8	Input status byte 11
14	Out	UINT8	Input status byte 12
15	Out	UINT8	Input status byte 13
16	Out	UINT8	Input status byte 14
17	Out	UINT8	Input status byte 15
18	Out	UINT8	Fieldbus input byte 0 feedback
19	Out	UINT8	Fieldbus input byte 1 feedback
20	Out	UINT8	Fieldbus input byte 2 feedback
21	Out	UINT8	Fieldbus input byte 3 feedback
22	Out	UINT8	Probe status byte 0
23	Out	UINT8	Probe status byte 1
24	Out	UINT8	Probe status byte 2
25	Out	UINT8	Probe status byte 3
26	Out	UINT8	OSSD status byte 0
27	Out	UINT8	OSSD status byte 1
28	Out	UINT8	OSSD status byte 2
29	Out	UINT8	OSSD status byte 3

Module Analog data

Byte offset	Data direction	Size	Name
0	Out	FLOAT	Analog data float 0
4	Out	FLOAT	Analog data float 1
8	Out	FLOAT	Analog data float 2
12	Out	FLOAT	Analog data float 3
16	Out	FLOAT	Analog data float 4
20	Out	FLOAT	Analog data float 5
24	Out	FLOAT	Analog data float 6
28	Out	FLOAT	Analog data float 7
32	Out	FLOAT	Analog data float 8
36	Out	FLOAT	Analog data float 9
40	Out	FLOAT	Analog data float 10
44	Out	FLOAT	Analog data float 11
48	Out	FLOAT	Analog data float 12
52	Out	FLOAT	Analog data float 13
56	Out	FLOAT	Analog data float 14
60	Out	FLOAT	Analog data float 15

Record Data read/write services¹

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Input diagnostics	00h	04h	32	Get
OSSD diagnostics	00h	05h	32	Get
Project CRC	00h	06h	2	Get

¹ See Acyclic data format

Acyclic data format

Errors data CPUx format

Name	Size
Module	UINT8
Error code	UINT8
Error address	UINT32
Firmware version (x.y in hexadecimal format)	UINT8
Extended code 0 (optional)	UINT8
Extended code 1 (optional)	UINT8

The Module field is defined as follow:

B7-B2	B1-B0
Module name	Node

The subfield Module name is defined as follow:

Name	Code	Name	Code
MI8O2	2	MV0	10
MO2	3	MOR4	11
MI16	4	MOR4S8	12
MI8	5	MOS8	13
MO4	6	MOS16	14
MI12	7	MO4LHCS8	15
MV2	8	MA4C	16
MV1	9	MI8O4	17

For the Error code field please refer to the DSC manual.

The optional Extended codes are only meaningful to Duelco.

Input diagnostics format

Name	Size
Diagnostic index	UINT8
Diagnostic code	UINT8

A maximum of 16 Input diagnostics are transferred, if more diagnostics are present on the system only the first 16 are available on the fieldbus.

OSSD diagnostics format

Name	Size
Diagnostic index	UINT8
Diagnostic code	UINT8

A maximum of 16 OSSD diagnostics are transferred, if more diagnostics are present on the system only the first 16 are available on the fieldbus.

Project CRC format

Name	Size
CRC byte 0	UINT8
CRC byte 1	UINT8