

Machine Safety

Preventa safety PLCs

type XPS MF

Catalogue
January

07



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Flexibility

- Interchangeable modular functions, to better meet the requirements for extensions
- Software and accessories common to multiple product families



Ingenuity

- Auto-adapts to its environment, "plug & play"
- Application functions, control, communication and diagnostics embedded in the products
- User-friendly operation either directly on the product or remotely



Simplicity

- Cost effective "optimum" offers that make selection easy for most typical applications
- Products that are easy to understand for users, electricians and automation specialists
- User-friendly intuitive programming



Compactness

- High functionality in a minimum of space
- Freedom in implementation



Openness

- Compliance with field bus, connection, and software standards
- Enabling decentralised or remote surveillance via the web with Transparent Ready products

Machine safety Preventa safety PLCs, type XPS MF

Selection guide: Preventa compacts or modular safety PLCs pages 2 & 3

Preventa compacts PLCs, type XPS MF40 and XPS MF30/31/35

- Type XPS MF40 page 4
- Type XPS MF31/30/35 page 18

Preventa modular PLC, type XPS MF60

- Rack, power supply and CPU page 34
- "In rack" analogue input module page 50
- "In rack" analogue output module page 52
- "In rack" mixed module: counting input/digital outputs page 54
- "In rack" digital input module (24 digital inputs) page 56
- "In rack" digital input module (32 digital inputs) page 58
- "In rack" digital I/O module (24 digital inputs/16 digital outputs) page 60
- "In rack" relay output module page 62

Decentralised input/output modules for Preventa safety PLCs

Selection guide: Decentralised input/output modules. pages 64 & 65

- Decentralised input module type XPS MF1 page 66
- Decentralised output modules type XPS MF2 page 70
- Decentralised input/output modules type XPS MF3 page 80

Communication on network and bus

- Communication on Ethernet network page 95
- Communication on Modbus bus page 96
- Communication on Profibus bus page 97

XPSMFWIN programming software for Preventa compact or modular safety PLCs

- Presentation page 98
- Reference page 98

Product reference index. page 104

Machine Safety

Preventa safety PLCs

Compact and modular, type XPS MF

Presentation

Compact PLCs:

- Automated line control solution
- Safety functions monitoring: protection of personnel and safety of machines
- Inputs and outputs management: number and type of inputs/outputs depending on compact PLC type

Maximum use of compact safety PLCs, designed for use in safety related parts of control systems conforming to EN 954-1/ISO 13849-1 and IEC 61508:

- Up to category 4 (EN 954-1/ISO 13849-1), SIL 3 (IEC 61508)



Products referenced **XPS MF31222**, **XPS MF3022** and **XPS MF3500** are marked **HIMatrix F31**, **HIMatrix F30** and **HIMatrix F35** (manufactured by Hima, sold by Schneider Electric).

User memory		Application	250 Kb					
		Data	250 Kb					
Response time			Depending on application					
Maximum consumption			8 A		9 A			
Supply			External $\equiv$ 24 V supply (with separate protection conforming to IEC 61131-2)					
Inputs	Digital	Number of channels	24 , configurable using software XPSMFWIN		20 , not electrically isolated		24 , not electrically isolated	
		Current at state 0	1.5 mA max. at $\equiv$ 24 V					
		Current at state 1	3.5 mA at $\equiv$ 24 V 4.5 mA at $\equiv$ 30 V		$\geq$ 2 mA at $\equiv$ 15 V	> 2 mA at $\equiv$ 15 V	3.5 mA at $\equiv$ 24 V 4.5 mA at $\equiv$ 30 V	
	Analogue	Number of channels	–		–	–	8 , single-pole	
		Range: voltage/current	–		–	–	0...10 V/0...20 mA <i>(1)</i>	
	Counting	Number of channels	–		–	–	2	
		Current	–		–	–	1.4 mA at $\equiv$ 5 V, 6.5 mA at $\equiv$ 24 V	
	Outputs	Digital	Number of channels	24 , configurable using software XPSMFWIN		8 (2), not electrically isolated		8 , not electrically isolated
			Output current	Channels 1 to 3, 5 to 7, 9 to 11, 13 to 15, 17 to 19, 21 to 23: 0.5 A at 60 °C Channels 4, 8, 12, 16, 20 and 24: 1 A at 60 °C, 2 A at 50 °C		Channels 1 to 3 and 5 to 7: 0.5 A at 60 °C Channels 4 and 8: 1 A at 60 °C, 2 A at 50 °C		
			–		–	–	–	
Analogue		Number of channels	–		–	–	–	
		Range: voltage/current	–		–	–	–	
Relay		Number	–		–	–	–	
		Switching voltage	–		–	–	–	
Pulse			2 x 4 for line control		(2)	(2)	–	
Input/output connections			Removable screw terminal blocks, coded with locating device (safety PLCs XPS MF31, 30, 35 & 40) and also, removable spring terminal blocks, coded with locating device (safety PLCs XPS MF40)					
Communication		On Ethernet network		Yes, by 2 RJ45 connectors, with integrated switch		Yes, by 4 RJ45 connectors, with integrated switch		
			Using SafeEthernet safety protocol between decentralised I/O modules type XPS MF1/2/3 and compact or modular safety PLCs type XPS MF					
	Slave on Modbus bus (RS 485)		XPS MF4020/MF4022		–	XPS MF3022	XPS MF3522	
	Slave on Profibus bus		XPS MF4040/MF4042		–	–	XPS MF3542	
Safety PLC type			XPS MF400●/MF402●/MF404●	XPS MF31222	XPS MF3022	XPS MF3502/MF3522/MF3542		
See page			12	27	27	27		
“In rack” module type			–	–	–	–		
See page			–	–	–	–		

(1) With 500 Ω equipotential link.

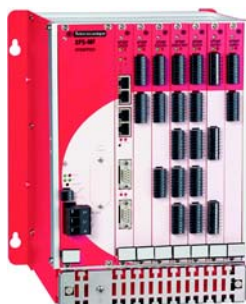
(2) The digital outputs can be configured as pulsed outputs using software XPSMFWIN.

Modular PLC XPS MF60: metal rack XPS MFGEH01 with slots for power supply module XPS MFPS01, CPU XPS MFCPU22 and “in rack” I/O modules.

- Automated line control solution
- Safety functions monitoring: protection of personnel and safety of machines
- Inputs and outputs management: number and type of inputs/outputs depending on type of “in rack” I/O modules

Maximum use of modular safety PLCs, designed for use in safety related parts of control systems conforming to EN 954-1/ISO 13849-1 and IEC 61508:

- Up to category 4 (EN 954-1/ISO 13849-1), SIL 3 (IEC 61508)



500 Kb						
500 Kb						
Depending on application						
30 A max., 32 A external fuse						
External $\sim$ 24 V supply (with separate protection conforming to IEC 61131-2)						

–	–	–	24, electrically isolated	32 (3), electrically isolated	24 (3), electrically isolated	–
–	–	–	–	1 mA at 5 V	1 mA at 5 V	–
–	–	–	≥ 2.2 mA at 79 V	2 mA at $\sim$ 10 V, 5 mA at $\sim$ 24 V	2 mA at $\sim$ 10 V, 5 mA at $\sim$ 24 V	–
8, single-pole or 4 2-pole (1), electrically isolated	–	–	–	–	–	–
- 10...+ 10 V/ 0...20 mA (2)	–	–	–	–	–	–
–	–	2	–	–	–	–
–	–	0.8 A at $\sim$ 3.3 V 0.1 A at $\sim$ 5 V 0.1 A + output current at $\sim$ 24 V	–	–	–	–
–	–	4	–	–	16 (4), electrically isolated	–
–	–	0.5 A per channel, 2 A max. per “in rack” module	–	–	2 A per channel at 30 °C, 8 A max. per “in rack” module at 30 °C	–
–	8, electrically isolated	–	–	–	–	–
–	- 10...10 V / 0...20 mA	–	–	–	–	–
–	–	–	–	–	–	8
–	–	–	–	–	–	$\sim$ 6...230 V / $\sim$ 110 V
–	–	–	–	–	(4)	–

Removable screw terminal blocks, coded with locating device

Yes, by 4 RJ45 connectors on CPU **XPS MFCPU22** of modular PLC **XPS MF60**, with integrated switch

Using SafeEthernet safety protocol between decentralised I/O modules type **XPS MF1/2/3** and compact or modular safety PLCs type **XPS MF**

XPS MF60

–	–	–	–	–	–	–
XPS MFGEH01 (rack) + XPS MFPS01 (power supply) + XPS MFCPU22 (CPU) + “in rack” I/O modules (to be selected from below)						
44						
XPS MFAI801	XPS MFAO801	XPS MFCIO2401	XPS MFDI2401	XPS MFDI3201	XPS MFDIO241601	XPS MFDO801
50	52	54	56	58	60	62

(1) Configurable by choice of connection.

(2) With 250 Ω or 500 Ω equipotential link.

(3) Digital inputs can be supplied by the pulsed outputs of the same I/O rack.

(4) Digital outputs (n° 1...n° 8) can be configured as pulsed outputs using software XPSMFWIN.

Machine Safety

Preventa safety PLCs

Compact, type XPS MF40



XPS MF4000
XPS MF4002



XPS MF4020
XPS MF4022



XPS MF4040
XPS MF4042

Presentation

Preventa compact safety PLCs type XPS MF40 offer an automated line control solution in conjunction with the monitoring of safety functions that are required for the protection of personnel and the safety of machines. They are designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ISO 13849-1. The compact safety PLC range XPS MF40 is based around 6 compact PLCs that are differentiated by their characteristics.

Compact PLCs XPS	Configurable digital Inputs/Outputs	Pulsed outputs	Communication		
			On Ethernet network		On serial bus
			Safety protocol	Non safety protocol	
MF4000	24, configured using software XPSMFWIN	8	SafeEthernet	–	–
MF4002	24, configured using software XPSMFWIN	8	SafeEthernet	Modbus TCP/IP	–
MF4020	24, configured using software XPSMFWIN	8	SafeEthernet	–	Modbus bus Slave (TER)
MF4022	24, configured using software XPSMFWIN	8	SafeEthernet	Modbus TCP/IP	Modbus bus Slave (TER)
MF4040	24, configured using software XPSMFWIN	8	SafeEthernet	–	Profibus bus Slave (BUS)
MF4042	24, configured using software XPSMFWIN	8	SafeEthernet	Modbus TCP/IP	Profibus bus Slave (BUS)

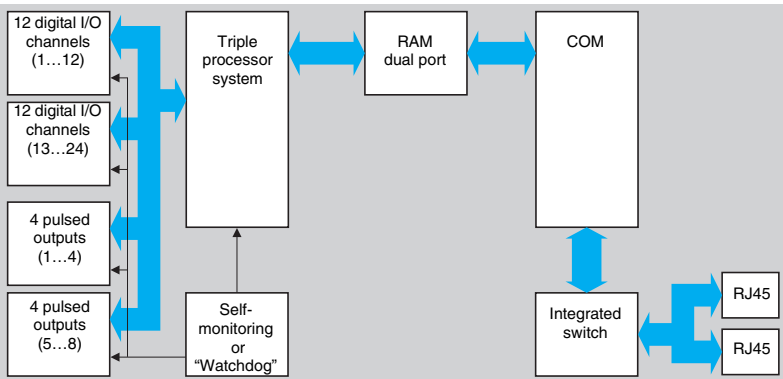
Safety PLCs

In order to comply with safety requirements, the compact PLCs XPS MF40 integrate two essential functions conforming to category 4 of EN 954-1/ISO 13849-1 in addition to the SafeEthernet safe communication protocol between the safety PLCs and the decentralised safety I/O modules (Special Switch).

- **Redundancy:** the triple processor integrated in the compact safety PLCs analyses and compares the information received from the safety inputs and outputs. The incoming and outgoing information (programmed values and received values) are received in parallel by the three processors and compared in real-time.
- **“Watchdog” or self-monitoring:** the compact safety PLCs continuously monitor the information processing cycle and the execution of tasks, and intervene if the time of a cycle does not conform to the predefined value.
- **The integrated switch (Special Switch)** stores for a very short time and sends at very high speed the information provided by the inputs and outputs of the safety PLCs on the Ethernet network, whilst avoiding signal collisions and excessive amounts of data on the network.

Functional synoptics

Compact safety PLC XPS 4000/MF4002



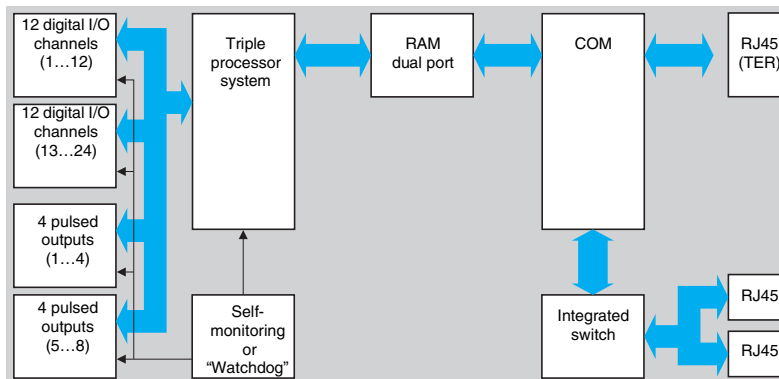
Machine Safety

Preventa safety PLCs

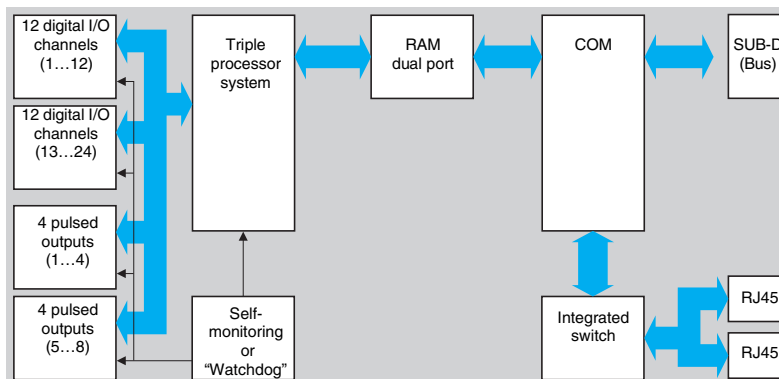
Compact, type XPS MF40

Functional synoptics (continued)

Compact safety PLCs XPS MF4020/MF4022



Compact safety PLCs XPS MF4040/MF4042



Line control on safety PLCs XPS MF40●●

Line control is a means of short-circuit and line break monitoring, for example Emergency stop inputs to category 4 of standard EN 954-1, that is configurable in compact safety PLCs XPS MF40●●.

The pulsed outputs 1 to 8 are connected to the digital inputs of the same circuit. The pulses are automatic on the pulsed outputs: that drive the monitoring of the digital input lines.

Programming automated safety functions

Software XPSMFWIN (reference SSV1XPSMFWIN or SSVXPSMFWINUP) running on a PC enables:

- Programming of the safety functions of compact PLCs XPS MF,
- Configuration of the bus and industrial communication networks,
- Configuration and IP addressing of the automation line sensors/actuators,
- Programming of alarms via the power supply system.

See programming using software XPSMFWIN, pages 98 to 103.

By using a PC, Magelis graphic terminal type XBT GT or a Premium automation platform and connecting to the RJ45 socket of compact safety PLCs XPS MF, an automation line can, at any time or point, be supervised and controlled.

- Using a PC: system programming, selection of communication network etc.
- Using a graphic terminal or Premium automation platform: diagnostics, cycle monitoring, etc.

Machine Safety

Preventa safety PLCs

Compact, type XPS MF40

Compact safety PLCs type XPS MF40 incorporate:

- 24 I/O channels, configurable using software XPSMFWIN
- as digital type inputs, or
- as digital type outputs
- and 8 (2 x 4) pulsed output channels.

Digital inputs

Compact safety PLCs type XPS MF40 incorporate up to 24 digital type inputs for connection to the hazardous zones of machines to be monitored (1).

Compact PLCs XPS	Digital inputs			
	N°	Safety detection	Safety dialogue	Safety control
MF4000	24	Limit switches,	Mushroom head	Switch disconnectors mini-Vario and Vario... (2)
MF4002	24	Guard switches,	Emergency stops,	
MF4020	24	with reset and	Enclosures for control	
MF4022	24	with actuator,	and signalling units,	
MF4040	24	Safety light curtains type	Two-hand control	
MF4042	24	2 and type 4,	stations... (2)	
		Safety mats and sensing		
		edges... (2)		

Digital outputs

Compact safety PLCs type XPS MF40 incorporate up to 24 digital type outputs for connection to the hazardous zones of machines to be controlled (1).

Compact PLCs XPS	Digital outputs		
	N°	Safety dialogue	Safety control
MF4000	24	Beacons and indicator banks,	Enclosed thermal-magnetic motor circuit-breakers, Enclosed D.O.L. starters for motor control, Power contactors... (2)
MF4002	24	Rotating mirror beacons,	
MF4020	24	Sirens... (2)	
MF4022	24		
MF4040	24		
MF4042	24		

Pulsed outputs

Outputs for line control

Compact PLCs XPS	Pulsed outputs	
	N°	
MF4000	8	Line control for line break and short-circuit monitoring
MF4002	(2 x 4)	
MF4020		
MF4022		
MF4040		
MF4042		

Decentralised inputs and outputs

In addition to the inputs/outputs integrated as standard, compact safety PLCs XPS MF40 can accept supporting decentralised input modules type XPS MF1 and/or decentralised output modules type XPS MF2 and/or mixed decentralised I/O modules type XPS MF3.

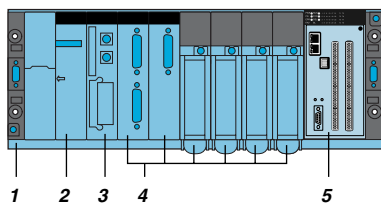
These decentralised input, output and I/O modules are located in the vicinity of hazardous zones of machines to be monitored and increase the I/O capacity of the compact safety PLCs, see pages 66, 70 and 80.

Communication between the compact safety PLCs and decentralised input, output and I/O modules is performed on the Ethernet network using SafeEthernet safety communication protocol, via the RJ45 communication ports.

Integrating safety PLCs XPSMF40 on Premium automation platform

Designed for mechanical integration on a Premium automation platform, safety PLCs XPS MF40 occupy 2 slots on the Premium rack TSX RKY.

If mounted in this way, there is interaction between the programming software: the variables defined using configuration software XPSMFWIN can be retrieved by Unity (Premium platform programming software) by using a tool included in Safety Suite V2, see page 98.



Example of mechanical integration of a safety PLC XPSMF40

- 1 Premium rack
- 2 Power supply module
- 3 Premium processor module
- 4 Other Premium modules (communication, I/O)
- 5 Compact safety PLC XPSMF40

(1) The connection of cables to screw terminal or spring terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with compact safety PLCs XPS MF40.

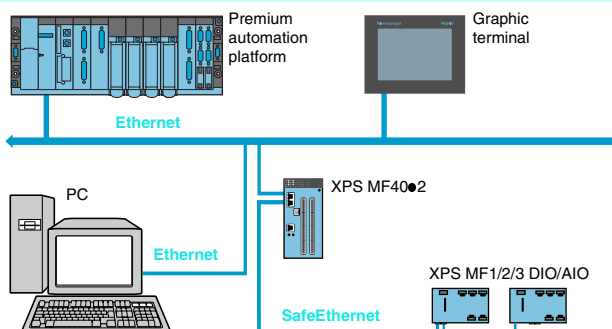
(2) Please refer to our "Safety solutions using Preventa" catalogue.

Machine Safety

Preventa safety PLCs

Compact, type XPS MF40

Communication on Ethernet network



- Communication between the PC, Magelis graphic terminal or automation platform (Premium) and the compact safety PLCs XPS MF4002 is achieved by Ethernet connection, via the RJ45 communication ports of the compact PLC.
- Connection on the Ethernet network enables integration of the compact safety PLCs XPS MF4002 of a safety installation within a type A10 Transparent Ready™ system.

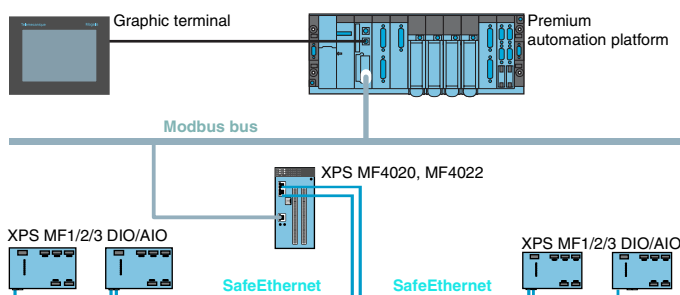
Compact PLCs XPS	Telemecanique Transparent Ready™		
	Class	Communication protocols	
		Safety	Non safety
XPS MF4000	A10	SafeEthernet	—
XPS MF4002		SafeEthernet	Modbus TCP/IP
XPS MF4020		SafeEthernet	—
XPS MF4022		SafeEthernet	Modbus TCP/IP
XPS MF4040		SafeEthernet	—
XPS MF4042		SafeEthernet	Modbus TCP/IP

Industrial communication

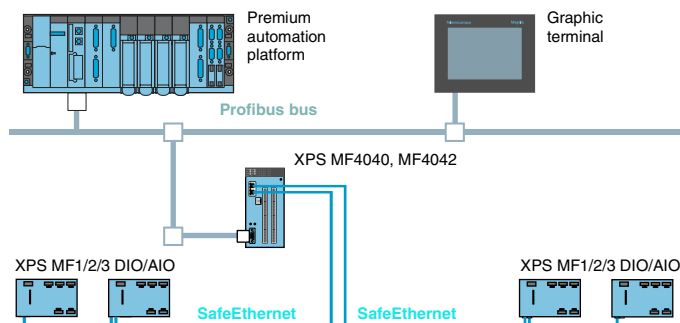
Safety PLCs XPS MF4020 and XPS MF4040 incorporate a port that enables their integration within an industrial architecture. See pages 94 and 95.

Examples

- On Modbus bus, the compact safety PLCs XPS MF4020 and XPS MF4022 are slaves of a Premium automation platform, via their RJ45 connector.



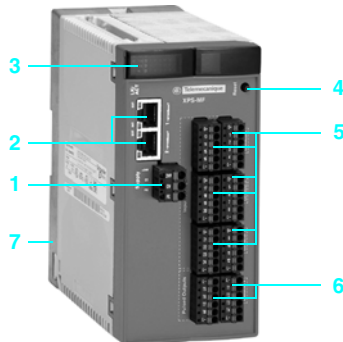
- On Profibus bus, the compact safety PLCs XPS MF4040 and XPS MF4042 are slaves of a Premium automation platform, via their SUB-D 9-pin connector.



Machine Safety

Preventa safety PLCs

Compact, type XPS MF40



Description

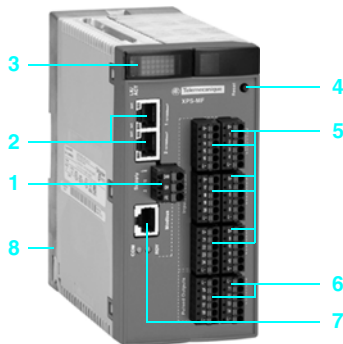
Safety PLCs XPS MF4000/MF4002

On the front face of the enclosure:

- 1 One terminal block (1) for $\pm$ 24 V supply.
- 2 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 3 Process status LEDs.
- 4 One "Reset" button.
- 5 Six terminal blocks (1) for connection of configurable I/Os.
- 6 Two terminal blocks (1) for connection of pulsed outputs.

On the rear face:

- 7 One plate with spring fixing for mounting on rail.



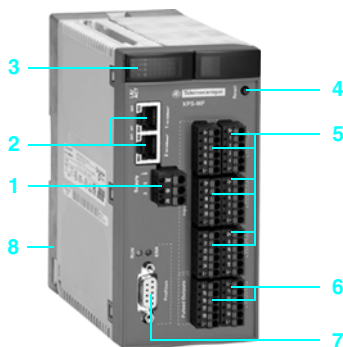
Safety PLCs XPS MF4020/MF4022

On the front face of the enclosure:

- 1 One terminal block (1) for $\pm$ 24 V supply.
- 2 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 3 Process status LEDs.
- 4 One "Reset" button.
- 5 Six terminal blocks (1) for connection of configurable I/Os.
- 6 Two terminal blocks (1) for connection of pulsed outputs.
- 7 One TER connector (RJ45) for connection to Modbus bus, with 2 process status LEDs.

On the rear face:

- 8 One plate with spring fixing for mounting on rail.



Safety PLCs XPS MF4040/MF4042

On the front face of the enclosure:

- 1 One terminal block (1) for $\pm$ 24 V supply.
- 2 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 3 Process status LEDs.
- 4 One "Reset" button.
- 5 Six terminal blocks (1) for connection of configurable I/Os.
- 6 Two terminal blocks (1) for connection of pulsed outputs.
- 7 One BUS connector (RJ45) for connection to Profibus bus, with 2 process status LEDs.

On the rear face:

- 8 One plate with spring fixing for mounting on rail.

(1) Removable screw or spring terminal blocks, coded with locating device, included with compact safety PLCs XPS MF40.

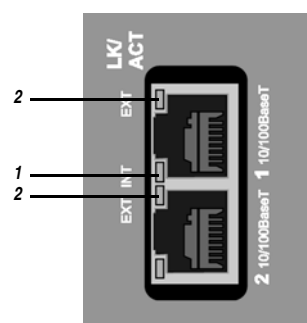
Machine Safety

Preventa safety PLCs

Compact, type XPS MF40

PWR	RUN	1	5	9	13	17	21	T1	T5
PG	FOR	2	6	10	14	18	22	T2	T6
ERR	OSL	3	7	11	15	19	23	T3	T7
FAU	BL	4	8	12	16	20	24	T4	T8

Process status LEDs



1 Internal Ethernet LED
2 External Ethernet LEDs



Modbus LEDs



Profibus LEDs

LED details

Process status LEDs on safety PLCs XPS MF40

LED	Colour	Status	Meaning
1...24	Green	On	Channels configured as inputs: input signal being received. Channels configured as outputs: output signal being sent.
T1...T8	Green	On	Pulsed outputs active.
PWR	Green	On	24 V voltage present.
		Off	No voltage.
PG	Yellow	On	The CPU is being loaded with a new configuration.
		Flashing	The FLASH ROM is being loaded with a new operating system.
		Off	No loading of configuration or operating system.
ERR	Red	On	Software error or hardware fault detected by the CPU. The monitoring program (Watchdog) has triggered the STOP state of the process because the programmed cycle time has been exceeded. The CPU has stopped the execution of the user application, ended all hardware and software tests and all outputs have been reset. The process can only be started again from the PC.
		Off	No errors detected.
FAU	Orange	On	Error display for line control. The user application has caused an error. The system configuration is defective. The loading of a new operating system was defective and the operating system is corrupt.
		Flashing	An error has occurred whilst writing to FLASH ROM memory (during updating of the operating system). One or more I/O errors have occurred.
		Off	None of the above errors have occurred.
RUN	Green	On	Normal service mode, loaded program running, the PLC receives I/O messages, communication and hardware/software tests carried out.
		Flashing	The CPU is in STOP and is not executing any user application. All the outputs are reset to a safe, de-energised state.
		Off	The CPU is in "ERROR" state (see ERR).
FOR	Green	On	The CPU is in RUN mode and force is active.
		Flashing	The system is not processing (STOP), but force is prepared and is activated if the triple processor is started.
		Off	Force mode not activated.
OSL	Orange	Flashing	Emergency loading of the operating system is active.
BL	Orange	Flashing	COM in INIT_Fail state.

Ethernet LEDs on safety PLCs XPS MF40

LK/ACT external	Green	Off	No connection/link established.
		On	Connection established/link established.
		Flashing	External data exchange (speed 10...100 Mbps).
LK/ACT internal	Green	Off	No connection/link established.
		On	Connection established/link established.
		Flashing	Internal data exchange (speed 10...100 Mbps).

Modbus LEDs on safety PLCs XPS MF4020/MF4022

COM	Yellow	Off	No bus network signals being received or transmitted.
		On	Bus network signals being received or transmitted.
RDY	Green	Off	Transmission power not available.
		On	Equipment on.

Profibus LEDs on safety PLCs XPS MF4040/MF4042

RUN	Green	Off	Equipment not connected or not operational.
		On	Equipment operational.
ERR	Red	Off	Transmission power not available or the slave is exchanging data.
		On	Connection to other equipment is established and no data exchange is possible. Bus disconnected or bus Master not available.
		Flashing	A configuration error has occurred and no data exchange is possible.

Environment

Compact safety PLC type		XPS MF4000/4002, XPS MF4020/4022, XPS MF4040/4042	
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1 and IEC 61508)		Category 4 (EN 954-1/ISO 13849-1), SIL 3 (IEC 61508)	
Product certifications		EN/IEC 61131-2, EN 501156 pending, DIN V 19250, DIN V VDE 0801	
Ambient air temperature	For operation	°C	0...+ 60
	For storage	°C	- 40...+ 85, - 30...+ 85 with battery
Relative humidity		95% (supply not connected)	
Degree of protection Enclosure		IP 20, IP 54: mounted in enclosure conforming to EN 60204	
Pollution		Degree of pollution II	
Altitude		m	< 2000
Protection class		Class II, conforming to EN/IEC 61131-2	
Electromagnetic compatibility		Conforming to EN/IEC 61131-2	
Vibration resistance Operating conforming to EN/IEC 61131-2		1 gn, frequency 10...150 Hz	
Shock resistance Operating conforming to EN/IEC 61131-2		15 gn (duration 11 ms)	
Resistance to electrostatic discharges conforming to EN/IEC 61000-4-2		kV	4 contact, 8 air discharge
Immunity to high frequency interference conforming to EN/IEC 61000-4-3		V/m	10 (26 MHz...1 GHz)

Electrical characteristics

Supply	Voltage	V	≐ 24 (external supply with separate protection conforming to EN/IEC 61131-2)
	Voltage limits		- 15...+ 20%
Maximum consumption		A	8
Idle current		A	0.5
Immunity to momentary supply interruptions		ms	10
Protection		Internal fuse, 10 A	
Response time		ms	Depending on application
Clock		Supplied by backup capacitor for 1 week following loss of supply	
User memory	Application		250 Kb
	Data		250 Kb
LED display		Yes, see page 9	

Digital inputs

Number	Inputs not electrically isolated		24, configurable using software XPSMFWIN
Permissible current	At state 0	mA	1.5 max. at --- 24 V
	At state 1	mA	3.5 at --- 24 V
Input supply			3 x --- 20 V/100 mA (at 24 V)
Input resistance		kΩ	< 7
Overvoltage protection		V	- 10...+ 35
LED display			Yes, see page 9
Maximum distance of equipment		m	300

Digital outputs

Number	Outputs not electrically isolated		24, configurable using software XPSMFWIN
Output voltage		V	== 24 ± 2
Output current	Channels 1 to 3, 5 to 7, 9 to 11, 13 to 15, 17 to 19, 21 to 23	A	0.5 at 60 °C
	Channels 4, 8, 12, 16, 20 and 24	A	1 at 60 °C, 2 at 50 °C
Minimum load		mA	2 per channel
Leakage current at state 0		mA	1 max. at 2 V
Response to overloads			Shutdown of outputs concerned with cyclic reconnection
Total output current		A	7 max., shutdown of all outputs if exceeded with cyclic reconnection
LED display			Yes, see page 9
Maximum distance of equipment		m	300

Pulsed outputs

Number	Outputs not electrically isolated		8, for line control
Output voltage		V	20, depending on the supply voltage
Output current		mA	60
Minimum load		mA	None
Response to overload		4 x ≥ 19.2 V/60 mA (on 24 V), short-circuit current	
LED display		Yes, see page 9	

Communication

Ethernet network

■ Safety communication using SafeEthernet safety protocol

Compatibility		XPS MF4000/MF4002, XPS MF4020/MF4022, XPS MF4040/MF4042	
Transmission	Communication ports		2 x RJ45 with integrated switch
	Speed	Mbps	100
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable

■ Non safety communication using Modbus TCP/IP protocol

Compatibility		XPS MF4002, XPS MF4022, XPS MF4042	
Connection ports	Number and type		2 x RJ45
	Speed	Mbps	100
	Status		Premium automation platform slave
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable
Transparent Ready service	Class		A10
	Standard Ethernet TCP/IP communication services (supported by compact safety PLCs XPS MF40)		Modbus TCP/IP, Modbus serial
	TCP port		Standard 502
	Max. number of TCP connections		1 to 20

Modbus SL bus

Compatibility		XPS MF4020, XPS MF4022	
Serial link ports	Number and type		1 x RJ45 (TER)
	Status		Slave
Addressing			122 slaves max.
Physical layer			RS 485
Medium			Shielded dual twisted pair cable

Profibus bus

Compatibility		XPS MF4040.XPS MF4042	
Serial link ports	Number and type		1 x SUB-D 9-pin female (BUS)
	Status		Slave
Physical layer			RS 485
Medium			Shielded dual twisted pair cable, fibre optic

Connections (1)

Type of connection			Removable screw clamp terminal blocks	Removable spring terminal blocks
Supply connection	Number of terminal blocks		1	1
	For 1 cable without cable end		Solid or flexible 0.2...2.5 mm ² , AWG 24-12	–
	For 1 flexible cable with or without plastic cable end		0.25...2.5 mm ² , AWG 23-14	–
	For 2 cables of same diameter, without cable end		–	Solid or flexible 0.2...2.5 mm ² , AWG 24-12
	For 2 cables of same diameter, flexible without cable end		–	0.25...2.5 mm ² , AWG 23-12
	For 2 cables of same diameter, flexible with plastic cable end		–	0.25...2.5 mm ² , AWG 23-12
Cable connection	Tightening torque	Nm	0.5	–
	Bared length	mm	10	9
Connection to digital input channels, digital output channels, pulsed output channels	Number of terminal blocks		8	8
	For 1 cable without cable end		Solid or flexible 0.14...1.5 mm ² , AWG 25-15	–
	For 1 flexible cable without cable end		0.25...1.5 mm ² , AWG 23-15	–
	For 1 flexible cable with plastic cable end		0.25...0.5 mm ² , AWG 23-20	–
	For 2 cables of same diameter, without cable end		–	Solid or flexible: 0.14...1.5 mm ² , AWG 26-16
	For 2 cables of same diameter, flexible without cable end		–	0.25...0.34 mm ² , AWG 22
Cable connection	Tightening torque	Nm	0.22...0.25	–
	Bared length	mm	9	9

(1) AWG: American Wire Gauge.

Machine Safety

Preventa safety PLCs

Compact, type XPS MF40



XPS MF4000
XPS MF4002



XPS MF4020
XPS MF4022



XPS MF4040
XPS MF4042

Compact safety PLCs

≡ 24 V supply

Digital Inputs or Outputs	Pulsed outputs	Communication on			Reference	Weight kg
		Ethernet network	Modbus	Profibus		
		SafeEthernet protocol	TCP/IP protocol	SL bus		
0...24 configurable using software XPSMFWIN	8	Yes	–	–	XPS MF4000	1.000
		Yes, client	–	–	XPS MF4002	1.000
		–	Yes, slave	–	XPS MF4020	1.000
		Yes, client	Yes, slave	–	XPS MF4022	1.000
		–	–	Yes, slave	XPS MF4040	1.000
		Yes, client	–	Yes, slave	XPS MF4042	1.000

Configuration software

■ Reference SSV1XPSMFWIN is the full version of configuration software XPSMFWIN version 4.1 and must be installed if no previous version of this software has been installed.

■ Reference SSVXPSMFWINUP is an update for software XPSMFWIN and can be used if SSV1XPSMFWIN has been installed using Safety Suite V1. An update from version 4.1 to version 4.1-6150 for the software XPSMFWIN will then be performed.

Description	Operating system	Details	Languages	Reference	Weight kg
Configuration software XPSMFWIN for programming compact safety PLCs CD-ROM + user manual	Windows 2000, Windows XP	Software available on Safety Suite V2 software pack	English, German, French	SSV1XPSMFWIN	0.520
XPSMFWIN software update CD-ROM + user manual	Windows 2000, Windows XP	Software update available on Safety Suite V2 software pack	English, German, French	SSVXPSMFWINUP	0.520

Machine Safety

Preventa safety PLCs

Compact, type XPS MF40



ABL 7RE2403



ABL 1REM24042

Regulated switch mode power supplies, single-phase

Output voltage = 24 V

Mains input voltage 47...63 Hz	Nominal power	Nominal current	Auto-protect reset	Conformity to standard EN 61000-3-2	Reference	Weight
V	W	A				kg
~ 100...240 single-phase wide range	72	3	Automatic	No	ABL 7RE2403	0.520
	120	5	Automatic	No	ABL 7RE2405	1.000
	240	10	Automatic	No	ABL 7RE2410	2.200
	100	4.2	Automatic	No	ABL 1REM24042	0.640

Magelis multifunction graphic terminals with touch-sensitive screen and on-board Ethernet ^{(1) (2)}

Supply voltage = 24 V

Description	Ports: serial and communication (type of link)	Application memory	Reference	Weight kg
5.7" Monochrome black and white STN	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	16 Mb	XBT GT2130	1.000
Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	16 Mb	XBT GT2330	1.000
7.5" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT4330	1.800
10.4" Colour STN	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT5230	3.000
Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT5330	3.000
12.1" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT6330	3.000
15" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT7340	5.600

(1) Supplied with service instructions, USB connectors locking device and fixing kit.

(2) Other operator dialogue terminals, industrial PCs: please refer to our "Human Machine Interface" catalogue.



XBT GT2130, XBT GT2330



XBT GT4330



XBT GT5230



XBT GT6330



XBT GT7340



Connecting cables for network and bus

Connection to Ethernet network

Description	Pre-fitted connectors	Length (m)	Reference	Weight kg
Shielded twisted pair cables, straight through	2 RJ45 type connectors For connection to DTE (Data Terminal Equipment)	2	490 NTW 000 02 (1)	–
		5	490 NTW 000 05 (1)	–
		12	490 NTW 000 12 (1)	–
		40	490 NTW 000 40 (1)	–
		80	490 NTW 000 80 (1)	–
Shielded twisted pair cables, crossed wires	2 RJ45 type connectors For connection between hubs, switches and transceivers	5	490 NTC 000 05 (1)	–
		15	490 NTC 000 15 (1)	–
		40	490 NTC 000 40 (1)	–
		80	490 NTC 000 80 (1)	–

Connection to Modbus bus

Description	Use		Length (m)	Reference	Weight kg
	From	To			
Trunk cables, shielded dual twisted pair, RS 485	Compact safety PLCs XPS MF4020/MF4022 (RJ45)	Modbus splitter box LU9 GC3 (RJ45)	100	TSX SCA 100	5.680
			200	TSX SCA 200	10.920
			500	TSX SCA 500	30.000
	Graphic terminals XBT GT (SUB-D 9-pin)	Modbus splitter box LU9 GC3 (RJ45)	2.5	XBT Z938 (2)	0.210
Adaptor for cable XBT Z938	SUB-D 9-pin (XBT GT)	XBT Z938 (SUB-D 25-pin)	0.2	XBT ZG909	–

Description	Characteristics	Sold in lots of	Unit reference	Weight kg
End of line adaptors For RJ45 type connector	R = 120 Ω, C = 1 nF	2	VW3 A8 306 RC	0.200
	R = 150 Ω	2	VW3 A8 306 R	0.010

Profibus DP bus connection components

Description	Profile	Services	Reference	Weight kg
Profibus DP module set for Premium PLCs	Master, 12 Mbps	Class 1 and Class 2 master V0 functions, see characteristics. Profibus FMS messaging not supported	TSX PBY 100	0.870

Description	Use	Reference	Weight kg
Remote inputs/outputs on Profibus DP bus	Advantys STB network interface module	STB NDP 2112	0.140
	Momentum communication module	170 DTN 110 00	–

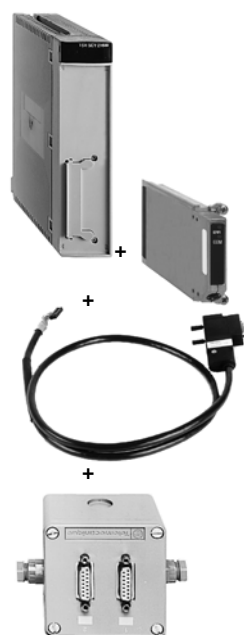
Connectors for remote I/O communication module	Line terminator	490 NAD 911 03	–
	Intermediate connection	490 NAD 911 04	–
	Intermediate connection and terminal port	490 NAD 911 05	–

Description	Length (m)	Reference	Weight kg
Profibus DP connecting cables	100	TSX PBS CA 100	–
	400	TSX PBS CA 400	–

Description	Reference	Weight kg
Replacement parts	Main bus junction box	490 NAE 911 00
	PCMCIA card	467 NHP 811 00

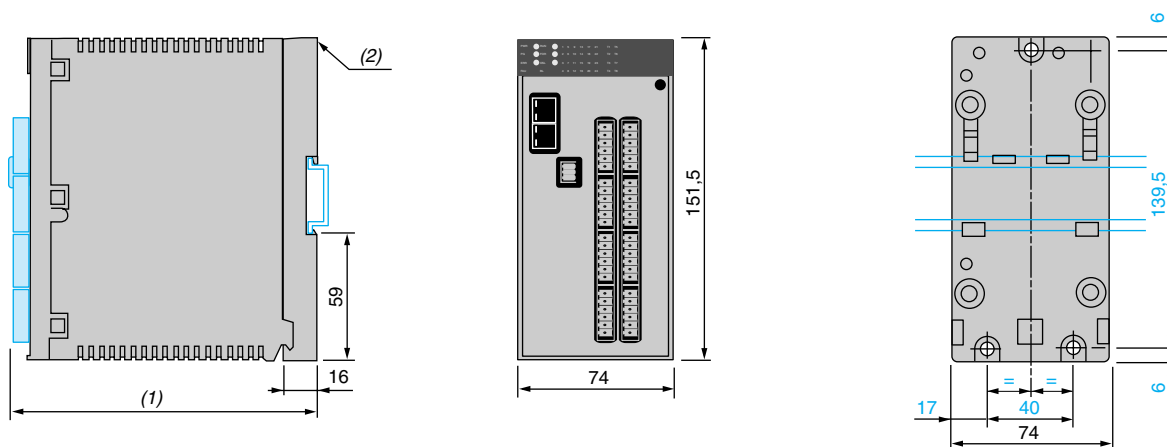
(1) Cable conforming to standard EIA/TIA-568 category 5 and IEC 1180/EN 50 173 class D. For UL and CSA 22.1 approved cables, add the letter **U** to the end of the reference.

(2) Requires adaptor XBT ZG909.



Dimensions

XPS MF40



(1) 153 mm with screw terminal block, 151.4 with spring terminal block.

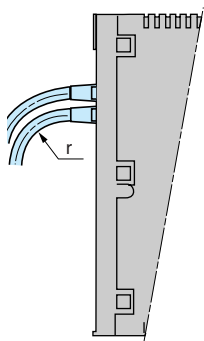
(2) Metal adaptor for mounting on metal 35 mm rail

Mounting

Mounting precautions relating to connectors

Access to Ethernet network

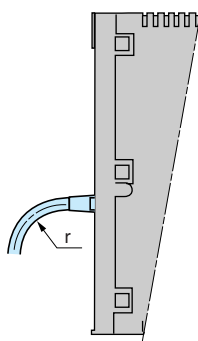
RJ45 sockets



$r = 22.5 \text{ min.}$

Access to Modbus bus

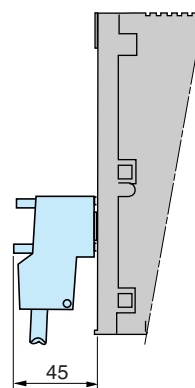
RJ45 socket



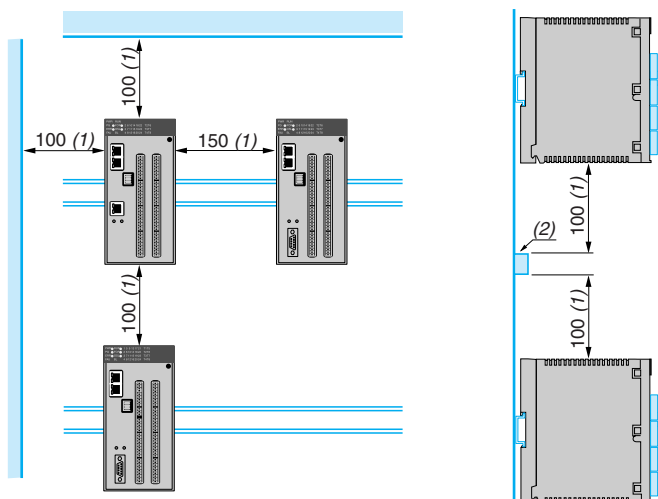
$r = 22.5 \text{ min.}$

Access to Profibus bus

Connector 490 NAD 911 03 in SUB-D 9-pin socket



Mounting in panel or enclosure

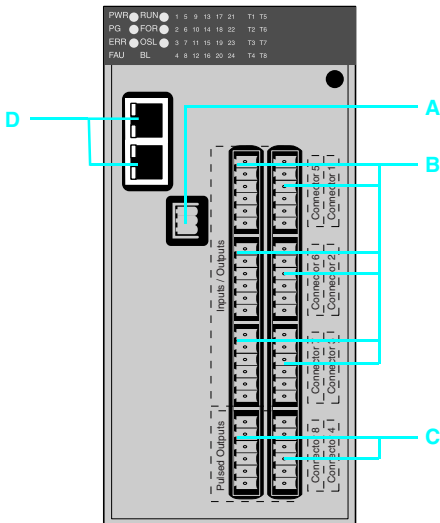


(1) Minimum recommended value.

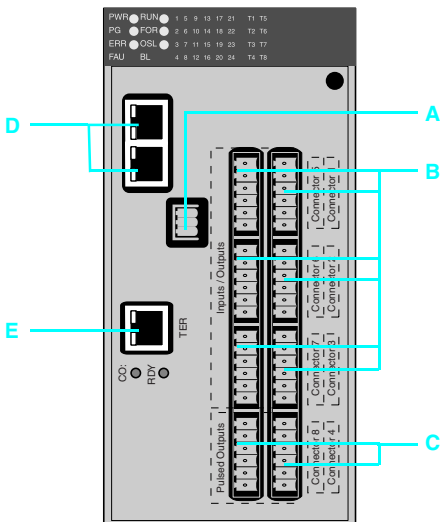
(2) Prefabricated electrical ducting for passage of cables.

Machine Safety
Preventa safety PLCs
Compact, type XPS MF40

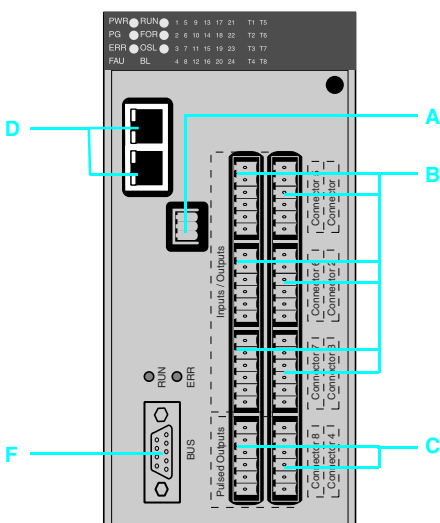
Connections



XPS MF4000/MF4002



XPS MF4020/MF4022



XPS MF4040/MF4042

XPS MF4000/MF4002, XPS MF4020/MF4022, XPSMF4040/MF4042

Item	Connection	Connector	Screw	Function
A	Supply	Supply	24 V	24 V
			0 V	24 V (reference pole)
			FE	Earth (1)
B	Digital Inputs or Outputs	Connector 1	S+	Supply to Inputs/Outputs 1 to 4
			1	Input/Output 1
			2	Input/Output 2
			3	Input/Output 3
			4	Input/Output 4
			L-	Inputs/Outputs 1 to 4 common
		Connector 2	S+	Supply to Inputs/Outputs 5 to 8
			5	Input/Output 5
			6	Input/Output 6
			7	Input/Output 7
			8	Input/Output 8
			L-	Inputs/Outputs 5 to 8 common
		Connector 3	S+	Supply to Inputs/Outputs 9 to 12
			9	Input/Output 9
			10	Input/Output 10
			11	Input/Output 11
			12	Input/Output 12
			L-	Inputs/Outputs 9 to 12 common
		Connector 5	S+	Supply to Inputs/Outputs 13 to 16
			13	Input/Output 13
			14	Input/Output 14
			15	Input/Output 15
			16	Input/Output 16
			L-	Inputs/Outputs 13 to 16 common
		Connector 6	S+	Supply to Inputs/Outputs 17 to 20
			17	Input/Output 17
			18	Input/Output 18
			19	Input/Output 19
			20	Input/Output 20
			L-	Inputs/Outputs 17 to 20 common
		Connector 7	S+	Supply to Inputs/Outputs 21 to 24
			21	Input/Output 21
			22	Input/Output 22
			23	Input/Output 23
			24	Input/Output 24
			L-	Inputs/Outputs 21 to 24 common
C	Pulsed outputs	Connector 4	L-	Outputs 1 to 4 common
			1	Output 1
			2	Output 2
			3	Output 3
			4	Output 4
			L-	Outputs 1 to 4 common
		Connector 8	L-	Outputs 5 to 8 common
			5	Output 5
			6	Output 6
			7	Output 7
			8	Output 8
			L-	Outputs 5 to 8 common
D	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

Item	Connection	Type	Function
D	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.

XPS MF4020/MF4022

Item	Connection	Type	Function
E	Communication	RJ45 (TER)	XPS MF4020/MF4022: slaves on Modbus bus

XPS MF4040/MF4042

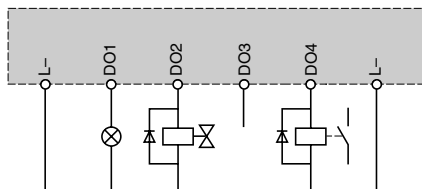
Item	Connection	Type	Function
F	Communication	SUB-D 9-pin female (BUS)	XPS MF4040/MF4042: slaves on Profibus bus

(1) Earthed when mounting on plate or rail.

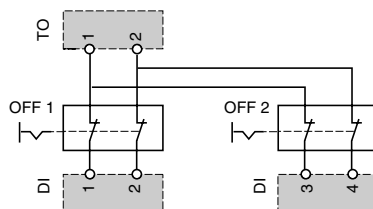
Connections

Connection examples

Actuator connections to the outputs



Emergency stop connections (line control)



Machine Safety

Preventa safety PLCs

Compact, type XPS MF31/30/35



XPS MF31222



XPS MF3022



XPS MF3500

Products referenced XPS MF31222, XPS MF3022 and XPS MF3500 are marked HIMatrix F31, HIMatrix F30 and HIMatrix F35 (manufactured by Himma, sold by Schneider Electric).

Presentation

Preventa compact safety PLCs type XPS MF offer an automated line control solution in conjunction with the monitoring of safety functions that are required for the protection of personnel and the safety of machines. They are designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ISO 13849-1. The compact safety PLC range XPS MF is based around 5 compact PLCs that are differentiated by their characteristics.

Compact PLCs XPS	Inputs			Outputs Digital	Communication	
	Digital	Analogue	Counter		On Ethernet network	On serial bus
MF31222	20	–	–	8	Using SafeEthernet safety protocol	–
MF3022	20	–	–	8	Using SafeEthernet safety protocol	Modbus Slave
MF3502	24	8	2	8	Using SafeEthernet safety protocol	–
MF3522	24	8	2	8	Using SafeEthernet safety protocol	Modbus Slave
MF3542	24	8	2	8	Using SafeEthernet safety protocol	Profibus Slave

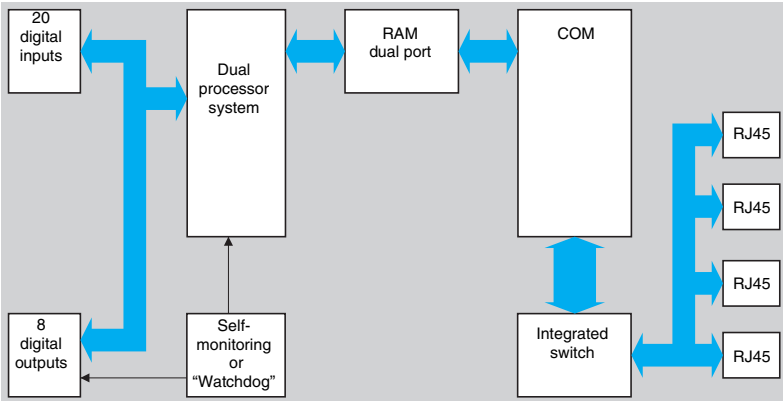
Safety PLCs

In order to comply with safety requirements, the compact PLCs XPS MF integrate two essential functions conforming to category 4 of EN 954-1/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between the safety PLCs and the decentralised safety I/O modules (Special Switch).

- **Redundancy:** the dual processor integrated in the compact safety PLCs analyses and compares the information received from the safety inputs and outputs. The incoming and outgoing information (programmed values and received values) are received in parallel by the two processors and compared in real-time.
- **“Watchdog” or self-monitoring:** the compact safety PLCs continuously monitor the information processing cycle and the execution of tasks, and intervene if the time of a cycle does not conform to the predefined value.
- **The integrated switch (Special Switch)** stores for a very short time and sends at very high speed the information provided by the inputs and outputs of the safety PLCs on Ethernet network, whilst avoiding signal collisions and excessive amounts of data on the network.

Functional synoptics

Compact safety PLC XPS MF31222



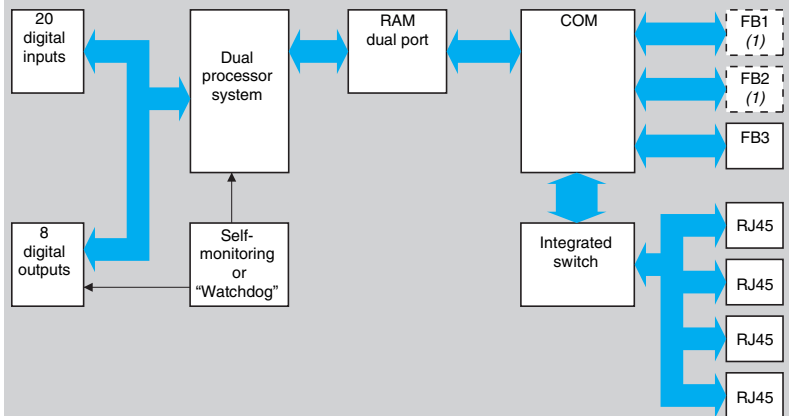
Machine Safety

Preventa safety PLCs

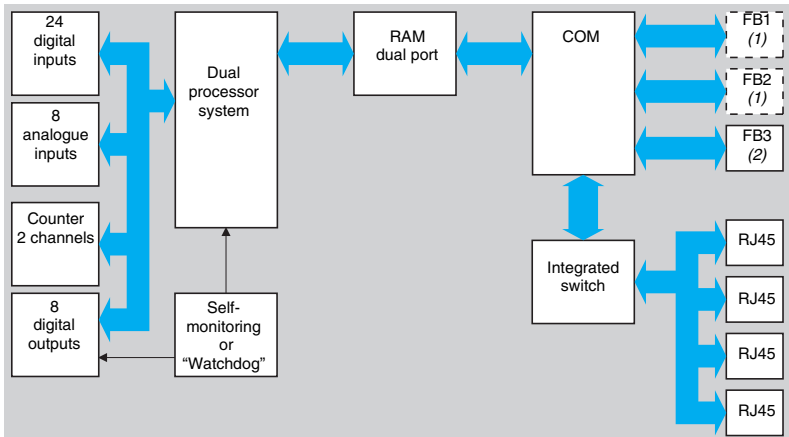
Compact, type XPS MF31/30/35

Functional synoptics (continued)

Compact safety PLC XPS MF3022



Compact safety PLCs XPS MF3500



Line control on XPS MF31222 and XPS MF3022

Line control is a means of short-circuit and line break monitoring, for example Emergency stop inputs to category 4 of standard EN 954-1/ISO 13849-1, that is configurable in compact safety PLCs XPS MF31222 and MF3022. Digital outputs 1 to 8 are connected to the digital inputs of the same circuit. The pulses are automatic on the digital outputs: that drive the monitoring of the digital input lines.

Programming automated safety functions

Software XPSMFWIN (reference SSV1XPSMFWIN or SSVXPSMFWINUP) running on a PC enables:

- Programming of the safety functions of compact PLCs XPS MF,
- Configuration of the bus and industrial communication networks,
- Configuration and IP addressing of the automation line sensors/actuators,
- Programming of alarms via the power supply system.

See programming using software XPSMFWIN, pages 98 to 103.

By using a PC, Magelis graphic terminal type XBT GT or a Premium automation platform and connecting to the RJ45 socket of compact safety PLCs XPS MF, an automation line can, at any time or point, be supervised and controlled.

- Using a PC: system programming, selection of communication network etc.
- Using a graphic terminal or Premium automation platform: diagnostics, cycle monitoring, etc.

(1) FB1 and FB2 not used.

(2) FB3 not available on PLC XPS MF3502.

Machine Safety

Preventa safety PLCs

Compact, type XPS MF31/30/35

Digital inputs

All compact safety PLCs type XPS MF3●●●● incorporate digital type inputs for connection to the hazardous zones of machines to be monitored (1).

Compact PLCs XPS	Digital inputs			
	N°	Safety detection	Safety dialogue	Safety control
MF31222	20	Limit switches, Guard switches, with reset and with actuator, Safety light curtains type 2 and type 4, Safety mats and sensing edges...(2)	Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations...(2)	Switch disconnectors mini-Vario and Vario...(2)
MF3022	20			
MF3502	24			
MF3522	24			
MF3542	24			

Analogue inputs

Compact safety PLCs XPS MF35●● incorporate 8 analogue measuring inputs for connection to the hazardous zones of machines to be monitored (1) (3).

Compact PLCs XPS	Analogue inputs with transmitter supply	
	N°	Functions
MF3502	8	Closed circuit scanning of input channels, Single-pole measuring of 0 to 10 V voltages, Measuring, with equipotential link, currents from 0 to 20 mA
MF3522	8	
MF3542	8	

Counter inputs

Compact safety PLCs type XPS MF35●● incorporate 2 independent and configurable counting channels: one channel for counting and one channel for increasing or decreasing counting direction (1).

Compact PLCs XPS	Counting inputs		
	N°	≡ 5 V	≡ 24 V
MF3502	2	Incremental encoders	Sensors, 2/3-wire PNP/NPN
MF3522	2		
MF3542	2		

Digital outputs

All compact safety PLCs type XPS MF●●●● incorporate 8 digital type outputs for connection to signalling equipment and to the hazardous zones of machines to be controlled (1).

Compact PLCs XPS	Digital outputs		
	N°	Safety dialogue	Safety control
MF31222	8	Beacons and indicator banks, Rotating mirror beacons, Sirens... (2)	Enclosed thermal-magnetic motor circuit-breakers, Enclosed D.O.L. starters for motor control, Power contactors... (2)
MF3022	8		
MF3502	8		
MF3522	8		
MF3542	8		

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with compact safety PLCs XPS MF31/30/35.

(2) Please refer to our "Safety solutions using Preventa" catalogue.

(3) Use shielded dual twisted pair cables, maximum length 300 m, short-circuit unused analogue inputs.

Machine Safety

Preventa safety PLCs

Compact, type XPS MF31/30/35

Decentralised inputs/outputs

In addition to the inputs/outputs integrated as standard, compact safety PLCs can accept supporting decentralised input modules type XPS MF1 and/or decentralised output modules type XPS MF2 and/or mixed decentralised I/O modules type XPS MF3.

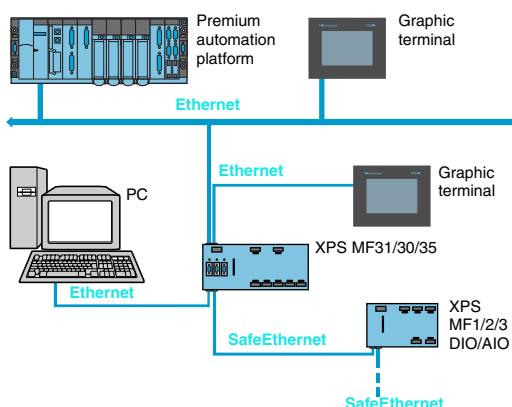
These decentralised input, output and I/O modules are located in the vicinity of hazardous zones of machines to be monitored and increase the I/O capacity of the compact safety PLCs, see pages 66, 70 and 80.

Communication between the compact safety PLCs and decentralised input, output and I/O modules is performed on the Ethernet network using SafeEthernet safety communication protocol, via the RJ45 communication ports.

Safety communication on Ethernet network

■ Communication between the PC, Magelis graphic terminal or automation platform (Premium) and the compact safety PLCs is achieved by Ethernet connection, via the RJ45 communication ports of the compact PLC.

■ Connection on the Ethernet network enables integration of the compact safety PLCs XPS MF31/30/35 of a safety installation within a type A10 Transparent Ready™ system.



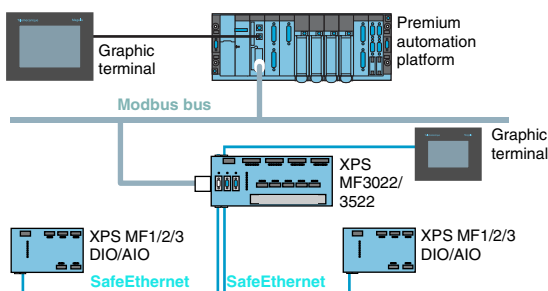
Compact PLCs XPS	Telemecanique Transparent Ready™		
	Class	Communication protocols	
		safety	non safety
MF31222	A10	SafeEthernet	Modbus TCP/IP
MF3022			
MF3502			
MF3522			
MF3542			

Industrial communication

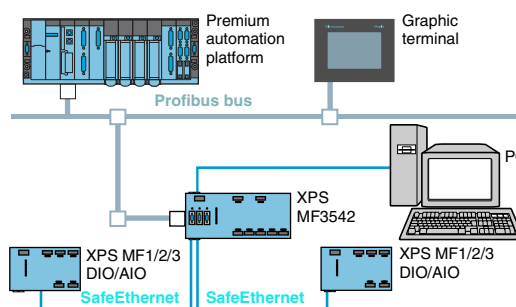
All compact safety PLCs XPS MF3022, XPS MF3522 and XPS MF3542 incorporate an FB3 (SUB-D 9-pin connector) which enables their integration in an industrial architecture. See pages 94 and 95.

Examples

■ On Modbus bus, the compact safety PLCs XPS MF3022 and XPS MF3522 are slaves of a Premium automation platform.



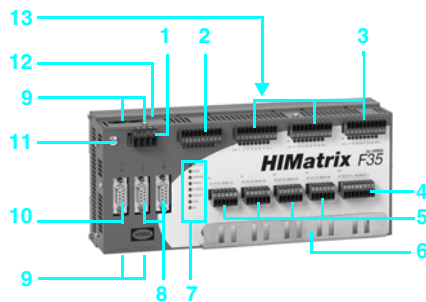
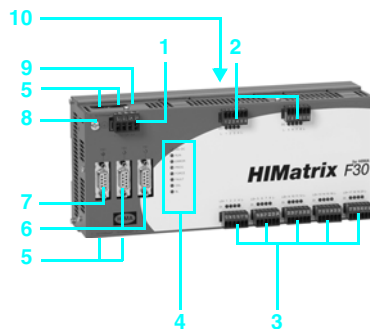
■ On Profibus bus, the compact safety PLC XPS MF3542 is a slave of a Premium automation platform.



Machine Safety

Preventa safety PLCs

Compact, type XPS MF31/30/35



Description

Safety PLCs XPS MF31222 and XPS MF3022

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\pm$ 24 V supply.
- 2 Two terminal blocks (1) for connection of digital outputs, with output status LED (four LEDs per terminal block).
- 3 Five terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 4 Eight process status LEDs.
- 5 Four RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 6 Two unused FB1 and FB2 connectors (2).
- 7 One FB3 (type SUB-D 9-pin female) connector for connection to Modbus bus (XPS MF3022 only).
- 8 One earth connection screw.

On the top:

- 9 One "Reset" button.

On the rear face:

- 10 One spring operated fixing device for mounting on rail.

Safety PLCs XPS MF3500

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\pm$ 24 V supply.
- 2 One terminal block (1) for connection of digital outputs, with four digital output status LEDs.
- 3 Three terminal blocks (1) for connection of digital inputs, with input status LED (eight LEDs per terminal block).
- 4 One terminal block (1) for connection of 2 counting input channels.
- 5 Four terminal blocks (1) for connection of analogue inputs.
- 6 One plate for securing shielded analogue input connection cables.
- 7 Eight process status LEDs.
- 8 Two unused FB1 and FB2 connectors.
- 9 Four RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 10 One FB3 (type SUB-D 9-pin female) connector for connection to Profibus bus (XPS MF3542) or Modbus bus (XPS MF3502).
- 11 One earth connection screw.

On the top:

- 12 One "Reset" button.

On the rear face:

- 13 One spring operated fixing device for mounting on rail.

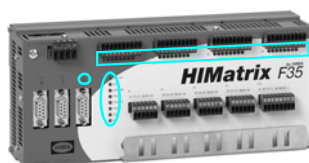
(1) Removable screw terminal blocks, with locating devices, included with compact safety PLCs XPS MF31/30/35.

(2) Only applicable to compact safety PLC XPS MF3022.

Machine Safety

Preventa safety PLCs

Compact, type XPS MF31/30/35



Status LED details

Compact safety PLCs XPS MF31222, XPS MF3022 and XPS MF35●●

LED	Colour	Status	Meaning
FB1, FB2	—	—	Not used.
FB3	Orange	On	Communication on Modbus or Profibus bus (1) active.
Inputs 1 to 20	Orange	On	Inputs active.
Outputs 1 to 8	Orange	On	Outputs active.
24 VDC	Green	On	24 V voltage present.
		Off	No voltage.
RUN	Green	On	Normal service mode, loaded program running, the PLC receives I/O messages, communication and hardware/software tests carried out.
		Flashing	The CPU is in STOP and is not executing any user application. All the outputs are reset to a safe, de-energised state.
		Off	The CPU is in "ERROR" state (see ERROR).
ERROR	Red	On	Software error or hardware fault detected by the CPU. The monitoring program (Watchdog) has triggered the STOP state of the process because the programmed cycle time has been exceeded. The CPU has stopped the execution of the user application, ended all hardware and software tests and all outputs have been reset. The process can only be started again from the PC.
		Off	No errors detected.
		Flashing	The CPU is being loaded with a new configuration. The FLASH ROM is being loaded with a new operating system.
PROG	Orange	On	No loading of configuration or operating system.
		Flashing	The CPU is in RUN mode and force is active.
		Off	The system is not processing (STOP), but force is prepared and is activated if the dual processor is started.
FORCE	Orange	On	Force mode not activated.
		Flashing	Error display for line control. The user application has caused an error. The system configuration is defective. The loading of a new operating system was defective and the operating system is corrupt.
		Off	An error has occurred whilst writing to FLASH ROM memory (during updating of the operating system). One or more I/O errors have occurred.
FAULT	Orange	On	None of the above errors have occurred.
		Flashing	Emergency loading of the operating system is active.
		Off	COM in INIT_Fail state.
OSL	Orange	Flashing	Full duplex mode operation.
BL	Orange	Flashing	Signal collision.
RJ45	Green	On	Half duplex mode operation, no collision.
		Flashing	Connection established.
		Off	Interface active.

(1) Depending on compact safety PLC model.

Environment

Compact safety PLC type		XPS MF31222	XPS MF3022	XPS MF3502, XPS MF3522, XPS MF3542
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1 and IEC 61508)		Category 4 (EN 954-1/ISO 13849-1), SIL 3 (IEC 61508)		
Product certifications		IEC 61131, EN 50156 pending, DIN V 19250, DIN V VDE 0801		
Ambient air temperature For operation conforming to EN 61131-2	For operation	°C	0...+ 60	
	For storage	°C	- 40...+ 85 - 30...+ 85 with battery	
Relative humidity			95% (supply not connected)	
Degree of protection Enclosure			IP 20, IP 54: mounted in enclosure conforming to EN 60204	
Pollution			Degree of pollution II	
Altitude		m	< 2000	
Protection class			Class II, conforming to EN/IEC 61131-2	
Electromagnetic compatibility			Conforming to IEC 61131-2	
Vibration resistance Operating conforming to EN 61131-2			1 gn, frequency 10...150 Hz	
Shock resistance Operating conforming to EN 61131-2			15 gn (duration 11 ms)	
Resistance to electrostatic discharges conforming to EN/IEC 61000-4-2		kV	4 contact, 8 air discharge	
Immunity to high frequency interference conforming to EN/IEC 61000-4-3		V/m	10 (26 MHz...1 GHz)	

Electrical characteristics

Supply	Voltage	V	--- 24 (external supply with separate protection conforming to IEC 61131-2)		
	Voltage limits		- 15...+ 20%		
Maximum consumption		A	8	8	9
Idle current		A	0.4	0.5	0.75
Immunity to momentary supply interruptions		ms	10		
Protection			Internal fuse		
Response time		ms	Depending on application		
Clock			Supplied by backup capacitor for 1 week following loss of supply		
User memory	Application		250 Kb		
	Data		250 Kb		
LED display			Yes, see page 23		
Digital inputs					
Number	Inputs not electrically isolated		20		24
Permissible current	At state 0	mA	1.5 max., 1 mA at 5 V	1.5 max., 1.25 mA at 5 V	1.5 max., 1 mA at 5 V
	At state 1	mA	≥ 2 at --- 15 V	> 2 at --- 15 V	Approx. 3.5 at --- 24 V Approx. 4.5 at --- 30 V
Input supply			5 x 20 V/100 mA (at 24 V)		20 V/100 mA
Input protection			Protected against short-circuits, short-circuits to earth		
Overvoltage protection		V	500, conforming to IEC 61000-4-5		
Switching point		V	Typically 7.5		—
Current		mA	> 2 (--- 15 V)		—
LED display			Yes, see page 23		
Maximum distance of equipment		m	100		
Digital outputs					
Number	Outputs not electrically isolated		8		
Output voltage		V	--- 24 ± 2		
Output current	Channels 1 to 3 and 5 to 7	A	0.5 at 60 °C		
	Channels 4 and 8	A	1 at 60 °C, 2 at 50 °C		
Minimum load		mA	2 per channel		
Leakage current at state 0		mA	1 max. at 2 V		
Output overloads			Shutdown of outputs concerned with cyclic reconnection		
Total output current		A	7 max., shutdown of all outputs if exceeded with cyclic reconnection		
LED display			Yes, see page 23		
Maximum distance of equipment		m	100		

Electrical characteristics (continued)				
Compact safety PLC type		XPS MF3502, XPS MF3522, XPS MF3542		
Analogue inputs				
Number	Inputs not electrically isolated		8, single-pole	
External equipotential link		Ω	250 or 500 depending on application	
Input values	Nominal value	V	0...10	
		mA	0...20, with 500 Ω equipotential link	
	Service value	V	0.1...11.5	
		mA	0.4...23, with 500 Ω equipotential link	
Input impedance		MΩ	1	
Maximum distance of equipment		m	300	
Internal resistance of signal source		Ω	≤ 500	
Overvoltage protection		V	+ 15, - 4	
Resolution (A/D converter)			12-bit	
Safety accuracy			± 2%	
LED display			Yes, see page 23	
Counting inputs				
Number	Counter		2, not electrically isolated	
	Inputs		3 on each pole (A, B, Z)	
Input voltages	High threshold 5 V	V	4...6	
	High threshold 24 V	V	13...33	
	Low threshold 5 V	V	0...0.5	
	Low threshold 24 V	V	- 3...5	
Input currents		mA	1.4 at 5 V 6.5 at 24 V	
Input impedance		kΩ	3.7	
Maximum distance of equipment		m	500, with shielded dual twisted pair cable	
Up/down counting resolution			24-bit	
Input frequency		kHz	100, at 5 and 24 V	
Triggering			On falling edge	
Edge steepness		V/μs	1	
LED display			Yes, see page 23	
Communication				
Ethernet network: safety communication using SafeEthernet protocol				
Compatibility		XPS MF31222	XPS MF3022	XPS MF3502, XPS MF3522, XPS MF3542
Transmission	Communication ports		4 x RJ45 With integrated switch	
	Speed	Mbps	100	
Structure		10BASE-T/100BASE-TX		
Medium		Dual twisted pair cable		
Modbus bus				
Compatibility		XPS MF31222	XPS MF3022	XPS MF3522
Serial link ports	Number and type	–	1 x SUB-D 9-pin female (FB3)	
	Status	–	Slave	
Addressing		–	122 slaves max.	
Physical layer		–	RS 485	
Medium		–	Shielded dual twisted pair cable	
Profibus bus				
Compatibility		XPS MF31222	XPS MF3022	XPS MF3542
Serial link ports	Number and type	–	–	1 x SUB-D 9-pin female
	Status	–	–	Master/Slave
Physical layer		–	–	RS 485
Medium		–	–	Shielded dual twisted pair cable, fibre optic

Connections ⁽¹⁾				
Compact safety PLC type		XPS MF31222	XPS MF3022	XPS MF3502, XPS MF3522, XPS MF3542
Type of connection		Screw clamp terminal blocks, removable and coded for correct location		
Supply connection	Number of terminal blocks	1		
	For 1 cable without cable end	Solid or flexible 0.2...2.5 mm ² , AWG 24-12		
	For 1 flexible cable with or without plastic cable end	0.25...2.5 mm ² , AWG 22-16		
	For 2 cables of same diameter, without cable end	Solid or flexible 0.2...1.5 mm ² , AWG 24-12		
	For 2 cables of same diameter, flexible without cable end	0.25...1.0 mm ² , AWG 22-18		
	For 2 cables of same diameter, flexible with plastic cable end	0.5...1.5 mm ² , AWG 22-16		
Digital input channel and output channel connection	Number of terminal blocks	5 (inputs) and 2 (outputs)	5 (inputs) and 2 (outputs)	3 (inputs) and 1 (output)
	For 1 cable without cable end	Solid or flexible 0.14...1.5 mm ² , AWG 28-16		
	For 1 flexible cable without cable end	0.25...1.5 mm ² , AWG 22-16		
	For 1 flexible cable with plastic cable end	0.25...0.5 mm ² , AWG 22-20		
	For 2 cables of same diameter, without cable end	Solid: 0.14...0.5 mm ² , AWG 28-20 Flexible: 0.14...0.75 mm ² , AWG 28-18		
	For 2 cables of same diameter, flexible without cable end	0.25...0.34 mm ² , AWG 22		
Analogue input channel connection	For 2 cables of same diameter, flexible with plastic cable end	0.5 mm ² , AWG 20		
	Number of terminal blocks	–	–	4
	For 1 cable without cable end	–	–	Solid or flexible 0.14...1.5 mm ² , AWG 28-16
	For 1 flexible cable without cable end	–	–	0.25...1.5 mm ² , AWG 22-16
	For 1 flexible cable with plastic cable end	–	–	0.25...0.5 mm ² , AWG 22-20
	For 2 cables of same diameter, without cable end	–	–	Solid: 0.14...0.5 mm ² , AWG 28-20 Flexible: 0.14...0.75 mm ² , AWG 28-18
Counting channel connection	For 2 cables of same diameter, flexible without cable end	–	–	0.25...0.34 mm ² , AWG 22
	For 2 cables of same diameter, flexible with plastic cable end	–	–	0.5 mm ² , AWG 20
	Number of terminal blocks	–	–	1
	For 1 cable without cable end	–	–	Solid or flexible 0.14...1.5 mm ² , AWG 28-16
	For 1 flexible cable without cable end	–	–	0.25...1.5 mm ² , AWG 22-16
	For 1 flexible cable with plastic cable end	–	–	0.25...0.5 mm ² , AWG 22-20
Cable connection	For 2 cables of same diameter, without cable end	–	–	Solid: 0.14...0.5 mm ² , AWG 28-20 Flexible: 0.14...0.75 mm ² , AWG 28-18
	For 2 cables of same diameter, flexible without cable end	–	–	0.25...0.34 mm ² , AWG 22
	For 2 cables of same diameter, flexible with plastic cable end	–	–	0.5 mm ² , AWG 20
	Tightening torque	Nm	0.22...0.25	
Cable connection	Bared length	mm	9	

(1) AWG: American Wire Gauge.

Machine Safety

Preventa safety PLCs

Compact, type XPS MF31/30/35

Compact safety PLCs

== 24 V supply

Inputs			Outputs Digital	Communication on			Reference	Weight kg
Digital	Analogue	Counting		Ethernet network	Modbus SL bus	Profibus bus		
20	–	–	8	Yes, using SafeEthernet protocol	–	–	XPS MF31222	1.000
					Yes Slave	–	XPS MF3022	1.200
24	8	2	8	Yes, using SafeEthernet protocol	–	–	XPS MF3502	1.200
					Yes Slave	–	XPS MF3522	1.200
					–	Yes Slave	XPS MF3542	1.200



XPS MF31222



XPS MF3022



XPS MF3502

Products referenced **XPS MF31222**, **XPS MF3022** and **XPS MF3502** are marked **HIMatrix F31**, **HIMatrix F30** and **HIMatrix F35** (manufactured by Hima, sold by Schneider Electric).

Configuration software

- Reference SSV1XPSMFWIN is the full version of configuration software XPSMFWIN version 4.1 and must be installed if no previous version of this software has been installed.
- Reference SSVXPSMFWINUP is an update for software XPSMFWIN and can be used if SSV1XPSMFWIN has been installed using Safety Suite V1. An update from version 4.1 to version 4.1-6150 for the software XPSMFWIN will then be performed.

Description	Operating system	Details	Languages	Reference	Weight kg
Configuration software XPSMFWIN for programming compact safety PLCs CD-ROM + user manual	Windows 2000, Windows XP	Software available on Safety Suite V2 software pack	English, German, French	SSV1XPSMFWIN	0.520
XPSMFWIN software update CD-ROM + user manual	Windows 2000, Windows XP	Software update available on Safety Suite V2 software pack	English, German, French	SSVXPSMFWINUP	0.520

Machine Safety

Preventa safety PLCs

Compact, type XPS MF31/30/35



ABL 7RE2403



ABL 1REM24042

Regulated switch mode power supplies, single-phase

Output voltage = 24 V

Mains input voltage 47...63 Hz	Nominal power	Nominal current	Auto-protect reset	Conformity to standard EN 61000-3-2	Reference	Weight
V	W	A				kg
~ 100...240 single-phase wide range	72	3	Automatic	No	ABL 7RE2403	0.520
	120	5	Automatic	No	ABL 7RE2405	1.000
	240	10	Automatic	No	ABL 7RE2410	2.200
	100	4.2	Automatic	No	ABL 1REM24042	0.640

Magelis multifunction graphic terminals with touch-sensitive screen and on-board Ethernet ^{(1) (2)}

Supply voltage = 24 V

Description	Ports: serial and communication (type of link)	Application memory	Reference	Weight kg
5.7" Monochrome black and white STN	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	16 Mb	XBT GT2130	1.000
Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	16 Mb	XBT GT2330	1.000
7.5" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT4330	1.800
10.4" Colour STN	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT5230	3.000
Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT5330	3.000
12.1" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT6330	3.000
15" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT7340	5.600

(1) Supplied with service instructions, USB connectors locking device and fixing kit.

(2) Other operator dialogue terminals, industrial PCs: please refer to our "Human Machine Interface" catalogue.



XBT GT2130, XBT GT2330



XBT GT4330



XBT GT5230



XBT GT6330



XBT GT7340



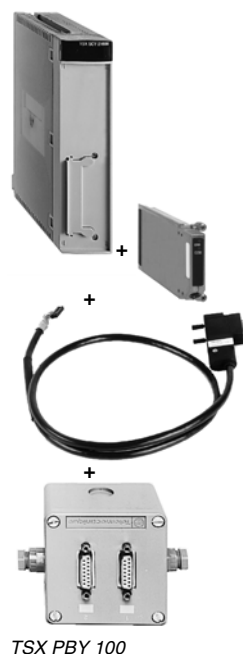
Connecting cables for network and bus

Connection to Ethernet network

Description	Pre-fitted connectors	Length (m)	Reference	Weight kg
Shielded twisted pair cables, straight through	2 RJ45 type connectors For connection to DTE (Data Terminal Equipment)	2	490 NTW 000 02 (1)	–
		5	490 NTW 000 05 (1)	–
		12	490 NTW 000 12 (1)	–
		40	490 NTW 000 40 (1)	–
		80	490 NTW 000 80 (1)	–
Shielded twisted pair cables, crossed wires	2 RJ45 type connectors For connection between hubs, switches and transceivers	5	490 NTC 000 05 (1)	–
		15	490 NTC 000 15 (1)	–
		40	490 NTC 000 40 (1)	–
		80	490 NTC 000 80 (1)	–

Connection to Modbus bus

Description	Use		Length (m)	Reference	Weight kg
	From	To			
Modbus bus connecting cables	Compact PLCs XPS MF3022/3522 + adaptor XPS MFADAPT (RJ45)	Modbus splitter box LU9 GC3 (RJ45)	0.3	VW3 A8 306 R03	0.025
			1	VW3 A8 306 R10	0.060
			3	VW3 A8 306 R30	1.130
		Premium module TSX SCY 21601 (SUB-D 25-pin)	0.3	XPS MCSCY	–
	Graphic terminals XBT GT (SUB-D 9-pin)	Modbus splitter box LU9 GC3 (RJ45)	2.5	XBT Z938 (2)	0.210
Adaptor for cable XBT Z938	SUB-D 9-pin (XBT GT)	XBT Z938 (SUB-D 25-pin)	0.2	XBT ZG909	–
Adaptor SUB-D 9-pin/RJ45	Compact PLCs (SUB-D 9-pin)	Connecting cables for Modbus bus (RJ45)	–	XPS MFADAPT	–
Description	Characteristics	Sold in lots of		Unit reference	Weight kg
End of line adaptors For RJ45 type connector	R = 120 Ω, C = 1 nF	2		VW3 A8 306 RC	0.200
	R = 150 Ω	2		VW3 A8 306 R	0.010



Profibus DP bus connection components

Profibus DP bus connection components				
Description	Profile	Services	Reference	Weight kg
Profibus DP module set for Premium PLCs	Master, 12 Mbps	Class 1 and Class 2 master V0 functions, see characteristics. Profibus FMS messaging not supported	TSX PBY 100	0.870
Description	Use		Reference	Weight kg
Remote inputs/outputs on Profibus DP bus	Advantys STB network interface module		STB NDP 2112	0.140
	Momentum communication module		170 DTN 110 00	—
Connectors for remote I/O communication module	Line terminator		490 NAD 911 03	—
	Intermediate connection		490 NAD 911 04	—
	Intermediate connection and terminal port		490 NAD 911 05	—
Description	Length (m)		Reference	Weight kg
Profibus DP connecting cables	100		TSX PBS CA 100	—
	400		TSX PBS CA 400	—
Description			Reference	Weight kg
Replacement parts	Main bus junction box		490 NAE 911 00	—
	PCMCIA card		467 NHP 811 00	—

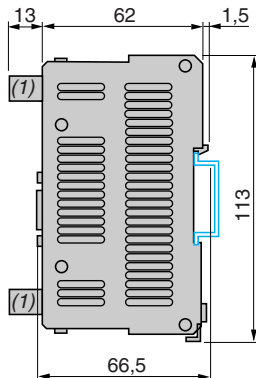


(1) Cable conforming to standard EIA/TIA-568 category 5 and IEC 1180/EN 50 173 class D. For UL and CSA 22.1 approved cables, add the letter U to the end of the reference.

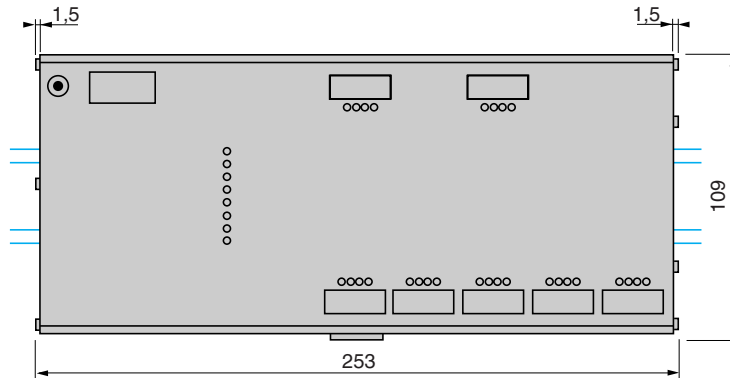
(2) Requires adaptor XBT ZG909.

Dimensions

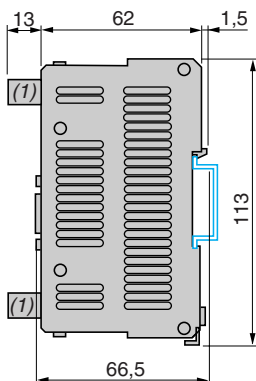
XPS MF31222



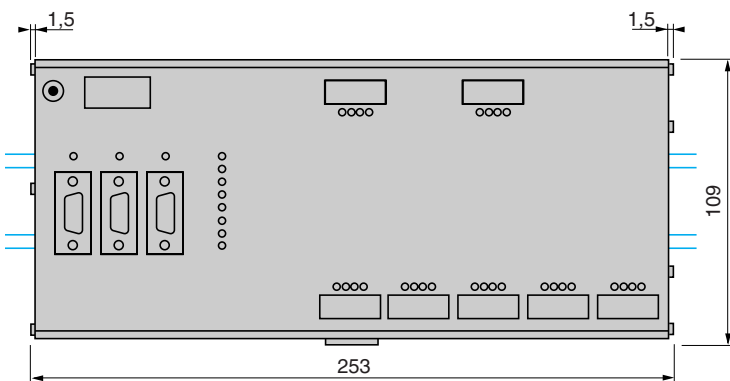
(1) Removable terminal blocks.



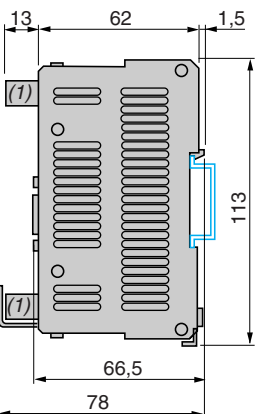
XPS MF3022



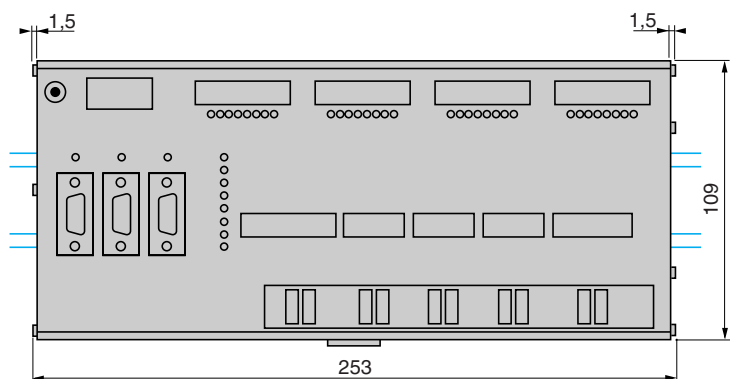
(1) Removable terminal blocks.



XPS MF35●●



(1) Removable terminal blocks.

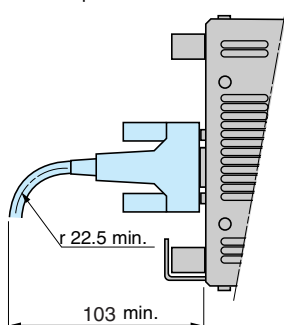


Mounting

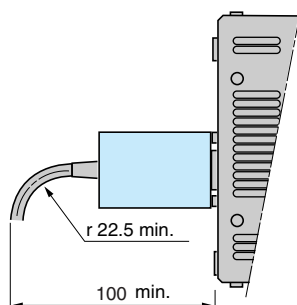
Mounting precautions relating to connectors

Access to Modbus bus

SUB-D 9-pin connector

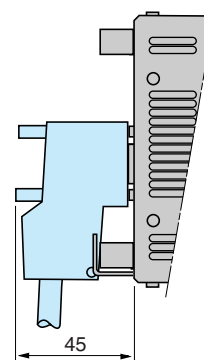


Connector XPS MFADAPT



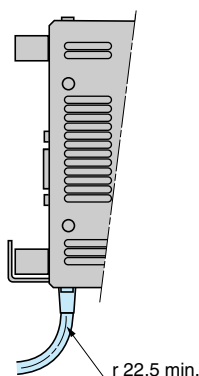
Access to Profibus bus

Connector 490 NAD 911 03

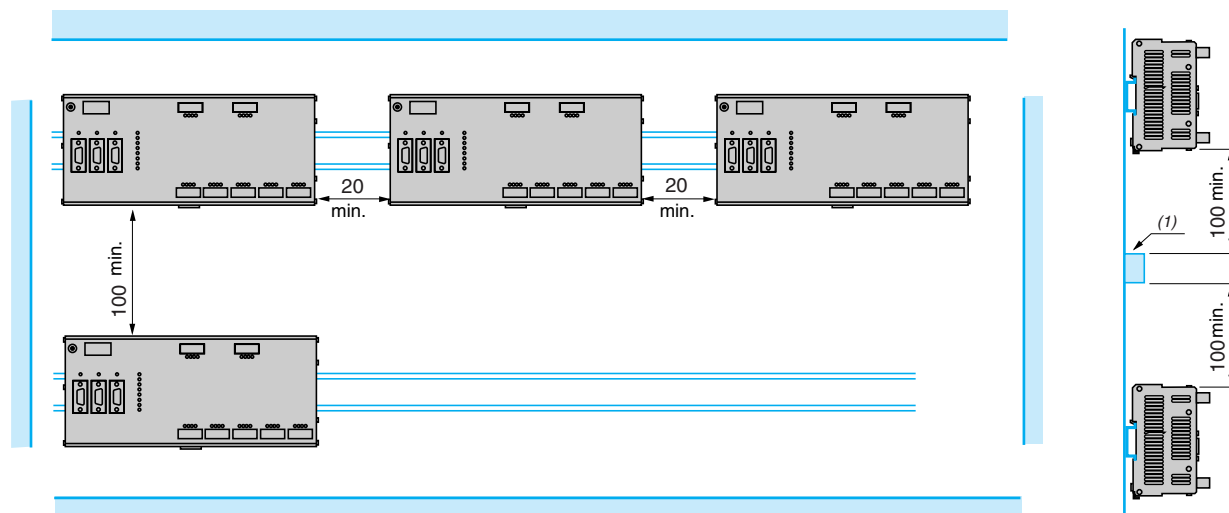


Access to Ethernet network

RJ45 socket



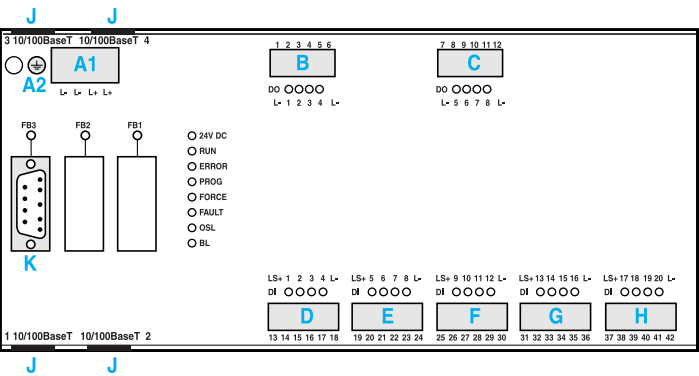
Mounting in panel or enclosure



(1) Prefabricated electrical ducting for passage of cables.

Connections

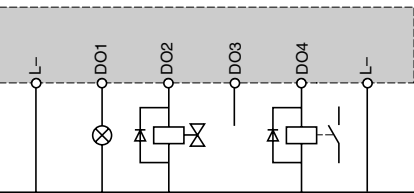
XPS MF31222, XPS MF3022



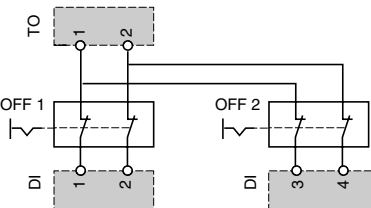
Item	Connection	Screw N°	Screw	Function
A1	Supply	—	L+	≡ 24 V
			L+	≡ 24 V
			L-	≡ 24 V (reference pole)
			L-	≡ 24 V (reference pole)
A2	Earth		⏏	Earth
B	Outputs Digital	1	L-	Outputs common
		2	1	Output 1
		3	2	Output 2
		4	3	Output 3
		5	4	Output 4 (for increased load)
		6	L-	Outputs common
C	Outputs Digital	7	L-	Outputs common
		8	5	Output 5
		9	6	Output 6
		10	7	Output 7
		11	8	Output 8 (for increased load)
		12	L-	Outputs common
D	Inputs Digital	13	LS+	Sensor supply for inputs 1 to 4
		14	1	Digital input 1
		15	2	Digital input 2
		16	3	Digital input 3
		17	4	Digital input 4
		18	L-	Inputs common
E	Inputs Digital	19	LS+	Sensor supply for inputs 5 to 8
		20	5	Digital input 5
		21	6	Digital input 6
		22	7	Digital input 7
		23	8	Digital input 8
		24	L-	Inputs common
F	Inputs Digital	25	LS+	Sensor supply for inputs 9 to 12
		26	9	Digital input 9
		27	10	Digital input 10
		28	11	Digital input 11
		29	12	Digital input 12
		30	L-	Inputs common
G	Inputs Digital	31	LS+	Sensor supply for inputs 13 to 16
		32	13	Digital input 13
		33	14	Digital input 14
		34	15	Digital input 15
		35	16	Digital input 16
		36	L-	Inputs common
H	Inputs Digital	37	LS+	Sensor supply for inputs 17 to 20
		38	17	Digital input 17
		39	18	Digital input 18
		40	19	Digital input 19
		41	20	Digital input 20
		42	L-	Inputs common
Item	Connection	Type	Function	
K	Communication	FB3 (SUB-D 9-pin female)	XPS MF3022: slave on Modbus bus	
J	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

Connection examples

Actuator connections to the outputs

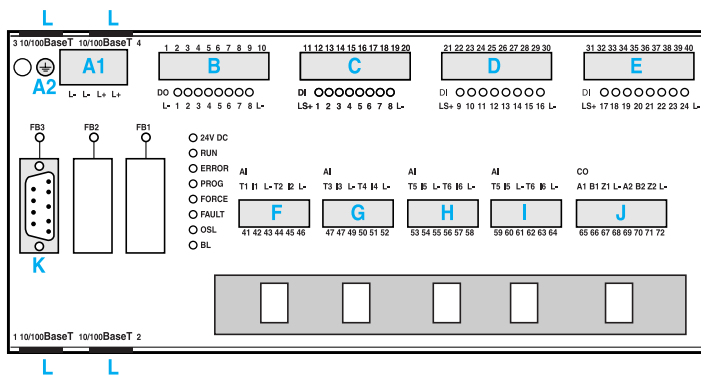


Emergency stop connections (line control)



Connections

XPS MF35●●



Item	Connection	Screw N°	Screw	Function
A1	Supply	—	L+	24 V
			L+	24 V
			L-	24 V (reference pole)
			L-	24 V (reference pole)
A2	Earth	—	⊥	Earth
B	Outputs - Digital	1	L-	Outputs common
		2	1	Digital output 1
		3	2	Digital output 2
		4	3	Digital output 3
		5	4	Digital output 4 (for increased load)
		6	5	Digital output 5
		7	6	Digital output 6
		8	7	Digital output 7
		9	8	Digital output 8 (for increased load)
		10	L-	Outputs common
C	Inputs - Digital	11	LS+	Sensor supply for inputs 1 to 8
		12	1	Digital input 1
		13	2	Digital input 2
		14	3	Digital input 3
		15	4	Digital input 4
		16	5	Digital input 5
		17	6	Digital input 6
		18	7	Digital input 7
		19	8	Digital input 8
		20	L-	Inputs common
D	Inputs - Digital	21	LS+	Sensor supply for inputs 9 to 16
		22	9	Digital input 9
		23	10	Digital input 10
		24	11	Digital input 11
		25	12	Digital input 12
		26	13	Digital input 13
		27	14	Digital input 14
		28	15	Digital input 15
		29	16	Digital input 16
		30	L-	Inputs common
E	Inputs - Digital	31	LS+	Sensor supply for inputs 17 to 24
		32	17	Digital input 17
		33	18	Digital input 18
		34	19	Digital input 19
		35	20	Digital input 20
		36	21	Digital input 21
		37	22	Digital input 22
		38	23	Digital input 23
		39	24	Digital input 24
		40	L-	Inputs common

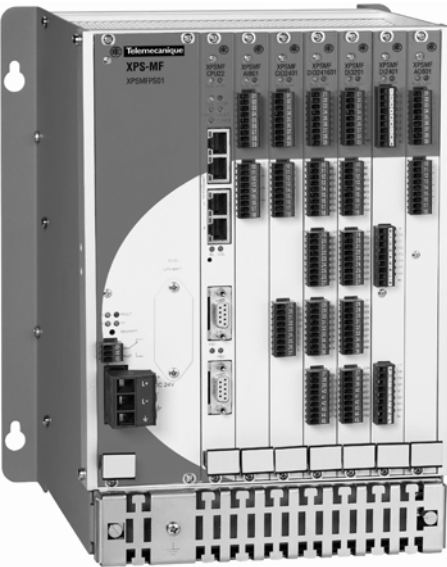
Item (cont.)	Connection	Screw N°	Screw	Function
F	Inputs - Analogue	41	T1	Transmitter supply 1
		42	I1	Analogue input 1
		43	L-	Inputs common
		44	T2	Transmitter supply 2
		45	I2	Analogue input 2
		46	L-	Inputs common
G	Inputs - Analogue	47	T3	Transmitter supply 3
		48	I3	Analogue input 3
		49	L-	Inputs common
		50	T4	Transmitter supply 4
		51	I4	Analogue input 4
		52	L-	Inputs common
H	Inputs - Analogue	53	T5	Transmitter supply 5
		54	I5	Analogue input 5
		55	L-	Inputs common
		56	T6	Transmitter supply 6
		57	I6	Analogue input 6
		58	L-	Inputs common
I	Inputs - Analogue	59	T7	Transmitter supply 7
		60	I7	Analogue input 7
		61	L-	Inputs common
		62	T8	Transmitter supply 8
		63	I8	Analogue input 8
		64	L-	Inputs common
J	Inputs - Counter	65	A1	Input A1 or bit 0 (LSB)
		66	B1	Input B1 or bit 1
		67	Z1	Input Z1 or bit 2 (MSB)
		68	L-	Inputs common
		69	A2	Input A2 or bit 0 (LSB)
		70	B2	Input B2 or bit 1
		71	Z2	Input Z2 or bit 2 (MSB)
		72	L-	Inputs common
Item	Connection	Type	Function	
K	Communication	FB3 (SUB-D 9-pin female)	XPS 3522: slave on Modbus bus XPS 3542: slave on Profibus bus	
L	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

Rack, power supply and CPU



Modular safety PLC XPS MF60, fitted with 6 different "in rack" I/O modules

Presentation

Preventa safety PLC type XPS MF60 offers a modular automated line control solution in conjunction with the monitoring of safety functions that are required for the protection of personnel and the safety of machines.

The modular safety PLC XPS MF60 is designed to meet SIL 3 requirements of standard IEC 64508 and category 4 requirements conforming to EN 954-1/ISO 13849-1.

Modularity

The safety PLC XPS MF60 is a modular system comprising a metal housing or rack, fitted with a power supply module, a CPU and "in rack" I/O modules.

- Six slots are available.
- Various types of "in rack" I/O modules are catalogue listed and are selected according to the application.
- Mounting the modules in the rack is performed by simple fitting using the guide rails. Electrical connection is automatic and assured by the back plane bus of the rack.
- The mounting order of the "in rack" I/O modules is open to the user, but the order must, however, correspond to the programming software.
- The removal of the modules, performed with the supply switched-off, is facilitated by a grip in the base of the modules.
- Covering plates for unused "in rack" I/O module slots are available and protect the system in polluted environments.

Composition of the modular safety PLC XPS MF60

Basics	"In rack" I/O modules		
	XPS	Characteristics	See page
Metal rack XPS MFGEH01 with back plane bus assuring electrical connection of components installed + metal securing plate for shielded cables (EMC), 2 cooling fans + power supply module (≡ 24 V) XPS MFPS01 with lithium backup battery, + CPU XPS MFCPU22 with safety communication ports (RJ45: Ethernet) and industrial (FB2: Modbus)	MFAI801	8 single-pole analogue inputs or 4 2-pole analogue inputs	50
	MFAO801	8 analogue outputs	52
	MFCIO2401	2 counting inputs, 4 digital outputs	54
	MFDI2401	24 digital inputs (≡ 110 V / ~ 117 V)	56
	MFDI3201	32 digital inputs	58
	MFDIO241601	24 digital inputs, 16 digital outputs	60
	MFAO801	8 relay outputs (~ 6...230 V / ≡ 110 V)	62

Safety PLCs

In order to comply with safety requirements, the modular safety PLC XPS MF60 integrates two essential functions conforming to category 4 of EN 954-1/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between the safety PLCs and the decentralised safety I/O modules (Special Switch).

- **Redundancy:** the 2 processors integrated in the CPU of the modular safety PLC XPS MF60 analyse and compare the information received from the safety inputs and outputs. The incoming and outgoing information (programmed values and received values) are received in parallel by the two processors and compared in real-time.
- **"Watchdog" or self-monitoring:** the modular PLC continuously monitors the information processing cycle and the execution of tasks, and intervenes if the time of a cycle does not conform to the predefined value.
- **The integrated switch (Special Switch)** manages the supply voltage variations from the Communication (Ethernet) and Serial (Modbus) ports. It stores for a very short time and sends at very high speed the information provided by inputs and outputs of the PLC on the Ethernet network, whilst avoiding signal collisions.

Machine Safety

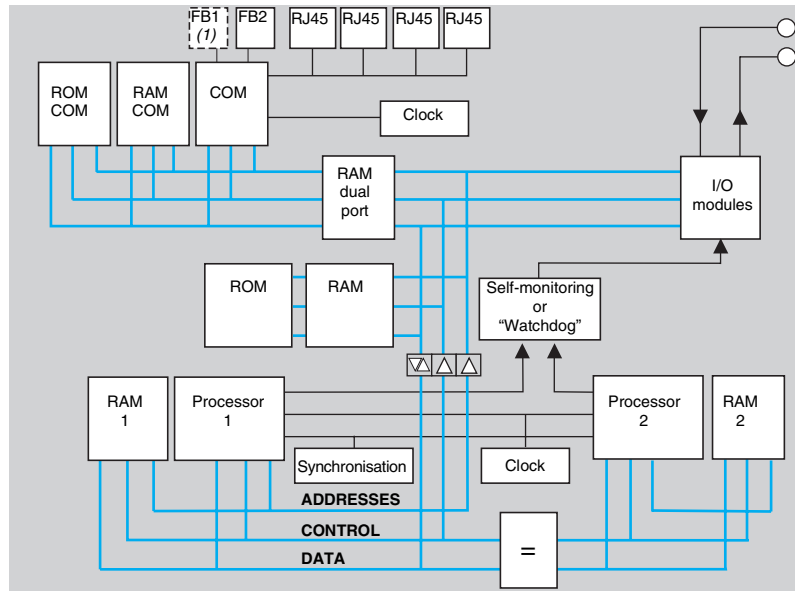
Preventa safety PLCs

Modular, type XPS MF60

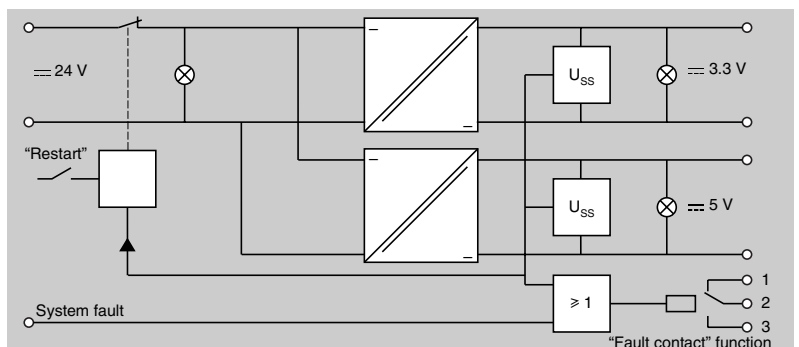
Rack, power supply and CPU

Functional synoptics

CPU XPS MF60CPU22



Power supply module XPS MFPS01



Line control on "in rack" I/O module XPS MFDIO241601 and XPS MFDI3201

Line control is a means of short-circuit and line break monitoring, for example Emergency stop inputs to category 4 of standard EN 954-1/ISO 13849-1, that is configurable in modular safety PLCs XPS MF60. The digital outputs 1 to 16 of the "in rack" module XPS MFDIO241601 are connected the digital inputs of the same module or to the inputs of module XPS MFDI3201. The pulses are automatic on the digital outputs: that drive the monitoring of the digital input lines.

(1) FB1 not used.

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

Rack, power supply and CPU

Presentation (continued)

Programming safety automation system functions

Software XPSMFWIN (reference SSV1XPSMFWIN or SSVXPSMFWINUP) running on a PC enables:

- Programming of the safety functions of the “in rack” I/O modules of the modular PLC XPS MF60,
- Configuration of the bus and industrial communication networks,
- Configuration and IP addressing of the automation line sensors/actuators,
- Programming of alarms via the power supply system.

See programming using software XPSMFWIN, pages 98 to 103.

By using a PC, Magelis graphic terminal type XBT GT or a Premium automation platform and connecting to one of four RJ45 sockets of the CPU of the modular PLC XPS MF60, an automation line can, at any time or point, be supervised and controlled.

- using a PC: system programming, selection of communication network etc.
- using a graphic terminal or Premium automation platform: diagnostics, cycle monitoring, etc.

Safety inputs and outputs

The modularity of the PLC XPS MF60 allows the user to select and install, in the six slots of the rack, various input, output and input/output modules to alter the number and type of safety inputs and/or outputs to be monitored. 6 identical modules can be installed in the same rack.

The modules listed (see below and page 37) indicate the number of inputs and outputs available for connection to the hazardous zones of machines to be monitored.

Digital input modules (1)

Modules XPS	Digital inputs			
	N°	Type		
		Safety detection	Safety dialogue	Safety control
MFDI2401	24	Limit switches, Guard switches, with reset and with actuator,	Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations... (2)	Switch disconnectors mini-Vario and Vario... (2)
MFDI3201	32	Safety light curtains type 2 and type 4, Safety mats and sensing edges...(2)		

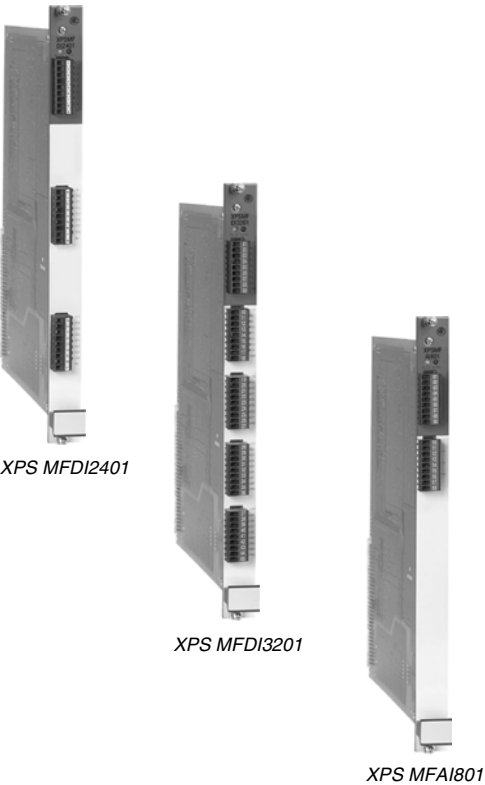
Analogue input module (1) (3)

Module XPS	Analogue measuring inputs	
	N°	Functions
MFAI801	8 single-pole or 4 2-pole	Closed circuit scanning of input channels, Single-pole measuring of 0 to 10 V voltages, 2-pole measuring of -10 to +10 V voltages, Single-pole measuring of 0 to 20 mA currents

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with CPU, power supply module and “in rack” I/O modules.

(2) Please refer to our “Safety solutions using Preventa” catalogue.

(3) Use shielded dual twisted pair cables, maximum length 300 m, short-circuit unused analogue inputs.



Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

Rack, power supply and CPU

Safety inputs and outputs (continued)

Mixed I/O modules (1)

Module XPS	Counting inputs			Digital outputs	
	N°	5 V	24 V	N°	Type
MFCIO2401	2	Incremental encoders	Sensors, 2/3-wire PNP/NPN	4	Safety dialogue Beacons and indicator banks, Rotating mirror beacons, Sirens... (2) Safety control Enclosed thermal-magnetic motor circuit-breakers, Enclosed D.O.L. starters for motor control, Power contactors... (2)



XPS MFCIO2401



XPS MFDIO241601

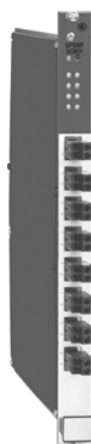
Module XPS	Digital inputs		Digital outputs	
	N°	Type	N°	Type
MFDIO241601	24	Safety detection Guard switches, with reset and with actuator, Safety light curtains type 2 and type 4, Safety mats and sensing edges... (2) Safety dialogue Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations... (2) Safety control Switch disconnectors mini-Vario and Vario... (2)	16	Safety dialogue Beacons and indicator banks, Rotating mirror beacons, Sirens... (2) Safety control Enclosed thermal-magnetic motor circuit-breakers, Enclosed D.O.L. starters for motor control, Power contactors... (2)

Analogue output module (1) (3)

Module XPS	Analogue outputs	
	N°	Functions
MFAO801	8	Closed circuit scanning of output channels, Single-pole measuring of 0 to 10 V voltages, Measuring, using equipotential link, 0.4 to 20 mA currents (with 500 Ω external resistor)



XPS MFAO801



XPS MFDO801

Relay output module (1) (3)

Module XPS	Relay outputs	
	N°	Type
MFDO801	8	Safety dialogue: Beacons and indicator banks, rotating mirror beacons, sirens... (2) Safety control: Enclosed thermal-magnetic motor circuit-breakers, Enclosed D.O.L. starters for motor control, Power contactors... (2)

Decentralised inputs/outputs

In addition to the inputs/outputs available on the removable "in rack" I/O modules, the modular safety PLC XPS MF60 can accept supporting decentralised input modules type XPS MF1 and/or decentralised output modules type XPS MF2 and/or mixed decentralised I/O modules type XPS MF3.

These decentralised input, output and I/O modules are located in the vicinity of hazardous zones of machines to be monitored and increase the I/O capacity of the modular PLC, see pages 66, 70 and 80.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with CPU, power supply module and "in rack" I/O modules.

(2) Please refer to our "Safety solutions using Preventa" catalogue.

(3) Use shielded dual twisted pair cables, maximum length 300 m, short-circuit unused analogue inputs.

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

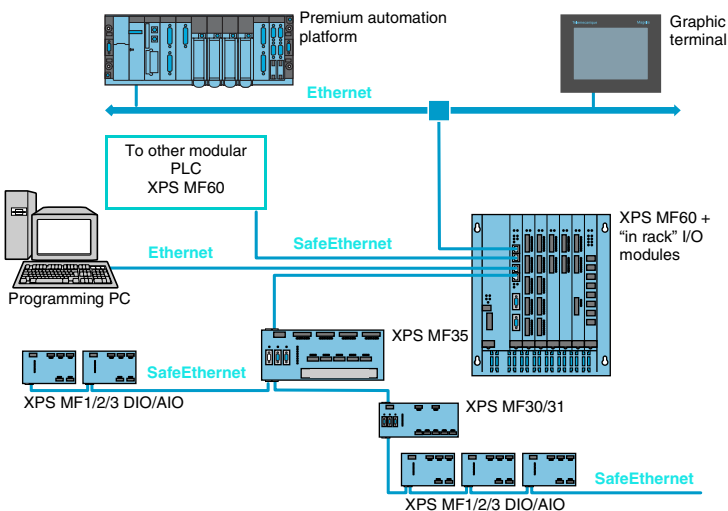
Rack, power supply and CPU

Communication

Safety communication on Ethernet network

- Communication between the PC, Magelis graphic terminal or automation platform (Premium) and the modular safety PLC is achieved by Ethernet network connection, via the four RJ45 communication ports of the CPU of the modular PLC.
- Connection on the Ethernet network enables integration of the modular safety PLC XPS MF60 of a safety installation within a type A10 Transparent Ready™ system.

Modular PLC	Telemecanique Transparent Ready™		
	Class	Communication protocols	
		safety	non safety
XPS MF60	A10	SafeEthernet	Modbus TCP/IP

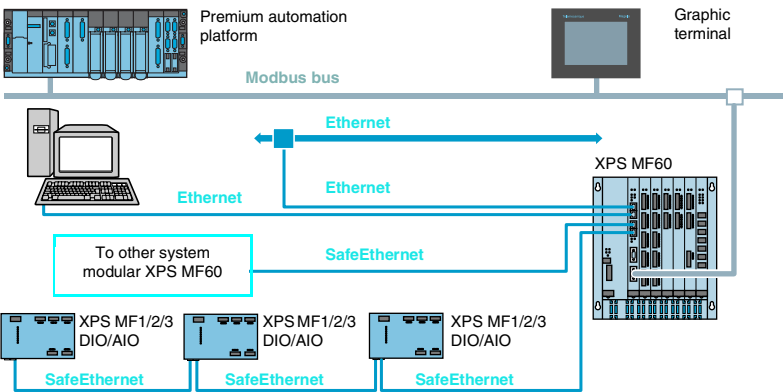


Communication between the modular safety PLC XPS MF60, compact safety PLCs type XPS MF30/31/35 and modules type XPS MF1/2/3 (Decentralised input, output and I/O modules) is performed on the Ethernet network using SafeEthernet communication protocol, via the RJ45 communication ports.

Industrial communication on Modbus bus

The CPU of the modular safety PLC XPS MF60 incorporates an FB2 (SUB-D 9-pin connector) which enables integration within an industrial architecture. See pages 94 and 95.

Examples: on Modbus, the modular safety PLC XPS MF60 is a slave of a Premium automation platform.

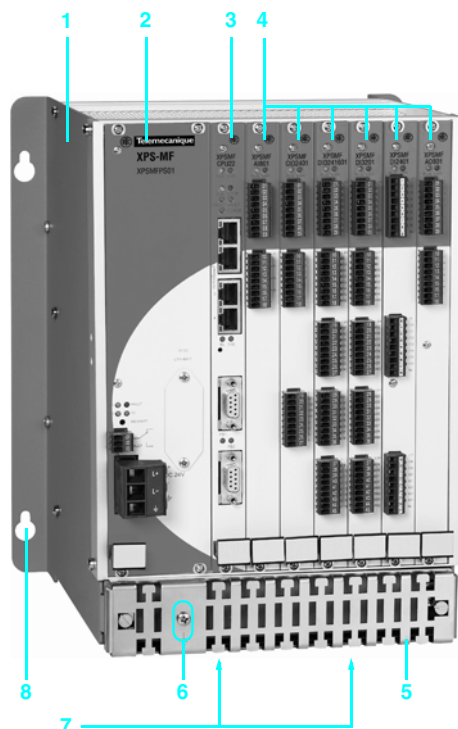


Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

Rack, power supply and CPU

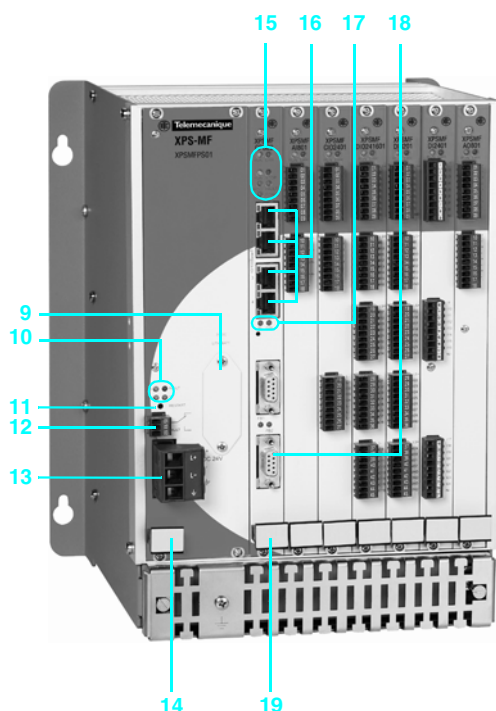


Description

Modular safety PLC XPS MF60

Modular assembly comprising:

- 1 A metal rack **XPS MFGEH01**.
- 2 A $\equiv$ 24 V power supply module **XPS MFPS01**.
- 3 A CPU **XPS MFCPU22**.
- 4 Six "in rack" I/O modules (back plane bus assures the electrical connection of "in rack" modules installed, the power supply module and the CPU).
- 5 A metal plate for securing shielded analogue input connection cables (EMC),
- 6 An earth connection screw.
- 7 Two cooling fans (beneath the metal rack).
- 8 Four $\varnothing$ 14 mm elongated holes for mounting the rack on a vertical support.



Power supply module XPS MFPS01 comprising:

- 9 A backup lithium battery compartment.
- 10 Four voltage status LEDs (FAULT, 24 V, 3.3 V or 5 V).
- 11 A RESTART button (accessible using fine pointed tool).
- 12 A 3-pole terminal block (3 captive screws) for "Fault contact" function (1).
- 13 A $\equiv$ 24 V supply terminal block, including earth connection (2).
- 14 A grip to assist installation/removal of the power supply module.

CPU XPS MFCPU22 comprising:

- 15 Seven process status LEDs.
- 16 Four RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 17 Two process status LEDs.
- 18 An FB2 connector for connection to Modbus bus (FB1 not used), with process status LED.
- 19 A grip to assist installation/removal of the CPU.

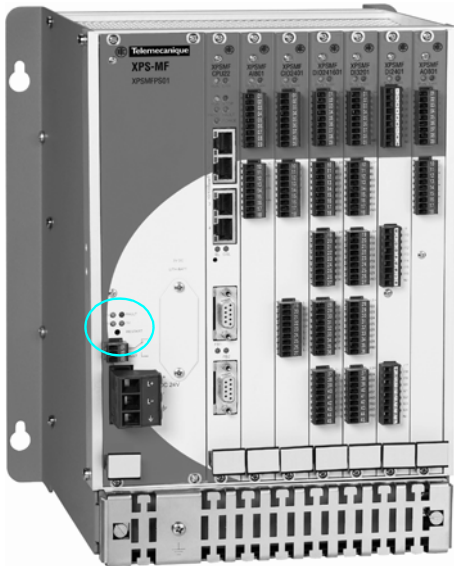
(1) "Fault contact" function: the power supply module incorporates a volt-free changeover contact. Operating errors occurring in the system are read and displayed by the LEDs. The errors are analysed on the programming PC:

Contact positions		Status
01	1-2 closed (2-3 open)	Normal operation of the PLC.
02	1-2 open (2-3 closed)	Absence of supply to the PLC or the CPU is in ERROR STOP mode.
03	FAULT	

(2) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with CPU, power supply module and "in rack" I/O modules.

Machine Safety

Preventa safety PLCs
Modular, type XPS MF60
Rack, power supply and CPU



LED details

Power supply module XPS MFPS01

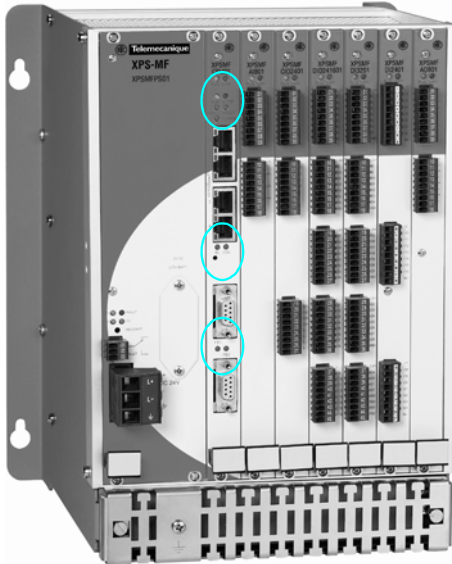
LED	Colour	Status	Meaning
24 VDC	Green	On	24 V voltage present.
		Off	No voltage.
3.3 VDC	Green	On	3.3 V voltage present.
		Off	No voltage.
5 VDC	Green	On	5 V voltage present.
		Off	No voltage.
FAULT	Orange	On	Operating error.
			The user application has caused an error.
			The system configuration is defective.
			Replace module.
		Off	None of the above errors have occurred.

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

Rack, power supply and CPU



LED details (continued)

CPU XPS MF60

LED	Colour	Status	Meaning
RUN	Green	On	Program in operation: CPU in STOP or RUN mode.
		Flashing	A new programming system will be downloaded.
		Off	The CPU is in "ERROR" state (see ERROR).
ERR	Red	On	Software error or hardware fault detected by the CPU. The monitoring program (Watchdog) has triggered the STOP state of the process because the programmed cycle time has been exceeded. The CPU has stopped the execution of the user application, ended all hardware and software tests and all outputs have been reset. The process can only be started again from the PC.
		Flashing	In the event of all the LEDs being on, restarting has detected a system error, a new operating system (OS) must be loaded.
		Off	No error detected.
FB1	–	–	Not used.
FB2	Orange	On	Communication on Modbus bus active.
RUN	Green	On	Normal service mode, loaded program running, the PLC receives I/O messages, communication and hardware/software tests carried out.
		Off	The CPU is in "ERROR" state (see ERROR).
STOP	Red	On	The CPU is in STOP mode and no program can be executed. The outputs are in the waiting state for the correct supply. The CPU has stopped the execution of the user application, ended all hardware and software tests and all outputs have been reset. The process can only be started again from the terminal.
		Off	CPU operating.
		Flashing	A new programming system will be downloaded.
PROG	Orange	On	The CPU is being loaded with a new configuration.
		Flashing	CPU changing from INIT state to STOP state. The FLASH ROM is being loaded with a new operating system.
		Off	No loading of configuration or operating system.
FAULT	Orange	On	Program error. The loading of a new operating system was defective and the operating system is corrupt.
		Flashing	An error has occurred whilst writing to FLASH ROM memory (during updating of the operating system). One or more I/O errors have occurred.
		Off	None of the above errors have occurred.
FORCE	Orange	On	CPU in RUN mode and force is active.
		Flashing	Program in STOP mode, but force is prepared and activated if the program restarts.
		Off	Force not activated.
OSL	Orange	Flashing	Operating system and backup loading active.
BL	Orange	Flashing	COM in INIT_Fail state.
RJ45	Green	On	Full duplex mode operation.
		Flashing	Signal collision.
		Off	Half duplex mode operation, no collision.
	Yellow	On	Connection established.
		Flashing	Interface active.

Environment

Modular safety PLC type			XPS MF60: rack XPS MFGEH01 + power supply module XPS MFPS01 and CPU XPS MFPCU22
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1 and IEC 61508)			Category 4 (EN 954-1/ISO 13849-1), SIL 3 (IEC 61508)
Product certifications			IEC 61131-2, EN 50156 pending, DIN V 19250, NFPA
Ambient air temperature conforming to EN 61131-2	For operation	°C	Rack, power supply and CPU: 0...+ 60
	For storage	°C	■ Rack XPS MFGEH01: - 40...+ 85, ■ Power supply module XPS MFPS01: □ - 40...+ 85, without backup battery □ - 30...+ 85, with backup battery ■ CPU XPS MFPCU22: - 40...+ 85
Relative humidity			95% (supply not connected)
Degree of protection	Enclosure		IP 20 with covering plate on unused "in rack" I/O module slots IP 54 mounted in enclosure
Pollution			Degree of pollution II
Altitude			m < 2000
Protection class			Class II, conforming to EN/IEC 61131-2
Electromagnetic compatibility			Conforming to IEC 61131-2
Vibration resistance conforming to EN 61131-2	Operating		1 gn, frequency 10...150 Hz
Shock resistance conforming to EN 61131-2	Operating		15 gn (duration 11 ms)
Resistance to electrostatic discharges conforming to EN/IEC 61000-4-2			kV 4 contact 8 air discharge
Immunity to high frequency interference conforming to EN/IEC 61000-4-3			V/m 10 (26 MHz...1 GHz)
Rack material			Metal alloy

Electrical characteristics

Supply	Voltage	V	--- 24
	Voltage limits		- 15... + 20% (power supply module) - 20... + 25%
Output voltage of power supply module		V	--- 3.3 / 10 A
		V	--- 5 / 2 A
Maximum consumption			A 30 max., 32 A external fuse
Immunity to momentary supply interruptions			ms 10
Protection			Internal fuse
Response time			ms Depending on application
Backup battery	On power supply module XPS MFPS01		Data backup: 24 hours, 3 V, lithium Service life: 1000 hours
Clock			Yes
Operational data of CPU			--- 3.3 V / 1.5 A
			--- 5 V / 1 A
User memory	Application	Kb	500
	Data	Kb	500
LED display			Yes, see pages 40 and 41

Communication

Ethernet network: safety communication using SafeEthernet protocol

Compatibility			CPU XPS MFPCU22
Transmission	Communication ports		4 x RJ45 With integrated switch
	Speed	Mbps	100
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable
Functions	Control of:		□ transmitted data: duplication, loss, bit changing □ addressing of transmitted and received messages □ data sequence: repetition, loss of data, change □ data reception time: delay, repetition, echo
	Diagnostics on:		□ CPU □ user program □ communication □ operating voltage and temperature □ inputs and outputs

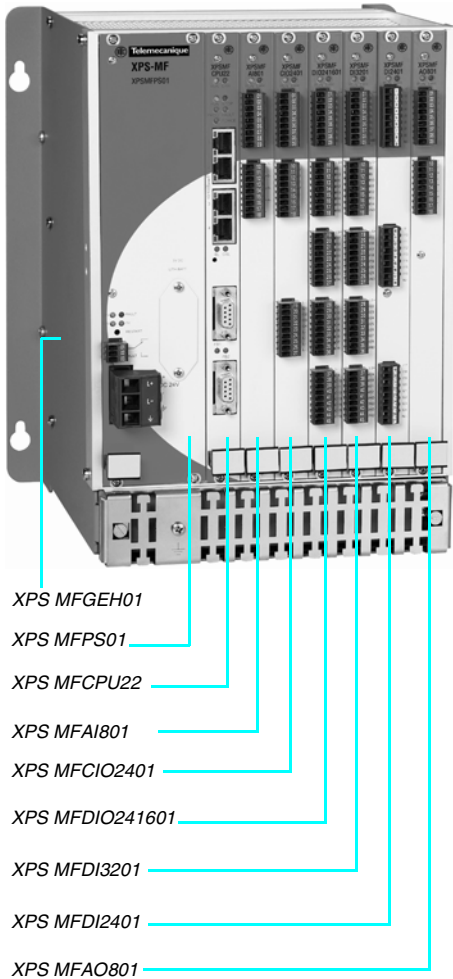
Modbus bus

Compatibility			CPU XPS MFPCU22
Serial link ports	Number and type		1 x SUB-D 9-pin female (FB2)
	Status		Slave
Addressing			122 slaves max.
Physical layer			RS 485

Connections ⁽¹⁾			
Power supply module		XPS MFPS01	
Type of connection		Screw clamp terminal blocks, removable and coded for correct location	
Supply connection	Number of terminal blocks	1	
	For 1 cable without cable end	Solid or flexible 0.75...16 mm ² , AWG 19	
	For 1 flexible cable with or without plastic cable end	0.5...16 mm ² , AWG 20	
	For 2 cables of same diameter, without cable end	Solid or flexible 0.75...6 mm ² , AWG 19	
	For 2 cables of same diameter, flexible without cable end	0.5...4 mm ² , AWG 20	
	For 2 cables of same diameter, flexible with plastic cable end	0.5...6 mm ² , AWG 20	
"In rack" I/O module		XPS MFAI801, XPS MFAO801, XPS MFCIO2401, XPS MFDI2401, XPS MFDI3201, XPS MFDIO241601, XPS MFDO801	
Type of connection		Screw clamp terminal blocks, removable and coded for correct location	
Digital input channel and output channel connection	Number of terminal blocks	Depending on "in rack" module type	
	For 1 cable without cable end	Solid or flexible: 0.14...1.5 mm ² , AWG 28-16	
	For 1 flexible cable without cable end	0.25...1.5 mm ² , AWG 22-16	
	For 1 flexible cable with plastic cable end	0.25...0.5 mm ² , AWG 22-20	
	For 2 cables of same diameter, without cable end	Solid: 0.14...0.5 mm ² , AWG 28-20 Flexible: 0.14...0.75 mm ² , AWG 28-18	
	For 2 cables of same diameter, flexible without cable end	0.25...0.34 mm ² , AWG 22	
	For 2 cables of same diameter, flexible with plastic cable end	0.5 mm ² , AWG 20	
Analogue input channel and output channel connection	Number of terminal blocks	Depending on "in rack" module type	
	For 1 cable without cable end	Solid or flexible: 0.14...1.5 mm ² , AWG 28-16	
	For 1 flexible cable without cable end	0.25...1.5 mm ² , AWG 22-16	
	For 1 flexible cable with plastic cable end	0.25...0.5 mm ² , AWG 22-20	
	For 2 cables of same diameter, without cable end	Solid: 0.14...0.5 mm ² , AWG 28-20 Flexible: 0.14...0.75 mm ² , AWG 28-18	
	For 2 cables of same diameter, flexible without cable end	0.25...0.34 mm ² , AWG 22	
	For 2 cables of same diameter, flexible with plastic cable end	0.5 mm ² , AWG 20	
Counting channel connection	Number of terminal blocks	Depending on "in rack" module type	
	For 1 cable without cable end	Solid or flexible: 0.14...1.5 mm ² , AWG 28-16	
	For 1 flexible cable without cable end	0.25...1.5 mm ² , AWG 22-16	
	For 1 flexible cable with plastic cable end	0.25...0.5 mm ² , AWG 22-20	
	For 2 cables of same diameter, without cable end	Solid: 0.14...0.5 mm ² , AWG 28-20 Flexible: 0.14...0.75 mm ² , AWG 28-18	
	For 2 cables of same diameter, flexible without cable end	0.25...0.34 mm ² , AWG 22	
	For 2 cables of same diameter, flexible with plastic cable end	0.5 mm ² , AWG 20	
Cable connection	Tightening torque	Nm	0.22...0.25
	Bared length	mm	9

(1) AWG: American Wire Gauge.

Machine Safety
Preventa safety PLCs
Modular, type XPS MF60
Rack, power supply and CPU



Modular PLC XPS MF60 (≡ 24 V supply)

Description	Reference	Weight kg
-------------	-----------	--------------

Metal rack fitted with:	XPS MFGEH01	—
☐ a back plane bus, assuring electrical connection of components installed: power supply module, CPU and “in rack” modules		
☐ two cooling fans		
☐ a metal securing plate for shielded cables (EMC)		
☐ a lithium backup battery		

≡ 24 V power supply module	XPS MFPS01	0.820
----------------------------	------------	-------

CPU fitted with:	XPS MFCPU22	0.280
☐ 4 Ethernet access ports (RJ45) for safety communication		
☐ 1 FB2 Modbus bus access port (SUB-D 9-pin) for industrial communication		

Description	Functions		Reference	Weight kg
	Inputs	Outputs		
“In rack” I/O modules	Analogue: 8 single-pole or 4 2-pole	—	XPS MFAI801 See page 50	0.240
	—	8 analogue	XPS MFAO801 See page 52	0.280
	2 counting	4 digital	XPS MFCIO2401 See page 54	0.260
	24 digital inputs (≡ 110 V / ~ 127 V)	—	XPS MFDI2401 See page 56	0.260
	32 digital	—	XPS MFDI3201 See page 58	0.260
	24 digital	16 digital	XPS MFDIO241601 See page 60	0.260
	—	8 relay ~ 0...230 V/≡ 110 V	XPS MFDO801 See page 62	0.600

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

Rack, power supply and CPU

Configuration software

- Reference SSV1XPSMFWIN is the full version of configuration software XPSMFWIN version 4.1 and must be installed if no previous version of this software has been installed.
- Reference SSVXPSMFWINUP is an update for software XPSMFWIN and can be used if SSV1XPSMFWIN has been installed using Safety Suite V1. An update from version 4.1 to version 4.1-6150 for the software XPSMFWIN will then be performed.

Description	Operating system	Details	Languages	Reference	Weight kg
Configuration software XPSMFWIN for programming modular safety PLCs CD-ROM + user manual	Windows 2000, Windows XP	Software available on Safety Suite V2 software pack	English, German, French	SSV1XPSMFWIN	0.520
XPSMFWIN software update CD-ROM + user manual	Windows 2000, Windows XP	Software update available on Safety Suite V2 software pack	English, German, French	SSVXPSMFWINUP	0.520

Accessories for modular PLCs

Description	For use with	Reference	Weight kg
Covering plate	Unused "in rack" I/O module slots	XPS MFBLK	—

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

Rack, power supply and CPU



ABL 7RE2403



ABL 1REM24042

Regulated switch mode power supplies, single-phase

Output voltage = 24 V

Mains input voltage 47...63 Hz	Nominal power	Nominal current	Auto-protect reset	Conformity to standard EN 61000-3-2	Reference	Weight
V	W	A				kg
~ 100...240 single-phase wide range	72	3	Automatic	No	ABL 7RE2403	0.520
	120	5	Automatic	No	ABL 7RE2405	1.000
	240	10	Automatic	No	ABL 7RE2410	2.200
	100	4.2	Automatic	No	ABL 1REM24042	0.640

Magelis multifunction graphic terminals with touch-sensitive screen and on-board Ethernet ^{(1) (2)}

Supply voltage = 24 V

Description	Ports: serial and communication (type of link)	Application memory	Reference	Weight kg
5.7" Monochrome black and white STN	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	16 Mb	XBT GT2130	1.000
Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	16 Mb	XBT GT2330	1.000
7.5" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 1 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT4330	1.800
10.4" Colour STN	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT5230	3.000
Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT5330	3.000
12.1" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT6330	3.000
15" Colour TFT	1 x SUB-D 9-pin (RS 232C or RS 422/485 serial link to PLCs) 1 x RJ45 (RS 485 serial link) 2 x USB (peripheral connection and application transfer) 1 x RJ45 (Ethernet TCP/IP, 10BASE-T/100BASE-TX)	32 Mb	XBT GT7340	5.600

(1) Supplied with service instructions, USB connectors locking device and fixing kit.

(2) Other operator dialogue terminals, industrial PCs: please refer to our "Human Machine Interface" catalogue.



XBT GT2130, XBT GT2330



XBT GT4330



XBT GT5230



XBT GT6330



XBT GT7340

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

Rack, power supply and CPU



Connecting cables for network and bus

Connection to Ethernet network

Description	Pre-fitted connectors	Length (m)	Reference	Weight kg
Shielded twisted pair cables, straight through	2 RJ45 type connectors For connection to DTE (Data Terminal Equipment)	2	490 NTW 000 02 (1)	–
		5	490 NTW 000 05 (1)	–
		12	490 NTW 000 12 (1)	–
		40	490 NTW 000 40 (1)	–
		80	490 NTW 000 80 (1)	–
Shielded twisted pair cables, crossed wires	2 RJ45 type connectors For connection between hubs, switches and transceivers	5	490 NTC 000 05 (1)	–
		15	490 NTC 000 15 (1)	–
		40	490 NTC 000 40 (1)	–
		80	490 NTC 000 80 (1)	–

Connection to Modbus bus

Description	Use		Length (m)	Reference	Weight kg
	From	To			
Modbus bus connecting cables	Compact PLCs XPS MF3022/3522 + adaptor XPS MFADAPT (RJ45)	Modbus splitter box LU9 GC3 (RJ45)	0.3	VW3 A8 306 R03	0.025
			1	VW3 A8 306 R10	0.060
			3	VW3 A8 306 R30	1.130
		Premium module TSX SCY 21601 (SUB-D 25-pin)	0.3	XPS MCSCY	–
	Graphic terminals XBT GT (SUB-D 9-pin)	Modbus splitter box LU9 GC3 (RJ45)	2.5	XBT Z938 (2)	0.210
Adaptor for cable XBT Z938	SUB-D 9-pin (XBT GT)	XBT Z938 (SUB-D 25-pin)	0.2	XBT ZG909	–
Adaptor SUB-D 9-pin/RJ45	Compact PLCs (SUB-D 9-pin)	Connecting cables for Modbus bus (RJ45)	–	XPS MFADAPT	–
Description	Characteristics	Sold in lots of		Unit reference	Weight kg
End of line adaptors For RJ45 type connector	R = 120 Ω, C = 1 nF	2		VW3 A8 306 RC	0.200
	R = 150 Ω	2		VW3 A8 306 R	0.010



Profibus DP bus connection components

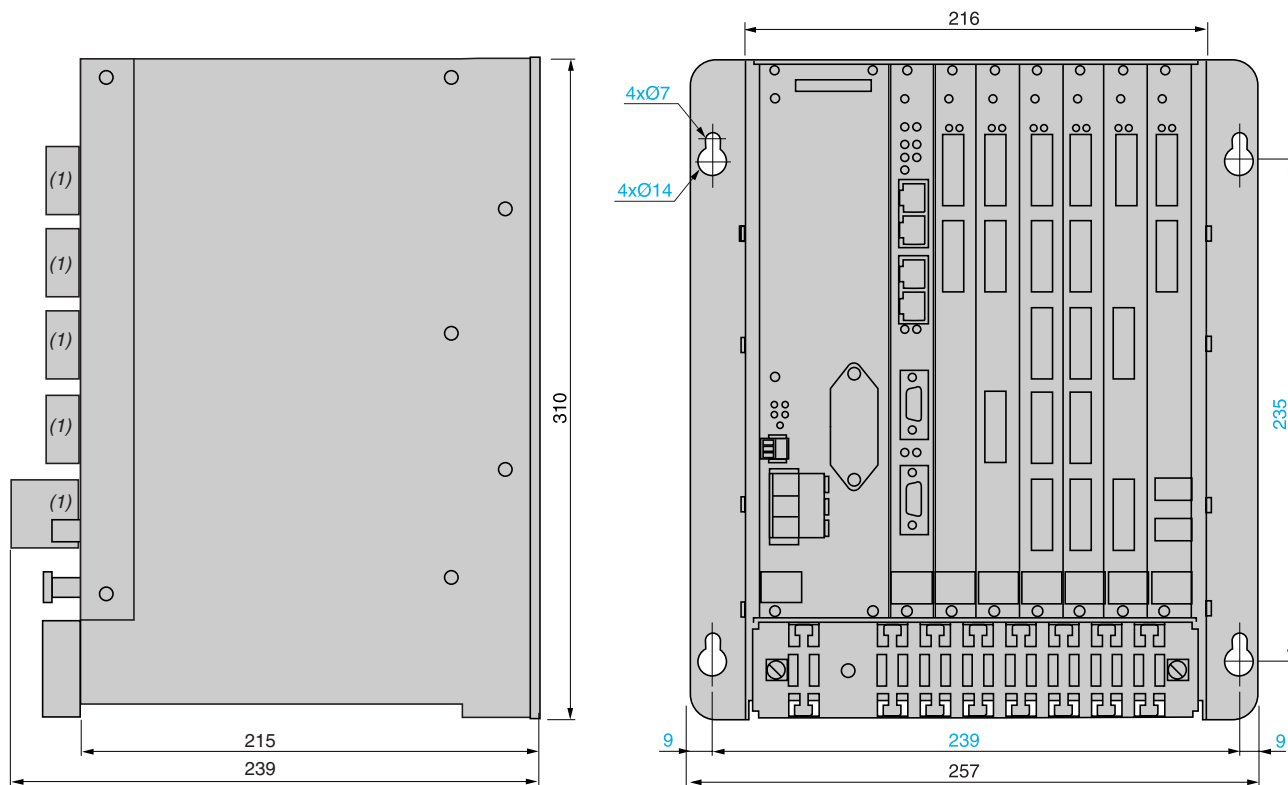
Description	Profile	Services	Reference	Weight kg
Profibus DP module set for Premium PLCs	Master, 12 Mbps	Class 1 and Class 2 master V0 functions, see characteristics. Profibus FMS messaging not supported	TSX PBY 100	0.870
Description	Use		Reference	Weight kg
Remote inputs/outputs on Profibus DP bus	Advantys STB network interface module		STB NDP 2112	0.140
	Momentum communication module		170 DTN 110 00	—
Connectors for remote I/O communication module	Line terminator		490 NAD 911 03	—
	Intermediate connection		490 NAD 911 04	—
	Intermediate connection and terminal port		490 NAD 911 05	—
Description	Length (m)		Reference	Weight kg
Profibus DP connecting cables	100		TSX PBS CA 100	—
	400		TSX PBS CA 400	—
Description			Reference	Weight kg
Replacement parts	Main bus junction box		490 NAE 911 00	—
	PCMCIA card		467 NHP 811 00	—

(1) Cable conforming to standard EIA/TIA-568 category 5 and IEC 1180/EN 50 173 class D. For UL and CSA 22.1 approved cables, add the letter U to the end of the reference.

(2) Requires adaptor XBT ZG909.

Dimensions

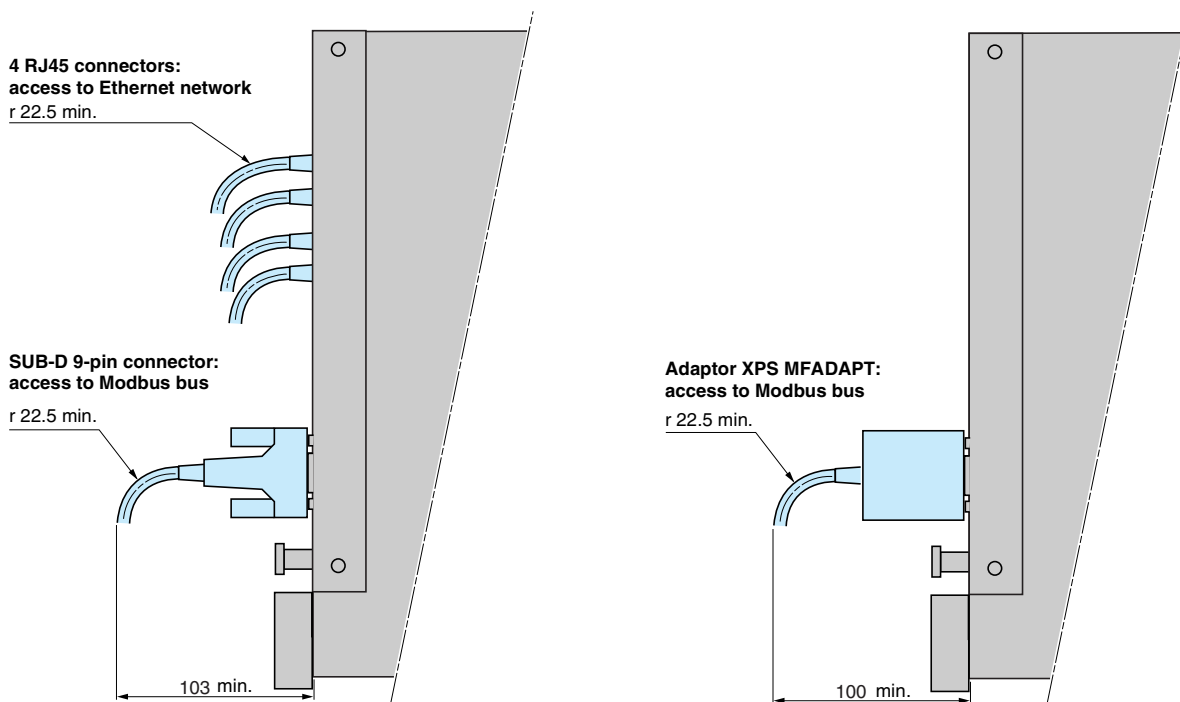
XPS MF60



(1) Removable terminal blocks.

Mounting precautions relating to connectors

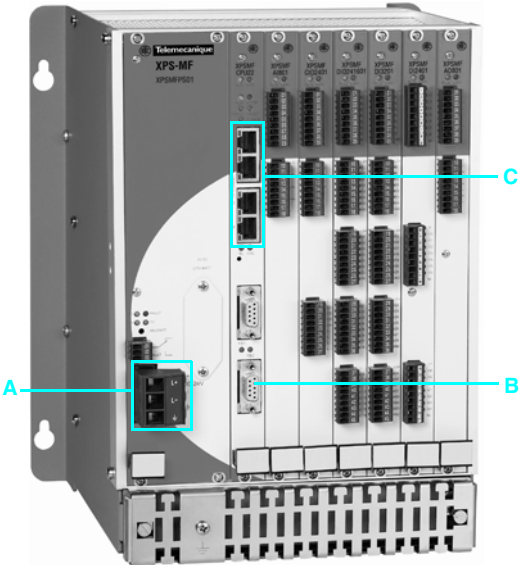
Access to Modbus bus and Ethernet network



Machine Safety
Preventa safety PLCs
Modular, type XPS MF60
Rack, power supply and CPU

Connections

Power supply module and CPU



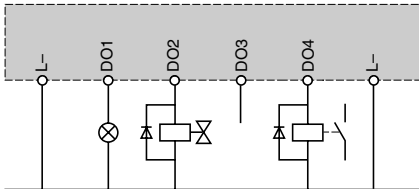
Item	Connection	Screw	Function
A	Supply	L+	24 V
		L-	24 V (reference pole)
		⏏	Earth

Item	Connection	Type	Function
B	Communication	FB2 (SUB-D 9-pin female)	XPS MF22: slave on Modbus bus

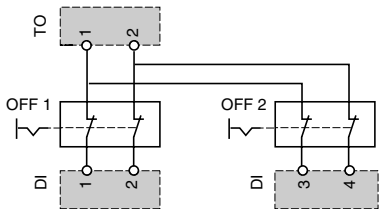
C	Communication	RJ45	Modular or compact safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules type XPS MF1/2/3.
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Connection examples

Actuator connections to the outputs



Emergency stop connections (line control)



Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

“In rack” analogue input module

Presentation

The analogue input module **XPS MFAI801** is designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ ISO 13849-1.

- It incorporates 8 analogue inputs:
 - electrically isolated from the back plane bus of rack XPS MFGEH01,
 - configured by choice of connection (see page 51) for managing eight single-pole or four 2-pole functions.
- This module can be installed in rack XPS MFGEH01 as many times as required in the six slots available.

Input values (1)

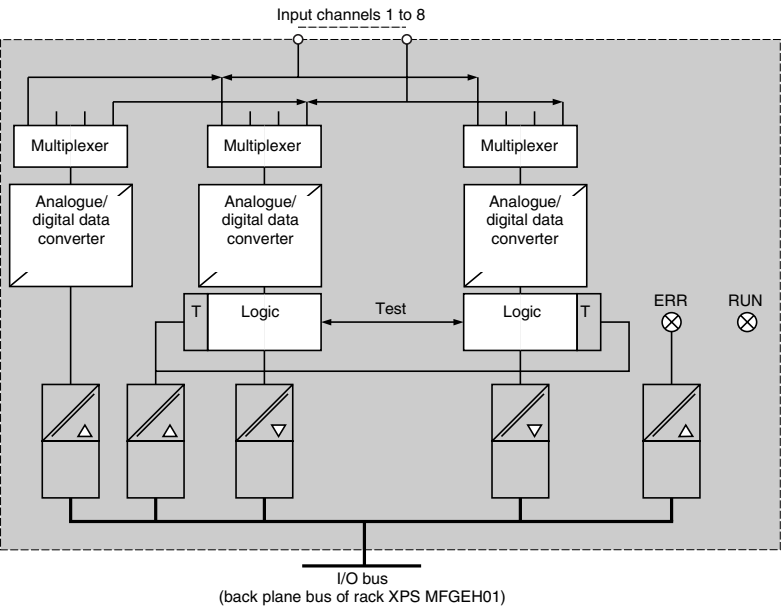
Number	Type	Voltage	Current	Value range	Example
8 inputs	Single-pole ± 10 V	–	–	± 1000	Single-pole measuring of 0 to 10 V voltages
			0...20 mA	0...1000 (2) 0...2000 (3)	Measuring, with equipotential link, currents from 0 to 20 mA
4 inputs	2-pole	± 10 V	–	± 1000	Closed circuit scanning of input channels

(2) The unused input channels must be short-circuited on the reference pole (L-).

(3) With a 250 Ω external equipotential link.

(4) With a 500 Ω external equipotential link.

Functional synoptic



Description

On the front face of the module:

- 1 Two process status LEDs (RUN, ERR).
- 2 Two removable screw terminal blocks (9 terminals per block) for connection of inputs (1).
- 3 Grip to assist installation/removal.

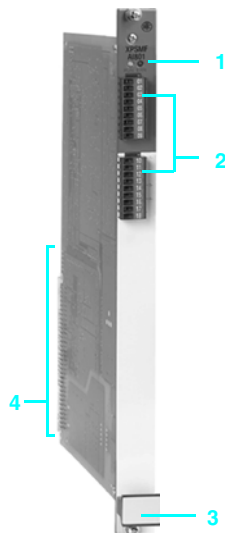
On the rear:

- 4 Terminals for automatic electrical connection to the back plane bus of rack XPS MFGEH01.

LED details

LED	Colour	Status	Description
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Module defect or external error, diagnostics response.
		Off	No error regarding the module or the network.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with module.



Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

"In rack" analogue input module

Characteristics			
Module type			XPS MFAI801
Number of analogue inputs			8 single-pole inputs ($\pm 10\text{ V} / 0\dots 20\text{ mA}$) or 4 2-pole inputs ($\pm 10\text{ V}$), electrically isolated, configurable by choice of connection
Supply	Voltage	V	≈ 24 , supplied by rack XPS MFGEH01 incorporating power supply module XPS MFPS01
	Voltage limits		- 15...+ 20%
Signal	Usable range	V	± 10.25
		mA	0...+ 20.5 (with equipotential link)
	Nominal value	V	± 10
		mA	0...+ 20 (with equipotential link)
Maximum input signal		V	± 10.7
Equipotential link for current measurement		Ω	250 or 500
Overvoltage protection		V	$\approx - 15\dots + 15$ (30 V range)
Input resistance	d.c.	M Ω	1
Operational data			$\approx 24\text{ V}/380\text{ mA}$ $\approx 3.3\text{ V}/150\text{ mA}$
Ambient air temperature conforming to EN 61131-2	Operating	$^{\circ}\text{C}$	0...+ 60
	Storage	$^{\circ}\text{C}$	- 40...+ 85
Resolution	Effective		9-bit
	Maximum		12-bit
Output voltage			$\pm 1\%$ max.
Safety accuracy			$\pm 1\%$ max.
Transient deviation			$\pm 1\%$ max.
Value acquisition renewal			Once per CPU cycle
Processing time			Approximately 45 μs
Connections			See page 43



XPS MFAI801

References

Description	Number of channels	Voltage Current	Reference	Weight kg
Analogue input module	8, single-pole	$\pm 10\text{ V}$ $0 \dots 20\text{ mA}$ (1)	XPS MFAI801	0.240
	4, 2-pole	$\pm 10\text{ V}$		

Connections

Item	Connection	Screw N°	Screw	Function
A	Analogue inputs	01	L1+	Analogue input 1
		02	L-	Input 1 (reference pole)
		03	L2+	Analogue input 2
		04	L-	Input 2 (reference pole)
		05	L3+	Analogue input 3
		06	L-	Input 3 (reference pole)
		07	L4+	Analogue input 4
		08	L-	Input 4 (reference pole)
		09	$\perp$	Earth/Shielding
B	Analogue inputs	10	L5+/L1-	Analogue input 5
		11	L-	Input 5 (reference pole)
		12	L6+/L2-	Analogue input 6
		13	L-	Input 6 (reference pole)
		14	L7+/L3-	Analogue input 7
		15	L-	Input 7 (reference pole)
		16	L8+/L4-	Analogue input 8
		17	L-	Input 8 (reference pole)
		18	$\perp$	Earth/Shielding

Configuration of analogue inputs

Connection	...	with	...	Connection	...	with	...
8 single-pole inputs	L1+		L-	4 2-pole inputs	L1+		L5+/L1-
	L2+		L-		L2+		L6+/L2-
	L3+		L-		L3+		L7+/L3-
	L4+		L-		L4+		L8+/L4-
	L5+/L1-		L-				
	L6+/L2-		L-				
	L7+/L3-		L-				
	L8+/L4-		L-				

(1) With a $250\text{ }\Omega$ or $500\text{ }\Omega$ external equipotential link.

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

“In rack” analogue output module

Presentation

The analogue output module **XPS MFAO801** is designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ISO 13849-1.

■ It incorporates 8 configurable analogue outputs (0...20 mA, 0...+ 10 V or - 10...+ 10 V):

□ For selection of the type of voltage/current measurement: a switch enables selection of 6 functions for each output channel.

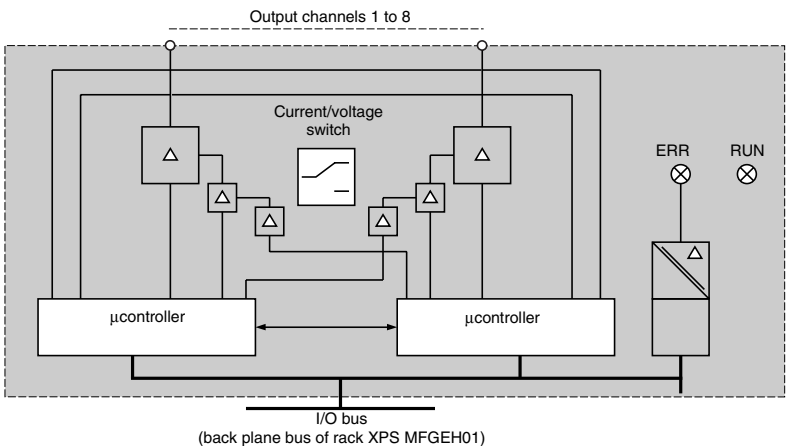
Switch position	Outputs	
	Voltage ± 10 V	Current 0...+ 20 mA
1	–	On
2	–	On
3	–	On
4	On	–
5	On	–
6	On	–

□ Selection of measuring scale using software XPSMFWIN: the “Properties” sub-menu displays the scale options in the “Type” window (...FS1000 or ...FS2000).

Configurable output values				
Type	Voltage	Current	Value range	
			Half scale (version FS1000)	Full scale (version FS2000)
8 analogue outputs	–	0...20 mA	0...+ 1000	0...+ 2000
	0...+ 10 V	–	0...+ 1000	0...+ 2000
	- 10...+ 10 V	–	- 1000...+ 1000	- 2000...+ 2000

■ The module can be installed in rack XPS MFGEH01 as many times as required in the six slots available.

Functional synoptic



Description

On the front face of the module:

- 1 Two process status LEDs (RUN, ERR).
- 2 Two removable screw terminal blocks (9 terminals per block) for connection of outputs (1).
- 3 Grip to assist installation/removal.

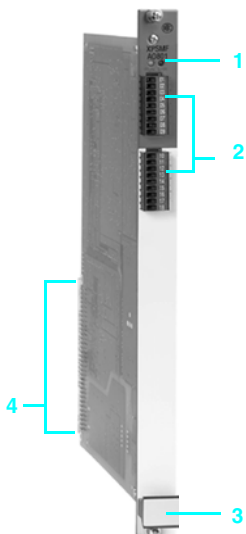
On the rear:

- 4 Terminals for automatic electrical connection to the back plane bus of rack XPS MFGEH01.

LED details

LED	Colour	Status	Description
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Module defect or external error, diagnostics response.
		Off	No error regarding the module or on the channels.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with module.



Characteristics			
Module type		XPS MFAO801	
Number of outputs		8 analogue outputs	
Supply	Voltage	V	— 24 (supplied by rack XPS MFGEH01 incorporating power supply module XPS MFPS01)
	Voltage limits		- 15...+ 20%
Nominal output values	V		± 10 (- 10...+ 10)
	mA		0...+ 20
Maximum output value	V		± 10.25
	mA		0...+ 21
Overvoltage protection		V	24
Output resistance	Current	Ω	≤ 600
	Voltage	kΩ	> 1
Operational data			3.3 V / 130 mA 5 V / 280 mA 24 V / 630 mA
Ambient air temperature conforming to EN 61131-2	Operating	°C	0...+ 60
	Storage	°C	- 40...+ 85
Resolution	Effective		7-bit
	Maximum		12-bit
Symmetrical tolerance			± 1% max.
Safety accuracy			± 1% max.
Processing time			Approximately 45 μs
Connections			See page 43

References

Description	No. of channels	Configuration		Reference	Weight kg
		Current	Voltage		
Analogue output module	8	0...20 mA	- 10...+ 10 V	XPS MFAO801	0.280

Connections

Item	Connection	Screw N°	Screw	Function
A	Analogue outputs	01	O1+	Analogue output 1
		02	O1-	Output 1 (reference pole)
		03	O2+	Analogue output 2
		04	O2-	Output 2 (reference pole)
		05	O3+	Analogue output 3
		06	O3-	Output 3 (reference pole)
		07	O4+	Analogue output 4
		08	O4-	Output 4 (reference pole)
		09	⊥	Earth/Shielding
B	Analogue outputs	10	O5+	Analogue output 5
		11	O5-	Output 5 (reference pole)
		12	O6+	Analogue output 6
		13	O6-	Output 6 (reference pole)
		14	O7+	Analogue output 7
		15	O7-	Output 7 (reference pole)
		16	O8+	Analogue output 8
		17	O8-	Output 8 (reference pole)
		18	⊥	Earth/Shielding



XPS MFAO801

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

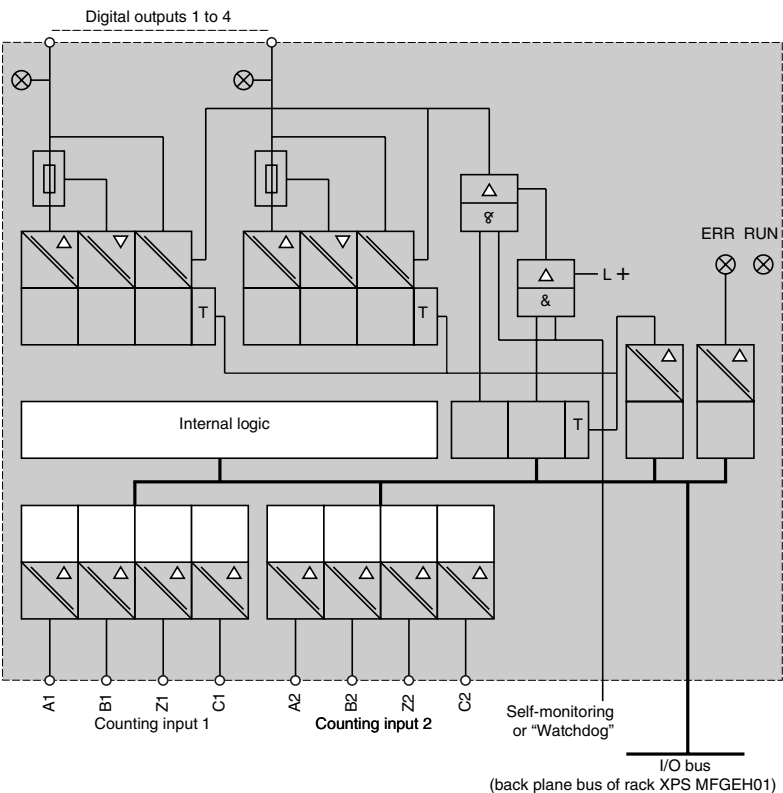
“In rack” mixed module: counting inputs/digital outputs

Presentation

The mixed counting input and digital output module **XPS MFCIO2401** is designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ISO 13849-1.

- It incorporates:
 - 2 24-bit independent and configurable counting channels (1) (one channel for counting and one channel for increasing or decreasing counting direction). They are configured using software XPSMFWIN.
 - 4 digital outputs.
- The module can be installed in rack XPS MFGEH01 as many times as required in the six slots available.

Functional synoptic



Description

On the front face of the module:

- 1 Two process status LEDs (RUN, ERR).
- 2 Two removable screw terminal blocks (9 terminals per block) for connection of inputs (1).
- 3 One removable screw terminal block (9 terminals) for connection of outputs (1) with four output status LEDs.
- 4 Grip to assist installation/removal.

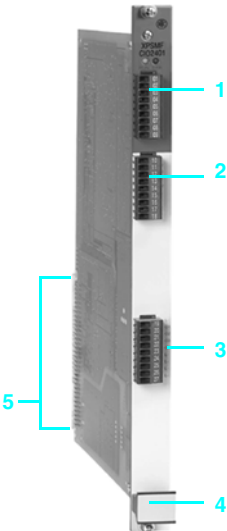
On the rear:

- 5 Terminals for automatic electrical connection to the back plane bus of rack XPS MFGEH01.

LED details

LED	Colour	Status	Description
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Module defect or external error, diagnostics response.
		Off	No error regarding the module or on the channels.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with module.



Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

“In rack” mixed module: counting inputs/digital outputs

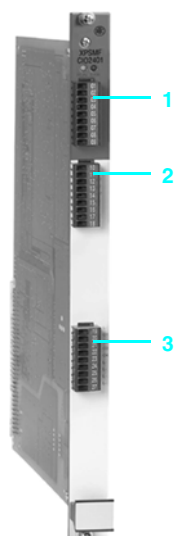
Characteristics			
Mixed module type			XPS MFCIO2401
Supply	Voltage	V	--- 24 (supplied by rack XPS MFGEH01 incorporating power supply module XPS MFPS01)
	Voltage limits		- 15...+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	°C	0...+ 60
	Storage	°C	- 40...+ 85
Counting inputs			
Number	Counter		2
	Inputs		4 on each pole (A, B, Z, C)
Input voltage		V	--- 5 or 24
Input current		mA	≤ 3
Input resistance		kΩ	3.7
Counting frequency		MHz	0...1
Resolution			24-bit
Time base accuracy			0.2%
Operational data			--- 3.3 V / 0.8 A --- 5 V / 0.1 A --- 24 V / 0.1 A + output current
Maximum distance of equipment		m	500, with shielded dual twisted pair cable
Input connections			See page 43
Digital outputs			
Number			4
Output voltage		V	--- 18.4...26.8
Output current		A	0.5 per channel, 2 max. per module Continuous short-circuit proof
Internal volt drop		V	3 max. at 0.5 A
Minimum current		mA	2 per channel
Permissible current	At state 0	mA	1 mA max. at 2 V
Current consumption		V	--- 24 / 0.1 A + output current
Output connections			See page 43

References

Description	Characteristics	Reference	Weight kg
Mixed I/O module	2 x 24-bit counting inputs, configurable: 5 V...24 V 4 digital outputs	XPS MFCIO2401	0.260

Connections

Item	Connection	Screw N°	Screw	Function
1	Counting input	01	C-	Common reference pole
		02	A1	Input A1 or bit 1
		03	B1	Input B1 or bit 2
		04	Z1	Input Z1 or bit 3
		05	C1	Input C1 or bit 4
		06	C-	Common reference pole
		07	C-	Common reference pole
		08	C-	Common reference pole
		09	C-	Common reference pole
2	Counting input	10	C-	Common reference pole
		11	A2	Input A2 or bit 1
		12	B2	Input B2 or bit 2
		13	Z2	Input Z2 or bit 3
		14	C2	Input C2 or bit 4
		15	C-	Common reference pole
		16	C-	Common reference pole
		17	C-	Common reference pole
		18	C-	Common reference pole
3	Digital outputs	19	L-	Common reference pole
		20	1	Digital output 1
		21	2	Digital output 2
		22	3	Digital output 3
		23	4	Digital output 4
		24	L-	Common reference pole
		25	L-	Common reference pole
		26	L-	Common reference pole
		27	L-	Common reference pole



XPS MFCIO2401

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

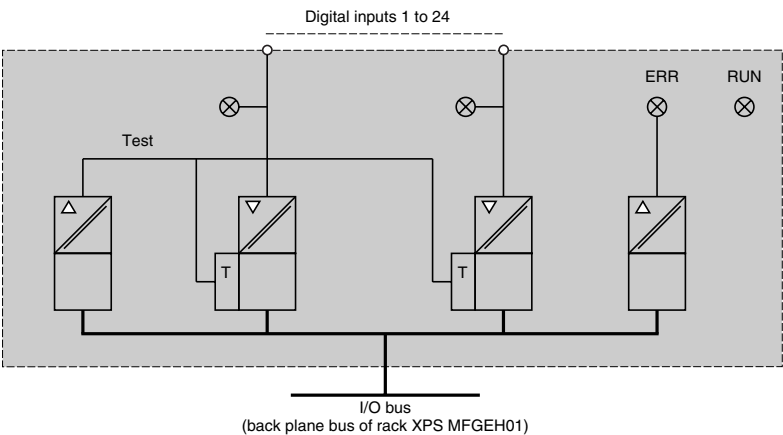
“In rack” digital input module

Presentation

The digital input module **XPS MFDI2401** is designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ISO 13849-1.

- It incorporates 24 --- 110 / $\sim$ 127 V digital inputs that are configurable using programming software XPSMFWIN.
- The module can be installed in rack XPS MFGEH01 as many times as required in the six slots available.

Functional synoptic



Description

On the front face of the module:

- 1 Two process status LEDs (RUN, ERR).
- 2 Three removable terminal blocks (9 terminals per block) for connection of inputs (1), each with eight input status LEDs.
- 3 Grip to assist installation/removal.

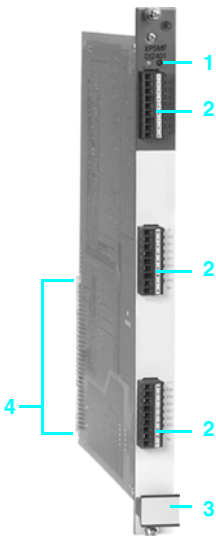
On the rear:

- 4 Terminals for automatic electrical connection to the back plane bus of rack XPS MFGEH01.

LED details

LED	Colour	Status	Description
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Module defect or external error, diagnostics response.
		Off	No error regarding the module or on the channels.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with module.



Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

“In rack” digital input module

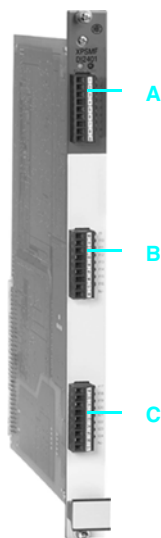
Characteristics			
Input module type			XPS MFDI2401
Supply	Voltage	V	≐ 24 (supplied by rack XPS MFGEH01 incorporating power supply module XPS MFPS01)
	Voltage limits		- 15...+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	°C	0...+ 60
	Storage	°C	- 40...+ 85
Number of inputs			24, electrically isolated
Nominal voltage			V ≐ 110/∼ 127 (single-phase)
Input voltage	At state 0	V	≤ 20
	At state 1	V	≥ 79
Input current	At state 1	mA	≥ 2.2 at 79 V
Operational data			≐ 3.3 V / 0.05 A ≐ 24 V / 0.1 A (79 V at state 1)
LED display			Yes
Connections			Shielded dual twisted pair cable recommended to provide protection against electromagnetic interference, or Ø 12 mm max. cable with connection to earth of rack XPS MFGEH01

References

Description	Characteristics	Reference	Weight kg
Input module	24 digital inputs ≐ 110 V / ∼ 127 V	XPS MFDI2401	0.260

Connections

Item	Connection	Screw N°	Screw	Function
A	Digital inputs	01	I1	Input 1
		02	I2	Input 2
		03	I3	Input 3
		04	I4	Input 4
		05	I5	Input 5
		06	I6	Input 6
		07	I7	Input 7
		08	I8	Input 8
		09	N/-	Common reference pole
B	Digital inputs	10	I9	Input 9
		11	I10	Input 10
		12	I11	Input 11
		13	I12	Input 12
		14	I13	Input 13
		15	I14	Input 14
		16	I15	Input 15
		17	I16	Input 16
		18	N/-	Common reference pole
C	Digital inputs	19	I17	Input 17
		20	I18	Input 18
		21	I19	Input 19
		22	I20	Input 20
		23	I21	Input 21
		24	I22	Input 22
		25	I23	Input 23
		26	I24	Input 24
		27	N/-	Common reference pole



XPS MFDI2401

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

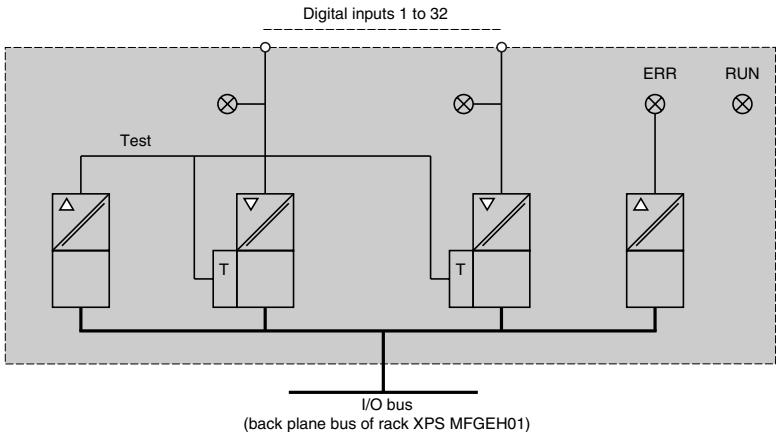
“In rack” digital input module

Presentation

The digital input module **XPS MFDI3201** is designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ISO 13849-1.

- It incorporates 32 digital inputs that are configurable using programming software XPSMFWIN.
- The module can be installed in rack XPS MFGEH01 as many times as required in the six slots available.

Functional synoptic



Line control

Line control is a means of short-circuit and line break monitoring, for example Emergency stop inputs to category 4 of standard EN 954-1/ISO 13849-1, that are configurable in the module XPS MFDI3201. See page 35.

Description

On the front face of the module:

- 1 Two process status LEDs (RUN, ERR).
- 2 Five removable terminal blocks (9 terminals per block) for connection of inputs (1), with a status LED for each input terminal.
- 3 Grip to assist installation/removal.

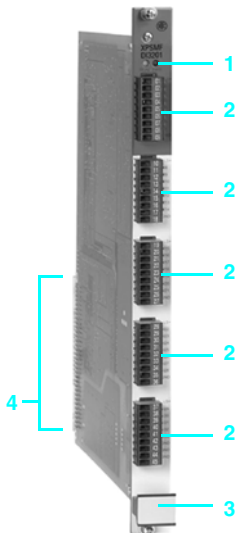
On the rear:

- 4 Terminals for automatic electrical connection to the back plane bus of rack XPS MFGEH01.

LED details

LED	Colour	Status	Description
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Module defect or external error, diagnostics response.
		Off	No error regarding the module or on the channels.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with module.



Machine Safety

Preventa safety PLCs
Modular, type XPS MF60
“In rack” digital input module

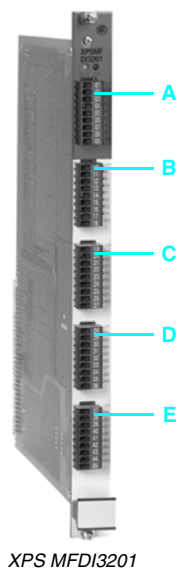
Characteristics			
Input module type		XPS MFDI3201	
Supply	Voltage	V	≐ 24, supplied by rack XPS MFGEH01 incorporating power supply module XPS MFPS01
	Voltage limits		- 15...+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	°C	0...+ 60
	Storage	°C	- 40...+ 85
Number of digital inputs			32, electrically isolated
Nominal voltage		V	≐ 24
Input voltage	At state 0	V	5 max.
	At state 1	V	10...30
Input current	At state 0	mA	1.0 at 5 V
	At state 1	mA	2 at 10 V, 5 at 24 V
Operational data			≐ 3.3 V / 0.05 A, ≐ 24 V / 0.2 A
LED display			Yes
Connections			Shielded dual twisted pair cable recommended to provide protection against electromagnetic interference, or Ø 12 mm max. cable with connection to earth of rack XPS MFGEH01

References

Description	Characteristics	Reference	Weight kg
Input module	32 digital inputs	XPS MFDI3201	0.260

Connections

Item	Connection	Screw N°	Screw	Function
A	Digital inputs	01	LS+	Supply for inputs 1 to 7
		02	I1	Input 1
		03	I2	Input 2
		04	I3	Input 3
		05	I4	Input 4
		06	I5	Input 5
		07	I6	Input 6
		08	I7	Input 7
		09	EGND	Reference pole
B	Digital inputs	10	LS+	Supply for inputs 8 to 14
		11	I8	Input 8
		12	I9	Input 9
		13	I10	Input 10
		14	I11	Input 11
		15	I12	Input 12
		16	I13	Input 13
		17	I14	Input 14
		18	EGND	Reference pole
C	Digital inputs	19	LS+	Supply for inputs 15 to 21
		20	I15	Input 15
		21	I16	Input 16
		22	I17	Input 17
		23	I18	Input 18
		24	I19	Input 19
		25	I20	Input 20
		26	I21	Input 21
		27	EGND	Reference pole
D	Digital inputs	28	LS+	Supply for inputs 22 to 28
		29	I22	Input 22
		30	I23	Input 23
		31	I24	Input 24
		32	I25	Input 25
		33	I26	Input 26
		34	I27	Input 27
		35	I28	Input 28
		36	EGND	Reference pole
E	Digital inputs	28	LS+	Supply for inputs 29 to 32
		29	I29	Input 29
		30	I30	Input 30
		31	I31	Input 31
		32	I32	Input 32
		33	EGND	Reference pole
		34	EGND	Reference pole
		35	EGND	Reference pole
		36	EGND	Reference pole



XPS MFDI3201

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

“In rack” digital I/O module

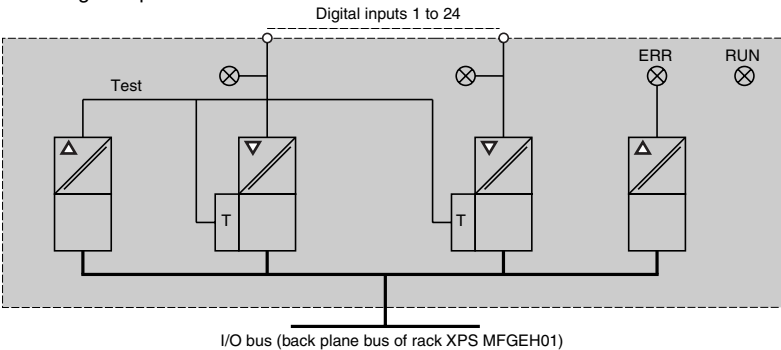
Presentation

The digital I/O module **XPS MFDIO241601** is designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ISO 13849-1.

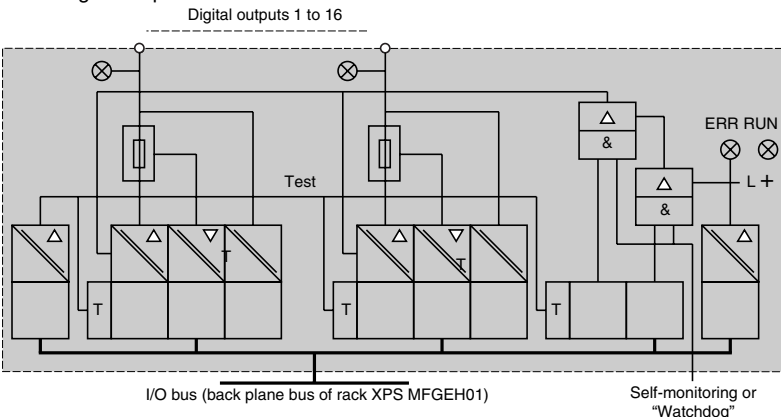
- It incorporates 24 digital inputs and 16 digital outputs.
- The module can be installed in rack XPS MFGEH01 as many times as required in the six slots available.

Functional synoptics

- 24 digital inputs



- 16 digital outputs



Line control

Line control is a means of short-circuit and line break monitoring, for example Emergency stop inputs to category 4 of standard EN 954-1/ISO 13849-1, that is configurable in the module XPS MFDIO241601. See page 35.

Description

On the front face of the module:

- 1 Two process status LEDs (RUN, ERR).
- 2 Three removable terminal blocks (9 terminals per block) for connection of inputs (1), each with eight input status LEDs.
- 3 Two removable screw terminal blocks (9 terminals per block) for connection of outputs (1), each with eight output status LEDs.
- 4 Grip to assist installation/removal.

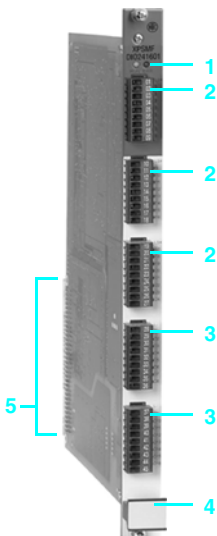
On the rear:

- 5 Terminals for automatic electrical connection to the back plane bus of rack XPS MFGEH01.

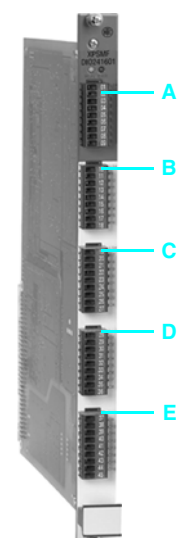
LED details

LED	Colour	Status	Description
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Module defect or external error, diagnostics response.
		Off	No error regarding the module or on the channels.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with module.



Characteristics			
Module type		XPS MFDIO241601	
Supply	Voltage	V	--- 24, supplied by rack XPS MFGEH01 incorporating power supply module XPS MFPS01
	Voltage limits		- 15...+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	°C	0...+ 60
	Storage	°C	- 40...+ 85
Digital input and output connections			Shielded dual twisted pair cable recommended to provide protection against electromagnetic interference, or Ø 12 mm max. cable with connection to earth of rack XPS MFGEH01
Digital inputs			
Number			24, electrically isolated
Nominal input voltage		V	--- 24
Input voltage	At state 0	V	5 max.
	At state 1	V	10...30
Input current	At state 0	mA	1.0 at 5 V
	At state 1	mA	2 at 10 V, 5 at 24 V
Operational data			--- 3.3 V / 0.3 A, --- 24 V / 0.5 A
Digital outputs			
Number			16, electrically isolated
Output voltage		V	--- 18.4...26.8
Internal volt drop			2 V max. at 2 A
Output current	At 30 °C	A	2 per output channel, 8 max. per module Continuous short-circuit proof
Minimum current		mA	2 per channel
Permissible current	At state 0	mA	1 max. at 2 V



XPS MFDIO241601

References

Description	Characteristics	Reference	Weight kg
I/O module	☐ 24 digital inputs ☐ 16 digital outputs	XPS MFDIO241601	0.260

Connections

Digital inputs

Item	Connection	Screw N°	Screw	Function
A	Digital inputs	01	LS+	Supply for inputs 1 to 8
		02	I1	Input 1
		03	I2	Input 2
		04	I3	Input 3
		05	I4	Input 4
		06	I5	Input 5
		07	I6	Input 6
		08	I7	Input 7
		09	I8	Input 8
B	Digital inputs	10	LS+	Supply for inputs 9 to 16
		11	I9	Input 9
		12	I10	Input 10
		13	I11	Input 11
		14	I12	Input 12
		15	I13	Input 13
		16	I14	Input 14
		17	I15	Input 15
		18	I16	Input 16
C	Digital inputs	19	LS+	Supply for inputs 17 to 24
		20	I17	Input 17
		21	I18	Input 18
		22	I19	Input 19
		23	I20	Input 20
		24	I21	Input 21
		25	I22	Input 22
		26	I23	Input 23
		27	I24	Input 24

Digital outputs

Digital outputs					Digital outputs							
Connection		Screw N°		Screw	Function	Item	Connection		Screw N°		Screw	Function
D	Digital outputs	28	L-		Reference pole for outputs 1 to 8	E	Digital outputs	37	L-		Reference pole for outputs 9 to 16	
		29	O1		Output 1			38	O9		Output 9	
		30	O2		Output 2			39	O10		Output 10	
		31	O3		Output 3			40	O11		Output 11	
		32	O4		Output 4			41	O12		Output 12	
		33	O5		Output 5			42	O13		Output 13	
		34	O6		Output 6			43	O14		Output 14	
		35	O7		Output 7			44	O15		Output 15	
		36	O8		Output 8			45	O16		Output 16	

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

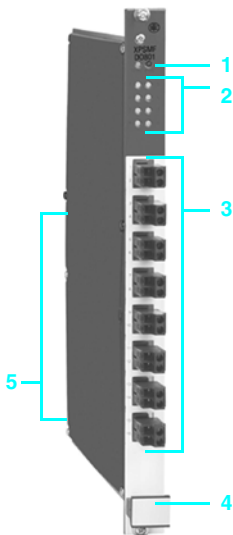
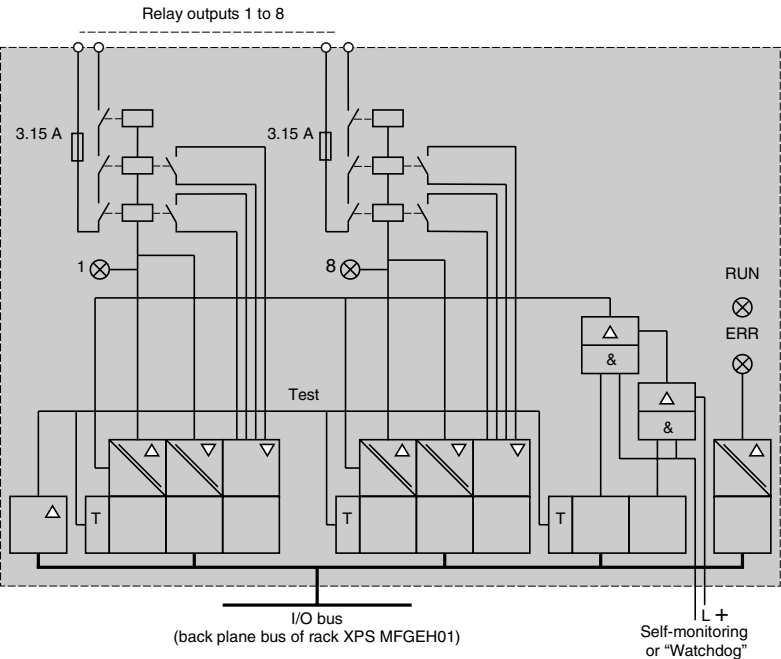
“In rack” relay output module

Presentation

The relay output module **XPS MFD0801** is designed to meet SIL 3 requirements of standard IEC 61508 and category 4 requirements conforming to EN 954-1/ISO 13849-1.

- It incorporates 8 relay safety outputs (3.15 A fuse) that are configurable using programming software XPSMFWIN.
- The module can be installed in rack XPS MFGEH01 as many times as required in the six slots available.

Functional synoptic



Description

On the front face of the module:

- 1 Two process status LEDs (RUN, ERR).
- 2 Eight output status LEDs.
- 3 Eight removable screw terminal blocks (2 terminals per block) for connection of outputs (1).
- 4 Grip to assist installation/removal.

On the rear:

- 5 Terminals for automatic electrical connection to the back plane bus of rack XPS MFGEH01.

LED details

LED	Colour	Status	Description
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Module defect or external error, diagnostics response.
		Off	No error regarding the module or on the channels.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with module.

Machine Safety

Preventa safety PLCs

Modular, type XPS MF60

"In rack" relay output module

Characteristics			
Output module type			XPS MFDO801
Supply	Voltage	V	--- 24, supplied by rack XPS MFGEH01 incorporating power supply module XPS MFPS01
	Voltage limits		- 15...+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	°C	0...+ 50 (1)
	Storage	°C	- 40...+ 85
Number and type of outputs			8 relay outputs, volt-free, with N/O contact
Relay	Type		2 safety relays with positively guided contacts
	Degree of protection		IP 40
	Contact material		Silver alloy, gold flashed
	Switching time	ms	30 approx.
	Reset time	ms	20 approx.
	Bounce time	ms	30 approx.
	Mechanical life		≥ 10 million operating cycles
	Electrical durability		≥ 250 000 operating cycles on full load (resistive) and ≤ 0.1 operating cycles/s
Switching voltage		V	~ 6 V...230 V / --- 110 V
Switching current		A	3.15 A with internal fuse Breaking capacity 100 A
Switching capacity	a.c.	VA	700 max., cos φ = 1
	d.c. (non inductive)		≤ --- 30 V: 95 W max. (3.15 A) ≤ --- 70 V: 40 W max. (0.5 A) ≤ --- 110 V: 33 W max. (0.315 A) With suitable external fuse
Operational data			--- 3.3 V / 0.2 A, --- 24 V ± 10% (1) / 0.7 A
LED display			Yes
Connections			Shielded dual twisted pair cable recommended to provide protection against electromagnetic interference, or Ø 12 mm max. cable with connection to earth of rack XPS MFGEH01

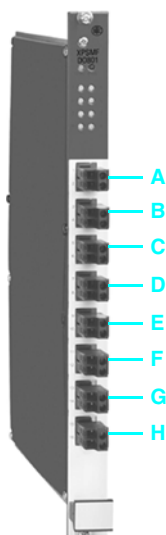
(1) Limited system data.

References

Description	Characteristics	Reference	Weight kg
Output module	8 relay outputs ~ 6 V...230 V / --- 110 V	XPS MFDO801	0.600

Connections

Item	Connection	Screw N°	Screw	Function
A	Relay output	01	1	Contact 1, terminal A
		02		Contact 1, terminal B
B	Relay output	03	2	Contact 2, terminal A
		04		Contact 2, terminal B
C	Relay output	05	3	Contact 3, terminal A
		06		Contact 3, terminal B
D	Relay output	07	4	Contact 4, terminal A
		08		Contact 4, terminal B
E	Relay output	09	5	Contact 5, terminal A
		10		Contact 5, terminal B
F	Relay output	11	6	Contact 6, terminal A
		12		Contact 6, terminal B
G	Relay output	13	7	Contact 7, terminal A
		14		Contact 7, terminal B
H	Relay output	15	8	Contact 8, terminal A
		16		Contact 8, terminal B



XPS MFDO801

Machine Safety

Preventa safety PLCs

Compact and modular, type XPS MF

Decentralised input, output and input/output modules
type XPS MF1/2/3

Presentation

Decentralised input, output and input/output modules:

- Location: within the vicinity of hazardous zones of machines to be monitored.
- Extension of the I/O capacity of compact and modular safety PLCs, both for number and type.

Maximum use of decentralised input, output and input/output modules, designed for use in safety related parts of control systems conforming to EN 954-1/ISO 13849-1 and IEC 61508:

- Up to category 4 (EN 954-1/ISO 13849-1),
- SIL 3 (IEC 61508)



Products referenced **XPS MF1DI1601** and **XPS MF2DO0000** are marked **HIMatrix F1DI** and **HIMatrix F2DI** (manufactured by Hima, sold by Schneider Electric).

User memory	Application
	Data
Response time	
Maximum consumption	
Supply	

–
–
Depending on application
0.8 A
0.5 A
9 A
External $\approx$ 24 V supply (with separate protection conforming to IEC 61131-2)

Inputs	Digital	Number of channels
		Current at state 0
		Current at state 1
	Analogue	Number of channels
		Range: voltage/current
	Counting	Number of channels
		Current

16, not electrically isolated	–	–
1.5 mA max., 1 mA at 5 V	–	–
≥ 2 mA at $\approx$ 15 V	–	–
–	–	–
–	–	–
–	–	–
–	–	–

Outputs	Digital	Number of channels
		Output current
	Analogue	Number of channels
		Range: voltage/current
	Relay	Number
		Switching voltage
	Pulse	Number
		Current/Voltage

–	4, not electrically isolated	16, not electrically isolated
–	5 A max.	1 A max. at 60 °C, 2 A max. at 40 °C
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
4, not electrically isolated	–	–
60 mA/20 V	–	–

Input/output connections

Removable screw terminal blocks, coded with locating device

Communication

On Ethernet network

Yes, by 2 RJ45 connectors, with integrated switch

Using SafeEthernet safety protocol between compact **XPS MF40**, **XPS MF31/30/35** or modular **XPS MF60** safety PLCs and other decentralised I/O modules type **XPS MF1/2/3**

Decentralised I/O module type

XPS MF1DI1601

XPS MF2DO401

XPS MF2DO1601

See page

68

75

(1) With 500 Ω equipotential link.



Products referenced XPS MF2..... and XPS MF3..... are marked HIMatrix F2DO and HIMatrix F3... (manufactured by Hima, sold by Schneider Electric).

–	–	–	–	–	–
Depending on application					
0.6 A	0.6 A	8 A	14 A	8 A	0.8 A
External $\approx$ 24 V supply (with separate protection conforming to IEC 61131-2)					
–	–	8, not electrically isolated	16, not electrically isolated	20, not electrically isolated	–
–	–	1.5 mA max.	1.5 mA max.	1.5 mA max.	–
–	–	1.25 mA at $\approx$ 5 V	1 mA at $\approx$ 5 V	1.25 mA at $\approx$ 5 V	–
–	–	> 2 mA at $\approx$ 15 V	> 2 mA at $\approx$ 15 V	$\geq$ 2 mA at $\approx$ 15 V	–
–	–	–	–	–	8, single-pole
–	–	–	–	–	$\approx$ 0...10 V/0...20 mA (1)
–	–	–	–	–	–
–	–	–	–	–	–
–	–	8 DO+ (reference pole L-) 2 DO- (reference pole S+)	8 2-pole or 16 single-pole, not electrically isolated	8, not electrically isolated	–
–	–	DO+: - channels 1 to 3 and 5 to 7: 0.5 A at 60 °C - channels 4 and 8: 1 A at 60 °C, 2 A at 40 °C DO-: channels 1 and 2: 1 A at 60 °C	2 A max. at 40 °C, 1 A max. at 60 °C, 10 mA min.	Channels 1 to 3 and 5 to 7: 0.5 A at 60 °C Channels 4 and 8: 1 A at 60 °C, 2 A at 50 °C	–
–	–	–	–	–	4 non safety outputs
–	–	–	–	–	Usable range: 0...20 mA Nominal range: 4...20 mA
8	16	–	–	–	–
$\geq$ 5 V, $\leq$ 250 V/ $\sim$ 250 V	$\geq$ 5 V, $\leq$ 30 V/ $\sim$ 60 V	–	–	–	–
–	–	2, not electrically isolated	–	–	–
–	–	60 mA/20 V	60 mA/20 V	–	–

Removable screw terminal blocks, coded with locating device

Yes, by 2 RJ45 connectors, with integrated switch

Using SafeEthernet safety protocol between compact **XPS MF40**, **XPS MF31/30/35** or modular **XPS MF60** safety PLCs and other decentralised I/O modules type **XPS MF1/2/3**

XPS MF2DO801	XPS MF2DO1602	XPS MF3DIO8801	XPS MF3DIO16801	XPS MF3DIO20802	XPS MF3AIO8401
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75

87

(1) With 500 Ω equipotential link.

Machine Safety

Preventa safety PLCs

Compact or modular

Decentralised input module type XPS MF1



XPS MF1DI1601

This product referenced **XPS MF1DI1601** is marked **HIMatrix F1DI** (manufactured by Hima, sold by Schneider Electric).

Presentation

Supplied on $\text{---} 24 \text{ V}$, module XPS MF1DI160 is a compact decentralised input block that is designed to extend the input capacity of safety PLCs XPS MF to which it is connected.
It is connected to the compact or modular safety PLCs via its 2 RJ45 communication ports. It does not have a user program.

Decentralised input module XPS MF1DI1601

Decentralised digital inputs			
N°	Safety detection	Safety dialogue	Safety control
16	Limit switches, Guard switches, with reset and with actuator, Safety light curtains type 2 and type 4, Safety mats and sensing edges...(1)	Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations...(1)	Switch disconnectors mini-Vario and Vario... (1)
Decentralised pulsed outputs			
N°			
4	Line control for line break and short-circuit monitoring		

Line control

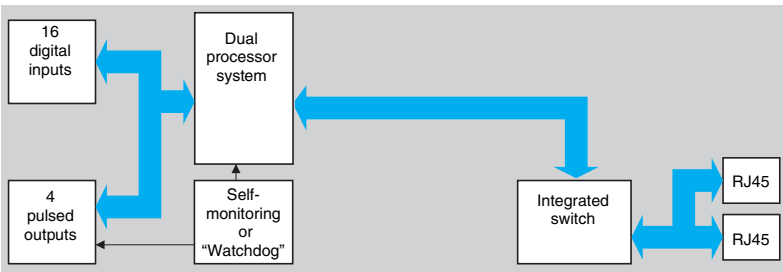
Line control is a means of short-circuit and line break monitoring, for example Emergency stop inputs to category 4 of standard EN 954-1/ISO 13849-1, that is configurable in the decentralised input module XPS MF1DI1601. The pulsed outputs 1 to 4 are connected to the digital inputs 1 to 16. The pulses are automatic on the outputs: that drive the monitoring of the digital input lines.

Safety PLCs

In order to comply with safety requirements, the decentralised input module XPS MF1DI1601 integrates two essential functions conforming to category 4 of EN 954-1/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between this decentralised input module and the safety PLCs (Special Switch).

- **Redundancy:** the dual processor integrated in the decentralised input module XPS MF1DI1601 analyses and compares the information received from the safety inputs and outputs.
The incoming and outgoing information (programmed values and received values) are received in parallel by the two processors and compared in real-time.
- **“Watchdog” or self-monitoring:** the decentralised input module XPS MF1DI1601 continuously monitors the information processing cycle and the execution of tasks, and intervenes if the time of a cycle does not conform to the predefined value.
- **The integrated switch (Special Switch)** stores for a very short time and sends at very high speed the information provided by inputs of the module on the Ethernet network, whilst avoiding signal collisions and excessive amounts of data on the network.

Functional synoptic



Safety communication on Ethernet network

The decentralised input module XPS MF1 incorporates two RJ45 (type 10BASE-T/100BASE-TX) connectors that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs type XPS MF.

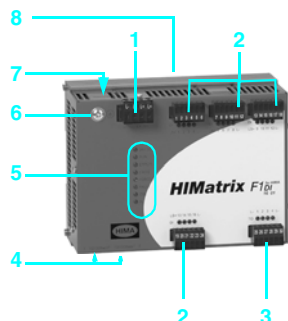
(1) Please refer to our “Safety solutions using Preventa” catalogue.

Machine Safety

Preventa safety PLCs

Compact or modular

Decentralised input module XPS MF1



Description

Decentralised input module XPS MF1DI1601

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\pm$ 24 V supply.
- 2 Four terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 3 One terminal block (1) for connection of pulsed digital outputs, with four digital output status LEDs.
- 4 Two RJ45 ports (type 10/100 BaseT) for connection on Ethernet network.
- 5 Eight process status LEDs.
- 6 One earth connection screw.
- 7 **On the top:** one "Reset" button.
- 8 **On the rear face:** one spring operated fixing device for mounting on rail.

Status LED details

Decentralised input module XPS MF1DI1601

LED	Colour	Status	Meaning
Inputs 1...16	Orange	On	Inputs active.
Outputs 1...4	Orange	On	Outputs active.
24 VDC	Green	On	$\pm$ 24 V voltage present.
		Off	No voltage.
RUN	Green	On	Normal service mode, loaded program running, the PLC receives I/O messages, communication and hardware/software tests carried out.
		Flashing	The CPU is in STOP and is not executing any user application. All the outputs are reset to a safe, de-energised state.
		Off	The CPU is in "ERROR" state (see ERROR).
ERROR	Red	On	Software error or hardware fault detected by the CPU. The monitoring program (Watchdog) has triggered the STOP state of the process because the programmed cycle time has been exceeded. The CPU has stopped the execution of the user application, ended all hardware and software tests and all outputs have been reset. The process can only be started again from the PC.
		Off	No errors detected.
		On	The CPU is being loaded with a new configuration.
PROG	Orange	Flashing	The FLASH ROM is being loaded with a new operating system.
		Off	No loading of configuration or operating system.
FORCE	Orange	On	The CPU is in RUN mode and force is active.
		Flashing	The system is not processing (STOP), but force is prepared and is activated if the dual processor is started.
		Off	Force mode not activated.
FAULT	Orange	On	Error display for line control. The user application has caused an error. The system configuration is defective. The loading of a new operating system was defective and the operating system is corrupt.
		Flashing	An error has occurred whilst writing to FLASH ROM memory (during updating of the operating system). One or more I/O errors have occurred.
		Off	None of the above errors have occurred.
		On	Emergency loading of the operating system is active.
OSL	Orange	Flashing	COM in INIT_Fail state.
RJ45	Green	On	Full duplex mode operation.
		Flashing	Signal collision.
		Off	Half duplex mode operation, no collision.
		Yellow	Connection established.
		Flashing	Interface active.

(1) Removable terminal block, with locating device, included with input module XPS MF1.

Characteristics

Decentralised I/O module type		XPS MF1DI1601	
Supply voltage		V	--- 24 (external supply with separate protection conforming to IEC 61131-2)
Voltage limits		V	- 15...+ 20%
Ambient air temperature	For operation	°C	0...+ 60
	For storage	°C	- 40...+ 85
Degree of protection			IP 20
Response time		ms	Depending on application
Current consumption		A	0.8 max.
Backup battery			None
Digital inputs			
Number			16, not electrically isolated
Permissible current	At state 1	mA	≥ 2 at --- 15 V
	At state 0	mA	1.5 max., 1 mA at 5 V
Switching point		V	Typically 7.5
Switching time		µs	250
Input supply			4 x 19.2 V/40 mA (at 24 V), protected against short-circuits
Pulsed outputs			
Number			4, not electrically isolated
Output voltage		V	20 (approximately, depending on the supply voltage)
Output current		mA	60
Minimum load			None
Response to overload			4 x ≥ 19.2 V, short-circuit current 60 mA at 24 V
Connections			See page 26

Communication

Ethernet network: safety communication using SafeEthernet protocol

Transmission	Communication ports		2 x RJ45 with integrated switch
	Speed	Mbps	100
Structure		10BASE-T/100BASE-TX	
Medium		Dual twisted pair cable	

References



XPS MF1DI1601

Product referenced **XPS MF1DI1601**
is marked **HIMatrix F1DI** (manufactured
by Hima, sold by Schneider Electric).

Decentralised input module (= 24 V supply)

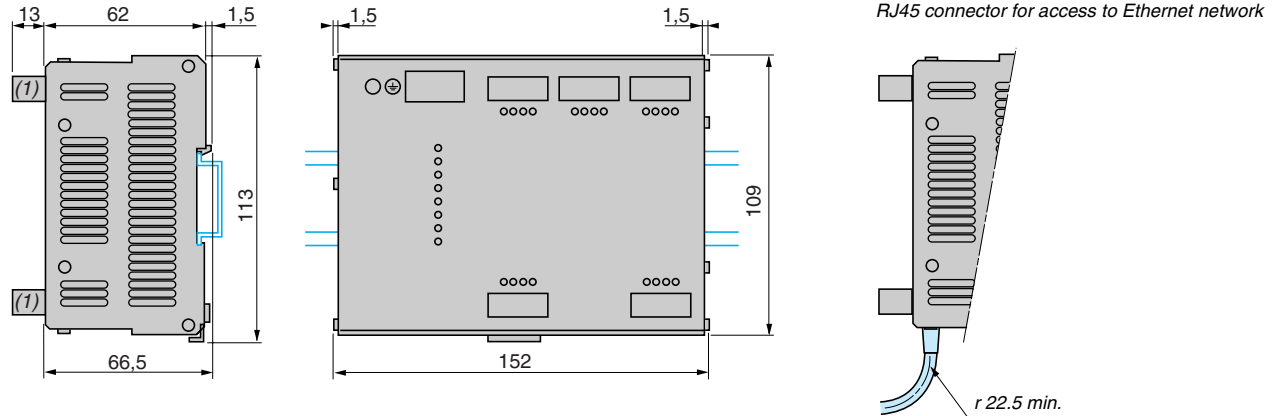
For use with	Digital inputs	Pulsed outputs	Ports	Reference	Weight kg
Safety PLCs, modular XPS MF60 or compact XPS MF40 and XPS MF31/30/35	16	4	2 x RJ45: access to Ethernet network	XPS MF1DI1601	0.700

Connecting cables

Description	For	Reference	Weight kg
Ethernet network connecting cables	Connection between decentralised input module XPS MF1 and compact safety PLCs XPS MF30/31/35 RJ45 connector fitted at each end	See page 29	–

Dimensions

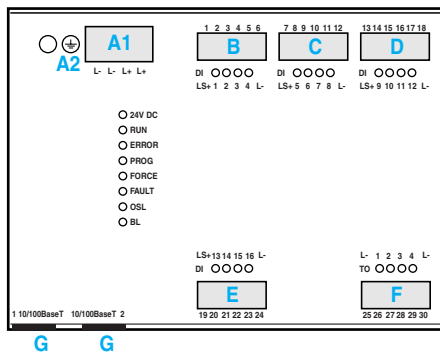
XPS MF1DI1601



(1) Removable terminal blocks.

Connections

XPS MF1DI1601



Item	Connection	Screw N°	Screw	Function
A1	Supply	–	L+	24 V
			L+	24 V
			L-	24 V (reference pole)
			L-	24 V (reference pole)
A2	Earth	–	⊥	Earth
B	Digital inputs	1	LS+	Sensor supply for inputs 1 to 4
		2	1	Digital input 1
		3	2	Digital input 2
		4	3	Digital input 3
		5	4	Digital input 4
		6	L-	Reference pole
C	Digital inputs	7	LS+	Sensor supply for inputs 5 to 8
		8	5	Digital input 5
		9	6	Digital input 6
		10	7	Digital input 7
		11	8	Digital input 8
		12	L-	Reference pole
D	Digital inputs	13	LS+	Sensor supply for inputs 9 to 12
		14	9	Digital input 9
		15	10	Digital input 10
		16	11	Digital input 11
		17	12	Digital input 12
		18	L-	Reference pole
E	Digital inputs	19	LS+	Sensor supply for inputs 13 to 16
		20	13	Digital input 13
		21	14	Digital input 14
		22	15	Digital input 15
		23	16	Digital input 16
		24	L-	Reference pole
F	Pulsed outputs	25	L+	Outputs common
		26	1	Output 1
		27	2	Output 2
		28	3	Output 3
		29	4	Output 4
		30	L-	Outputs common
Item	Connection	Type	Function	
G	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

Machine Safety

Preventa safety PLCs

Compact and modular

Decentralised output modules type XPS MF2



XPS MF2DO401



XPS MF2DO1601



XPS MF2DO801



XPS MF2DO801

Products referenced **XPS MF2●●●●●●** are marked **HIMatrix F2 DO...** (manufactured by Hima, sold by Schneider Electric).

Presentation

Supplied on $\text{---} 24 \text{ V}$, modules type XPS MF2 are compact decentralised output blocks that are designed to extend the output capacity of safety PLCs XPS MF to which they are connected.

They are connected to the modular or compact safety PLCs via their 2 RJ45 communication ports. They do not have a user program.

Decentralised output modules type XPS MF2

Output modules XPS	Decentralised outputs		
	N°	Type	
MF2DO401	4	Digital power outputs	Safety dialogue: Beacons and indicator banks, rotating mirror beacons, sirens... (1) Safety control: Enclosed thermal-magnetic motor circuit-breakers, Enclosed D.O.L. starters for motor control, Power contactors... (1)
MF2DO1601	16	Digital outputs	
MF2DO801	8	Relay outputs	
MF2DO1602	16	Relay outputs	

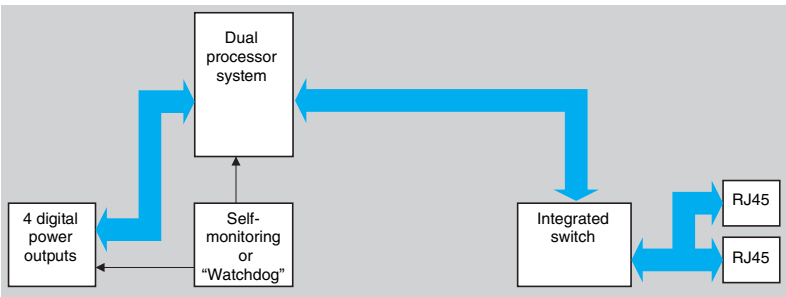
Safety PLCs

In order to comply with safety requirements, the decentralised output modules XPS MF2DO●●●● integrate two essential functions conforming to category 4 of EN 954-1/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between these decentralised output modules and the safety PLCs (Special Switch).

- **Redundancy:** the dual processor integrated in the decentralised output modules XPS MF2 analyses and compares the information received from the safety inputs and outputs.
The incoming and outgoing information (programmed values and received values) are received in parallel by the two processors and compared in real-time.
- **“Watchdog” or self-monitoring:** the decentralised output modules XPS MF2 continuously monitor the information processing cycle and the execution of tasks, and intervene if the time of a cycle does not conform to the predefined value.
- **The integrated switch (Special Switch)** stores for a very short time and sends at very high speed the information provided by the outputs of the modules on the Ethernet network, whilst avoiding signal collisions and excessive amounts of data on the network.

Functional synoptics

Decentralised output module XPS MF2DO401



(1) Please refer to our “Safety solutions using Preventa” catalogue.

Machine Safety

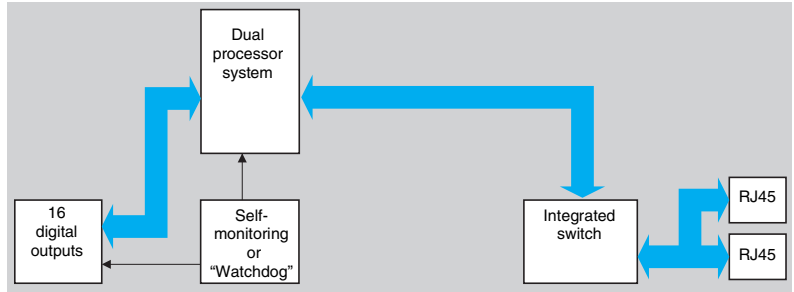
Preventa safety PLCs

Compact and modular

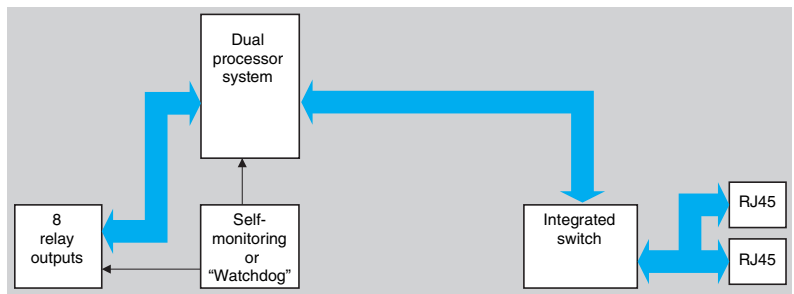
Decentralised output modules type XPS MF2

Functional synoptics (continued)

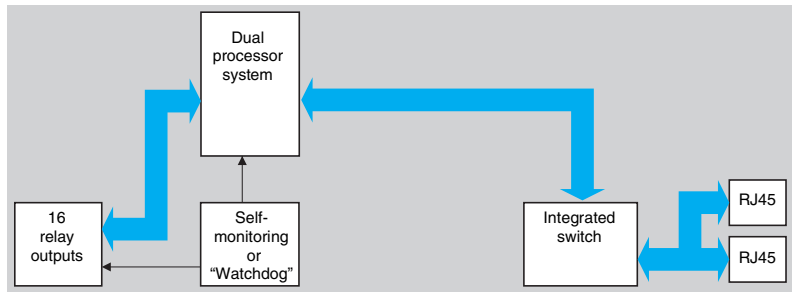
Decentralised output module XPS MF2DO1601



Decentralised output module XPS MF2DO801



Decentralised output module XPS MF2DO1602



Safety communication on Ethernet network

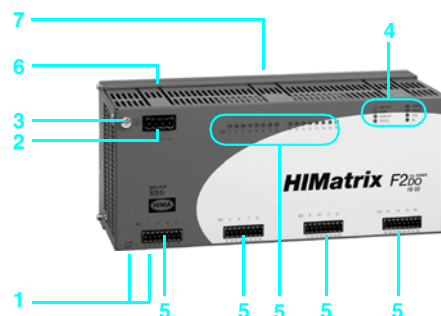
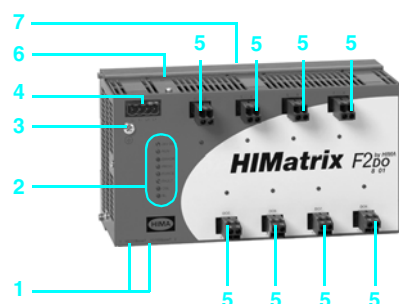
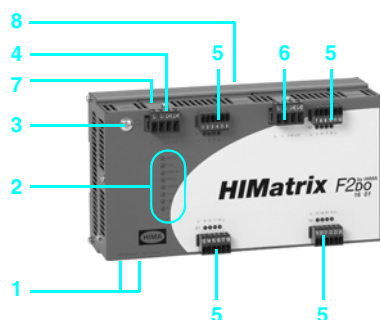
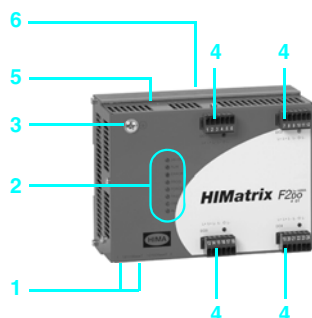
The decentralised output modules XPS MF2DO●●●● incorporate two RJ45 (type 10BASE-T/100BASE-TX) connectors that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs type XPS MF.

Machine Safety

Preventa safety PLCs

Compact and modular

Decentralised output modules type XPS MF2



Description

Decentralised output module XPS MF2DO401

On the front face of the metal enclosure:

- 1 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 2 Eight process status LEDs.
- 3 One earth connection screw.
- 4 Four terminal blocks (1) for connection of digital outputs, with output status LED (one LED per terminal block).

On the top:

- 5 One "Reset" button.

On the rear face:

- 6 One spring operated fixing device for mounting on rail.

Decentralised output module XPS MF2DO1601

On the front face of the metal enclosure:

- 1 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 2 Eight process status LEDs.
- 3 One earth connection screw.
- 4 One terminal block (1) for $\pm$ 24 V supply.
- 5 Four terminal blocks (1) for connection of digital outputs, with output status LED (four LEDs per terminal block).
- 6 One terminal block for connection of output channels.

On the top:

- 7 One "Reset" button.

On the rear face:

- 8 One spring operated fixing device for mounting on rail.

Decentralised output module XPS MF2DO801

On the front face of the metal enclosure:

- 1 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 2 Eight process status LEDs.
- 3 One earth connection screw.
- 4 One terminal block (1) for $\pm$ 24 V supply.
- 5 Eight terminal blocks (1) for connection of relay outputs, with output status LED (one LED per terminal block).

On the top:

- 6 One "Reset" button.

On the rear face:

- 7 One spring operated fixing device for mounting on rail.

Decentralised output module XPS MF2DO1602

On the front face of the metal enclosure:

- 1 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 2 One terminal block (1) for $\pm$ 24 V supply.
- 3 One earth connection screw.
- 4 Eight process status LEDs.
- 5 Four terminal blocks (1) for connection of relay outputs, with relay output status LEDs.

On the top:

- 6 One "Reset" button.

On the rear face:

- 7 One spring operated fixing device for mounting on rail.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance. Terminal blocks included with decentralised output modules type XPS MF2.

Machine Safety

Preventa safety PLCs

Compact and modular

Decentralised output modules type XPS MF2

Status LED details

Decentralised output modules XPS MF2DO●●●●●

LED	Colour	Status	Meaning
Outputs 1...16	Orange	On	Outputs active.
24 VDC	Green	On	24 V voltage present.
		Off	No voltage.
RUN	Green	On	Normal service mode, loaded program running, the PLC receives I/O messages, communication and hardware/software tests carried out.
		Flashing	The CPU is in STOP and is not executing any user application. All the outputs are reset to a safe, de-energised state.
		Off	The CPU is in "ERROR" state (see ERROR).
ERROR	Red	On	Software error or hardware fault detected by the CPU. The monitoring program (Watchdog) has triggered the STOP state of the process because the programmed cycle time has been exceeded. The CPU has stopped the execution of the user application, ended all hardware and software tests and all outputs have been reset. The process can only be started again from the PC.
		Off	No errors detected.
PROG	Orange	On	The CPU is being loaded with a new configuration.
		Flashing	The FLASH ROM is being loaded with a new operating system.
		Off	No loading of configuration or operating system.
FORCE	Orange	On	The CPU is in RUN mode and force is active.
		Flashing	The system is not processing (STOP), but force is prepared and is activated if the dual processor is started.
		Off	Force mode not activated.
FAULT	Orange	On	Error display for line control. The user application has caused an error. The system configuration is defective. The loading of a new operating system was defective and the operating system is corrupt.
		Flashing	An error has occurred whilst writing to FLASH ROM memory (during updating of the operating system). One or more I/O errors have occurred.
		Off	None of the above errors have occurred.
OSL	Orange	Flashing	Emergency loading of the operating system is active.
BL	Orange	Flashing	COM in INIT_Fail state.
RJ45	Green	On	Full duplex mode operation.
		Flashing	Signal collision.
		Off	Half duplex mode operation, no collision.
	Yellow	On	Connection established.
		Flashing	Interface active.

Machine Safety

Preventa safety PLCs

Compact and modular

Decentralised output modules type XPS MF2

Characteristics						
Decentralised output module type			XPS MF2DO401	XPS MF2DO1601	XPS MF2DO801	XPS MF2DO1602
Supply voltage		V	--- 24 (external supply with separate protection conforming to IEC 61131-2)			
Voltage limits		V	- 15...+ 20%			
Ambient air temperature	For operation	°C	0...+ 60			
	For storage	°C	- 40...+ 85			
Degree of protection			IP 20			
Response time		ms	Depending on application			
Maximum current consumption		A	0.5	9 per group Residual: 0.2 per group	0.6	
External fuse			10 A, slow blow			
Backup battery			None			
Connections			See page 26			
Digital outputs						
Number of outputs			4, not electrically isolated	16, not electrically isolated	–	
Permissible output channel current		A	20 max.	16 max.	–	
Output current		A	5 max.	1 max. at 60 °C 2 max. at 40 °C	–	
Maximum lamp load		W	60	10 for 1 A outputs 25 for 2 A outputs	–	
Maximum inductive load		mH	500	500	–	
Maximum leakage current		At state 0 mA	1 at 1 V	1 at 2 V	–	
Response to overload			Shutdown of outputs concerned with cyclic reconnection			–
Relay outputs						
Relay type per channel			–	–	2, with positively guided contacts 1 magnetic, high resolution	
Outputs	Number		–	–	8	16
	Type				N/O volt-free contacts (diversity factor)	
Switching voltage		V	–	–	≥ 5, ≤ --- 250 V/∼ 250 V	≥ 5, ≤ --- 30 V/∼ 60 V
Switching current		mA			3 A, with internal fuse Breaking capacity 100 A	3.15 A, with interna fuse Breaking capacity 100 A
Switching capacity (non inductive)	∼	VA	–	–	240 max., cos φ > 0.5	48 max., cos φ > 0.5
	Up to --- 30 V	W			90 max. (3.15 A internal fuse)	
	Up to --- 70 V	W			35 max. (0.5 A internal fuse)	–
	Up to --- 127 V	W			30 max. (0.315 A internal fuse)	–
Contact material			–	–	Silver alloy	
Mechanical life			–	–	≥ 1 million operating cycles	
Electrical life			–	–	≥ 250 000 operating cycles on full load (resistive) and ≤ 0.1 operating cycles/s	
Communication						
Ethernet network: safety communication using SafeEthernet protocol						
Transmission	Communication ports		2 x RJ45 with integrated switch			
	Speed	Mbps	100			
Structure			10BASE-T/100BASE-TX			
Medium			Dual twisted pair cable			

References



XPS MF2DO401



XPS MF2DO1601



XPS MF2DO801



XPS MF2DO1602

Products referenced **XPS MF2●●●●●●** are marked **HIMatrix F2 DO...** (manufactured by Hima, sold by Schneider Electric).

Decentralised output modules (≡ 24 V supply)

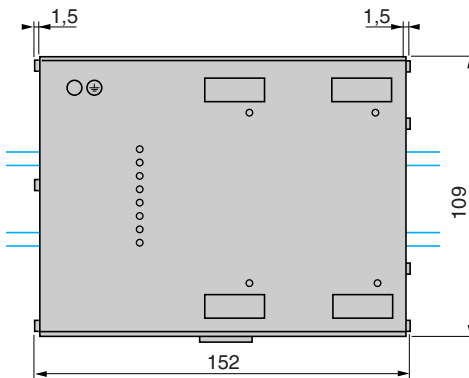
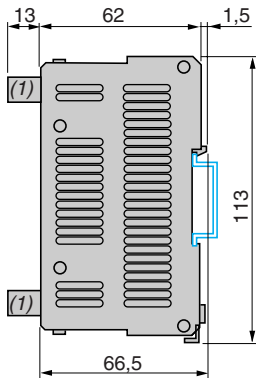
For use with	Outputs	Relay	Ports	Reference	Weight kg
Safety PLCs, modular XPS MF60 or compact XPS MF40 and XPS MF31/30/35	Digital				
	4	–	2 x RJ45: access to Ethernet network	XPS MF2DO401	0.800
	16	–	2 x RJ45: access to Ethernet network	XPS MF2DO1601	0.850
	–	8	2 x RJ45: access to Ethernet network	XPS MF2DO801	1.300
	–	16	2 x RJ45: access to Ethernet network	XPS MF2DO1602	2.000

Connecting cables

Description	For	Reference	Weight kg
Ethernet network connecting cables	Connection between decentralised output modules type XPS MF2 and compact or modular safety PLCs XPS MF RJ45 connector fitted at each end	See page 29	–

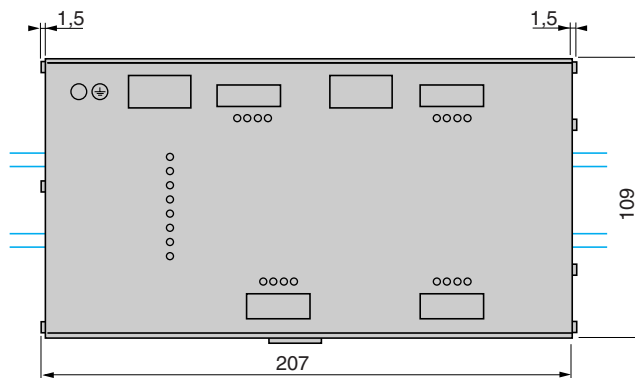
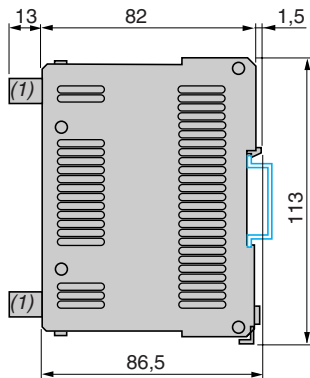
Dimensions

XPS MF2DO401



(1) Removable terminal blocks.

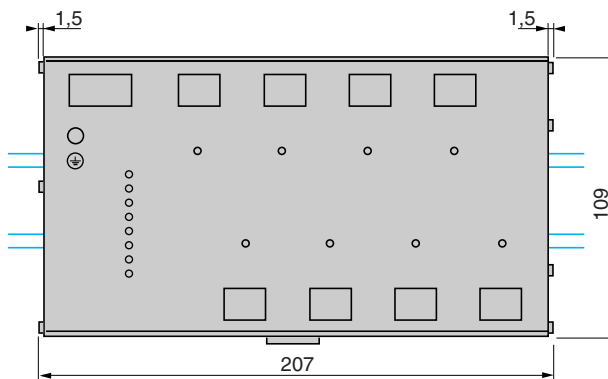
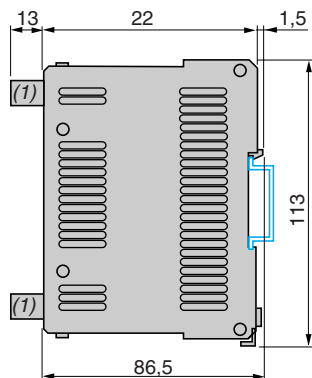
XPS MF2DO1601



(1) Removable terminal blocks.

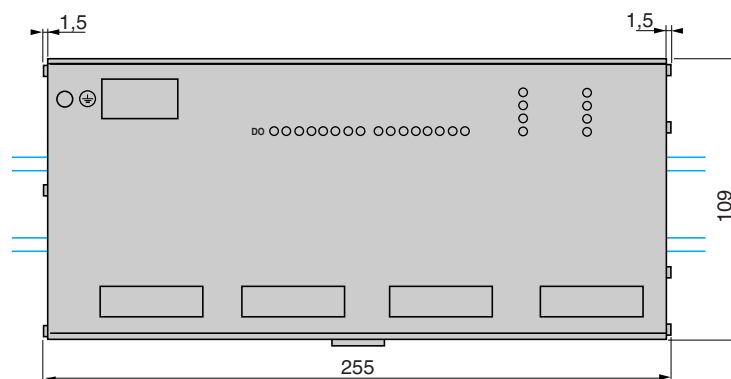
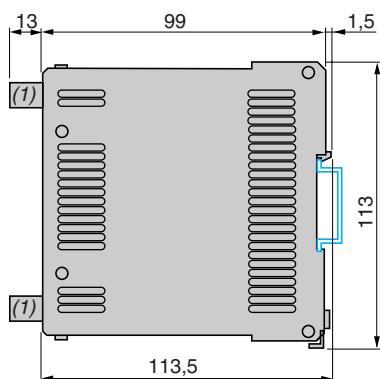
Dimensions

XPS MF2DO801



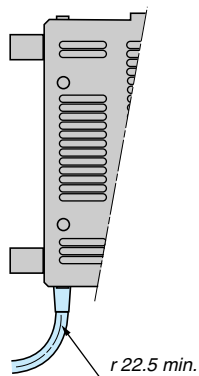
(1) Removable terminal blocks.

XPS MF2DO1602



(1) Removable terminal blocks.

RJ45 connector for access to Ethernet network



Machine Safety

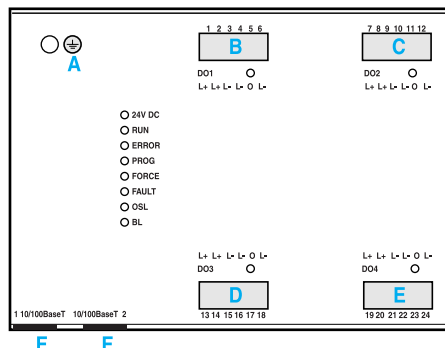
Preventa safety PLCs

Compact and modular

Decentralised output modules type XPS MF2

Connections

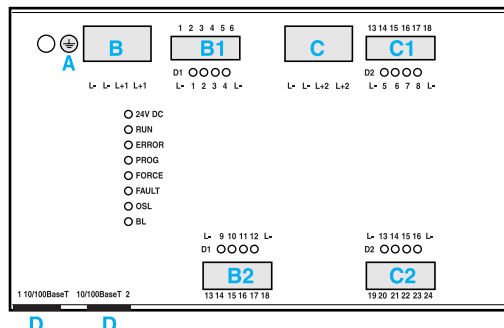
XPS MF2DO401



Item	Connection	Screw N°	Screw	Function
A	Earth	—	⏏	Earth
B	Digital output 1	1	L+	Supply for output 1
		2	L+	Supply for output 1
		3	L-	Reference pole
		4	L-	Reference pole
		5	O	Digital output 1
		6	L-	Reference pole
C	Digital output 2	7	L+	Supply for output 2
		8	L+	Supply for output 2
		9	L-	Reference pole
		10	L-	Reference pole
		11	O	Digital output 2
		12	L-	Reference pole
D	Digital output 3	13	L+	Supply for output 3
		14	L+	Supply for output 3
		15	L-	Reference pole
		16	L-	Reference pole
		17	O	Digital output 3
		18	L-	Reference pole
E	Digital output 4	19	L+	Supply for output 4
		20	L+	Supply for output 4
		21	L-	Reference pole
		22	L-	Reference pole
		23	O	Digital output 4
		24	L-	Reference pole

Item	Connection	Type	Function
F	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.

XPS MF2DO1601

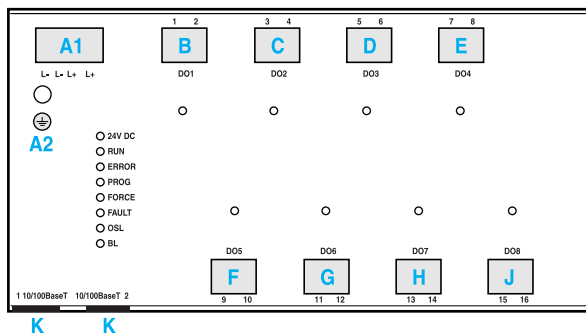


Item	Connection	Screw N°	Screw	Function
A	Earth	—	⏏	Earth
B	Supply	—	L-	Reference pole
		—	L-	Reference pole
		—	L+	Supply for outputs 1, 2, 3, 4, 9, 10, 11, 12
		—	L+	Supply for outputs 1, 2, 3, 4, 9, 10, 11, 12
B1	Digital outputs	1	L-	Reference pole
		2	1	Digital output 1
		3	2	Digital output 2
		4	3	Digital output 3
		5	4	Digital output 4
		6	L-	Reference pole
B2	Digital outputs	13	L-	Reference pole
		14	9	Digital output 9
		15	10	Digital output 10
		16	11	Digital output 11
		17	12	Digital output 12
		18	L-	Reference pole
C	Supply	—	L-	Reference pole
		—	L-	Reference pole
		—	L+	Supply for outputs 5, 6, 7, 8, 13, 14, 15, 16
		—	L+	Supply for outputs 5, 6, 7, 8, 13, 14, 15, 16
C1	Digital outputs	7	L-	Reference pole
		8	5	Digital output 5
		9	6	Digital output 6
		10	7	Digital output 7
		11	8	Digital output 8
		12	L-	Reference pole
C2	Digital outputs	19	L-	Reference pole
		20	13	Digital output 13
		21	14	Digital output 14
		22	15	Digital output 15
		23	16	Digital output 16
		24	L-	Reference pole

Item	Connection	Type	Function
D	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.

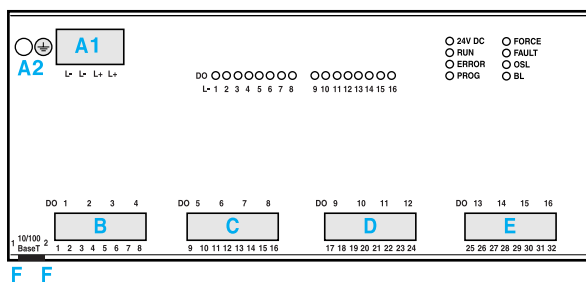
Connections

XPS MF2DO801



Item	Connection	Screw N°	Screw	Function
A1	Supply	–	L+	Supply for relay outputs
		–	L+	Supply for relay outputs
		–	L-	Reference pole
		–	L-	Reference pole
A2	Earth	–	⏏	Earth
B	Relay output 1	1	–	Contact 1, terminal A
		2	–	Contact 1, terminal B
C	Relay output 2	3	–	Contact 2, terminal A
		4	–	Contact 2, terminal B
D	Relay output 3	5	–	Contact 3, terminal A
		6	–	Contact 3, terminal B
E	Relay output 4	7	–	Contact 4, terminal A
		8	–	Contact 4, terminal B
F	Relay output 5	9	–	Contact 5, terminal A
		10	–	Contact 5, terminal B
G	Relay output 6	11	–	Contact 6, terminal A
		12	–	Contact 6, terminal B
H	Relay output 7	13	–	Contact 7, terminal A
		14	–	Contact 7, terminal B
J	Relay output 8	15	–	Contact 8, terminal A
		16	–	Contact 8, terminal B
Item	Connection	Type	Function	
K	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

XPS MF2DO1602



Item	Connection	Screw N°	Screw	Function
A1	Supply	–	L+	Supply for relay outputs
		–	L+	Supply for relay outputs
		–	L-	Reference pole
		–	L-	Reference pole
A2	Earth	–	⏏	Earth
B	Relay outputs 1 to 4	1	–	Contact 1, terminal A
		2	–	Contact 1, terminal B
		3	–	Contact 2, terminal A
		4	–	Contact 2, terminal B
		5	–	Contact 3, terminal A
		6	–	Contact 3, terminal B
		7	–	Contact 4, terminal A
		8	–	Contact 4, terminal B
C	Relay outputs 5 to 8	9	–	Contact 5, terminal A
		10	–	Contact 5, terminal B
		11	–	Contact 6, terminal A
		12	–	Contact 6, terminal B
		13	–	Contact 7, terminal A
		14	–	Contact 7, terminal B
		15	–	Contact 8, terminal A
		16	–	Contact 8, terminal B
D	Relay outputs 9 to 12	17	–	Contact 9, terminal A
		18	–	Contact 9, terminal B
		19	–	Contact 10, terminal A
		20	–	Contact 10, terminal B
		21	–	Contact 11, terminal A
		22	–	Contact 11, terminal B
		23	–	Contact 12, terminal A
		24	–	Contact 12, terminal B
E	Relay outputs 13 to 16	25	–	Contact 13, terminal A
		26	–	Contact 13, terminal B
		27	–	Contact 14, terminal A
		28	–	Contact 14, terminal B
		29	–	Contact 15, terminal A
		30	–	Contact 15, terminal B
		31	–	Contact 16, terminal A
		32	–	Contact 16, terminal B
Item	Connection	Type	Function	
F	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

Machine Safety

Preventa safety PLCs

Compact and modular

Decentralised mixed I/O modules type XPS MF3



XPS MF3DIO8801



XPS MF3DIO16801



XPS MF3DIO20802



XPS MF3AIO8401

Products referenced **XPS MF3●●●●●●** are marked **HIMatrix F3...** (manufactured by Hima, sold by Schneider Electric).

Presentation

Supplied on $\text{---} 24 \text{ V}$, modules type XPS MF3 are compact decentralised I/O blocks that are designed to extend the I/O capacity of safety PLCs XPS MF to which they are connected.
They are connected to the modular or compact safety PLCs via their 2 RJ45 communication ports. They do not have a user program.

Decentralised mixed I/O modules type XPS MF3

Mixed I/O modules XPS	Decentralised inputs		Decentralised outputs	
	N°	Type	N°	Type
MF3DIO8801	8	Digital	8 DO+ / 2 DO- 2	Digital Pulse
MF3DIO16801	16	Digital	8 2-pole or 16 single-pole 2	Digital Pulse
MF3DIO20802	20	Digital	8	Digital
MF3AIO8401	8	Analogue	4	Analogue (non safety outputs)

Examples of decentralised inputs of modules XPS MF3●IO●●●●●●

■ Digital inputs		
Safety detection	Safety dialogue	Safety control
Limit switches, Guard switches, with reset and with actuator, Safety light curtains type 2 and type 4, Safety mats and sensing edges... (1)	Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations... (1)	Switch disconnectors mini-Vario and Vario... (1)

■ Analogue inputs

Closed circuit scanning of input channels, Single-pole measuring of 0 to 10 V voltages, Measuring, using equipotential link, 0.4 to 20 mA currents (with 500 Ω external resistor)
--

Examples of decentralised outputs of modules XPS MF3●IO●●●●●●

■ Digital outputs	
Safety dialogue	Safety control
Beacons and indicator banks, Rotating mirror beacons, Sirens... (1)	Enclosed thermal-magnetic motor circuit-breakers, Enclosed D.O.L. starters for motor control, Power contactors... (1)

■ Pulsed outputs

Line control for line break and short-circuit monitoring
--

■ Analogue outputs

Closed circuit scanning of output channels, Single-pole measuring of 0 to 10 V voltages, Measuring, using equipotential link, 0.4 to 20 mA currents (with 500 Ω external resistor)

(1) Please refer to our "Safety solutions using Preventa" catalogue.

Machine Safety

Preventa safety PLCs

Compact and modular

Decentralised mixed I/O modules type XPS MF3

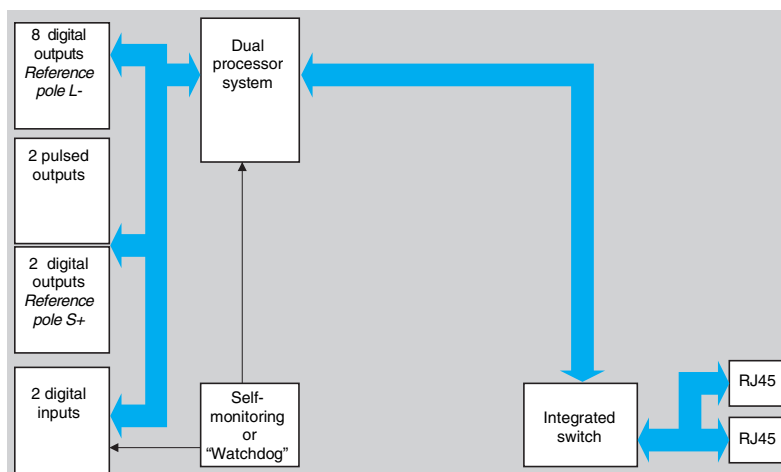
Safety PLCs

In order to comply with safety requirements, the decentralised I/O modules XPS MF3●IO●●●●● integrate two essential functions conforming to category 4 of EN 954-1/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between these decentralised mixed I/O modules and the safety PLCs (Special Switch).

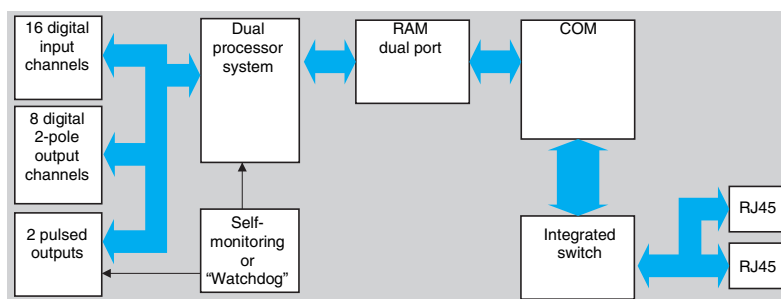
- **Redundancy:** the dual processor integrated in modules XPS MF3●IO●●●●● analyses and compares the information received from the safety inputs and outputs. The incoming and outgoing information (programmed values and received values) are received in parallel by the two processors and compared in real-time.
- **“Watchdog” or self-monitoring:** the modules XPS MF3●IO●●●●● continuously monitor the information processing cycle and the execution of tasks, and intervene if the time of a cycle does not conform to the predefined value.
- **The integrated switch (Special Switch)** stores for a very short time and sends at very high speed the information provided by the inputs and outputs of the modules on the Ethernet network, whilst avoiding signal collisions and excessive amounts of data on the network.

Functional synoptics

Decentralised mixed I/O module XPS MF3DIO8801



Decentralised mixed I/O module XPS MF3DIO16801



Machine Safety

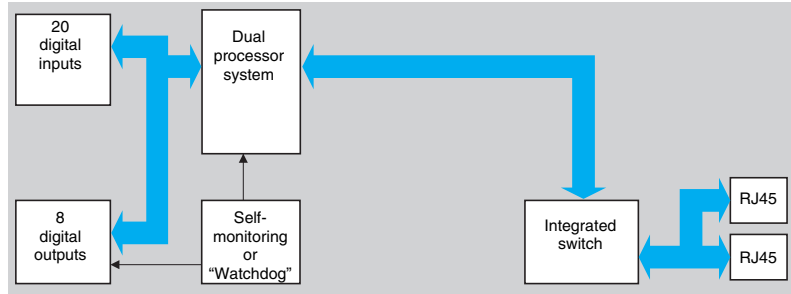
Preventa safety PLCs

Compact and modular

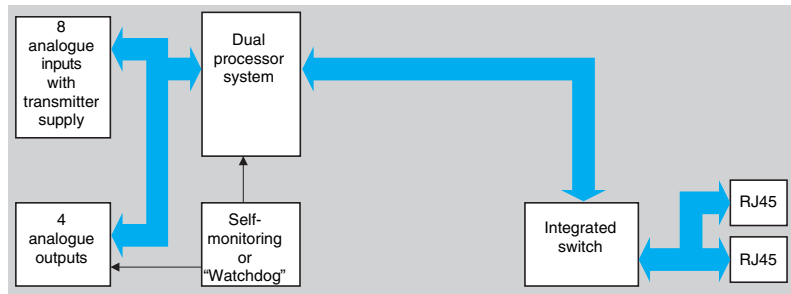
Decentralised mixed I/O modules type XPS MF3

Functional synoptics (continued)

Decentralised mixed I/O module XXPS MF3DIO20802



Decentralised mixed I/O module XPS MF3AIO8401



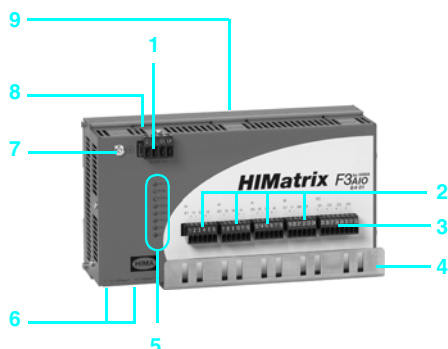
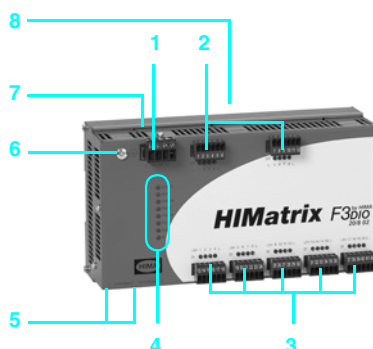
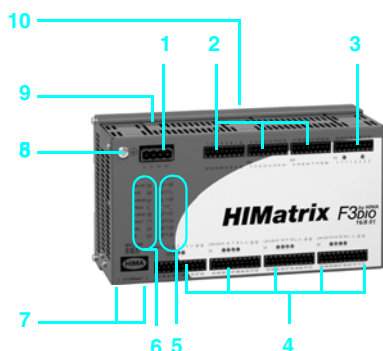
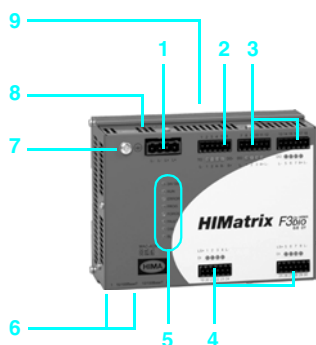
Line control

Line control is a means of short-circuit and line break monitoring, for example Emergency stop inputs to category 4 of standard EN 954-1, that is configurable in mixed decentralised I/O modules:

- For XPS MF3DIO8801 and XPS MF3DIO16801, the pulsed outputs 1 and 2 are connected to the digital inputs of the same circuit. The pulses are automatic on the outputs: that drive the monitoring of the digital input lines.
- For XPS MF3DIO20802, the digital outputs 1 to 8 are connected to the digital inputs of the same circuit. The pulses are automatic on the outputs: that drive the monitoring of the digital input lines.

Safety communication on Ethernet network

The decentralised mixed I/O modules XPS MF3●IO●●●● incorporate two RJ45 (type 10BASE-T/100BASE-TX) connectors that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs type XPS MF.



Description

Decentralised mixed I/O module XPS MF3DIO8801

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 2 One terminal block (1) for connection of pulsed outputs, with four pulse output status LEDs.
- 3 Two terminal blocks (1) for connection of digital outputs, with output status LED (four LEDs per terminal block).
- 4 Two terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 5 Eight process status LEDs.
- 6 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 7 One earth connection screw.
- 8 One "Reset" button (on the top).

On the rear face:

- 9 One spring operated fixing device for mounting on rail.

Decentralised mixed I/O module XPS MF3DIO16801

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 2 Three terminal blocks for connection of digital output channels.
- 3 One terminal block (1) for connection of pulsed outputs.
- 4 Four terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 5 Sixteen digital output status LEDs.
- 6 Eight process status LEDs.
- 7 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 8 One earth connection screw.
- 9 One "Reset" button (on the top).

On the rear face:

- 10 One spring operated fixing device for mounting on rail.

Decentralised mixed I/O module XXPS MF3DIO20802

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 2 Two terminal blocks (1) for connection of digital outputs, with output status LED (four LEDs per terminal block).
- 3 Five terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 4 Eight process status LEDs.
- 5 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 6 One earth connection screw.
- 7 One "Reset" button (on the top).

On the rear face:

- 8 One spring operated fixing device for mounting on rail.

Decentralised mixed I/O module XPS MF3AIO8401

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 2 Four terminal blocks (1) for connection of analogue inputs.
- 3 One terminal block (1) for connection of analogue outputs.
- 4 One metal plate for securing shielded analogue input/output connection cables (EMC).
- 5 Eight process status LEDs.
- 6 Two RJ45 ports (type 10BASE-T/100BASE-TX) for connection on Ethernet network.
- 7 One earth connection screw.
- 8 One "Reset" button (on the top).

On the rear face:

- 9 One spring operated fixing device for mounting on rail.

(1) The connection of cables to captive screw terminal blocks that are both removable and guide marked avoids all connection errors when, for example, carrying out maintenance.
Terminal blocks included with mixed I/O modules type XPS MF3.

Machine Safety

Preventa safety PLCs

Compact and modular

Decentralised mixed I/O modules type XPS MF3

Status LED details

Decentralised mixed I/O modules XPS MF3●I/O●●●●●●

LED	Colour	Status	Meaning
24 VDC	Green	On	--- 24 V voltage present.
		Off	No voltage.
RUN	Green	On	Normal service mode, loaded program running, the PLC receives I/O messages, communication and hardware/software tests carried out.
		Flashing	The CPU is in STOP and is not executing any user application. All the outputs are reset to a safe, de-energised state.
		Off	The CPU is in "ERROR" state (see ERROR).
ERROR	Red	On	Software error or hardware fault detected by the CPU.
			The monitoring program (Watchdog) has triggered the STOP state of the process because the programmed cycle time has been exceeded.
			The CPU has stopped the execution of the user application, ended all hardware and software tests and all outputs have been reset.
		Off	The process can only be started again from the PC.
PROG	Orange	On	No errors detected.
		Flashing	The CPU is being loaded with a new configuration.
		Off	The FLASH ROM is being loaded with a new operating system.
FORCE	Orange	On	No loading of configuration or operating system.
		Flashing	The CPU is in RUN mode and force is active.
		Off	The system is not processing (STOP), but force is prepared and is activated if the dual processor is started.
FAULT	Orange	On	Force mode not activated.
			Error display for line control.
			The user application has caused an error.
		Flashing	The system configuration is defective.
			The loading of a new operating system was defective and the operating system is corrupt.
OSL	Orange	Flashing	An error has occurred whilst writing to FLASH ROM memory (during updating of the operating system).
			One or more I/O errors have occurred.
BL	Orange	Flashing	None of the above errors have occurred.
RJ45	Green	On	Emergency loading of the operating system is active.
		Flashing	COM in INIT_Fail state.
		Off	Full duplex mode operation.
	Yellow	On	Signal collision.
		Flashing	Half duplex mode operation, no collision.
		Off	Connection established.
		Flashing	Interface active.

Machine Safety

Preventa safety PLCs

Compact and modular

Decentralised mixed I/O modules type XPS MF3

Characteristics						
Decentralised mixed I/O module type			XPS MF3DIO8801	XPS MF3DIO16801	XPS MF3DIO20802	XPS MF3AIO8401
Supply voltage		V	--- 24 (external supply with separate protection conforming to IEC 61131-2)			
Voltage limits		V	- 15...+ 20%			
Ambient air temperature	For operation	°C	0...+ 60			
	For storage	°C	- 40...+ 85	- 40...+ 85 without battery	- 40...+ 85	
Degree of protection			IP 20			
Response time		ms	Depending on application			
Maximum current consumption		A	8	14 (max. load) Residual: 0.6	8 (max. load) Residual: 0.4	0.8
External fuse			10 A, slow blow	16 A, slow blow	–	–
Backup battery			None	–	None	None
Connections			See page 26			
Digital inputs						
Decentralised mixed I/O module type			XPS MF3DIO8801	XPS MF3DIO16801	XPS MF3DIO20802	
Number	Inputs not electrically isolated		8	16	20	
Voltage	At state 1	V	--- 15...30			
		mA	> 2 at --- 15 V			
	At state 0	V	--- 5 max.			
		mA	1.5 max. 1.25 at --- 5 V	1.5 max. 1 at --- 5 V	1.5 max. 1.25 at --- 5 V	
Switching voltage		V	7.5	7.5	7.5	
Switching time		µs	–	250	–	
Supply		V	2 x 20 V/100 mA at 24 V, protected against short-circuits	4 x 20 V/40 mA at 24 V, protected against short-circuits, buffered for 20 ms. 20 V/2 A total at 22 V, protected against short-circuits, not buffered Max. current 2 A at 60 °C	5 x 20 V/100 mA at 24 V, protected against short-circuits	
LED display			Yes			
Digital outputs						
Decentralised mixed I/O module type			XPS MF3DIO8801	XPS MF3DIO16801	XPSMF3DIO20802	
Number	Outputs not electrically isolated		8 DO+ (reference pole L-)	8 x 2-pole or 16 x single-pole	8	
			2 DO- (reference pole S+)			
Output voltage		V	--- 24 ± 2	--- 24 ± 3	--- 24 ± 2	
Output current	Channels 1 to 3 and 5 to 7	A	DO+: 0.5 at 60 °C	2 max. at 40 °C	0.5 at 60 °C	
	Channels 4 and 8	A	DO+: 1 at 60 °C, 2 at 40 °C	1 max. at 60 °C 10 mA min.	1 at 60 °C, 2 at 50 °C	
	Channels 1 and 2	A	DO-: 1 at 60 °C	–	–	
Lamp load	Channels 1 to 3 and 5 to 7	W	DO+: 10	25 max.	–	
	Channels 4 and 8		DO+: 25			
	Channels 1 and 2		DO-: 25			
Inductive load	Channels 1 to 3 and 5 to 7		DO+: 500	500 mH max.	–	
	Channels 4 and 8		DO+: 500			
	Channels 1 and 2		DO-: 500			
Line break		kΩ	–	> 5	–	
Short-circuit threshold		Ω	–	< 10	–	
Minimum load		mA	2 per channel			
Leakage current at state 0		mA	1 max. at 2 V			
Response to overload			Shutdown of outputs concerned with cyclic reconnection			
Total output current		A	7 max.	9 max. (14 A for 2 ms)	7 max.	
			Shutdown of all outputs if exceeded with cyclic reconnection			
LED display			Yes			

Characteristics (continued)

Pulsed outputs

Decentralised mixed I/O module type		XPS MF3DIO8801	XPS MF3DIO16801
Number	Outputs not electrically isolated	2	2
Output voltage	V	20, depending on the supply voltage	
Output current	mA	60	
Minimum load		None	
Response to overload		4 x ≥ 19.2 V/60 mA (on 24 V), short-circuit current	
LED display		Yes	

Analogue inputs

Decentralised mixed I/O module type		XPS MF3AIO8401
Number	Inputs not electrically isolated	8, single-pole
External shunt		Ω 250 or 500 depending on application
Input values	Nominal value	V ≡ 0...10
		mA 0...20, with 500 Ω shunt
	Service value	V ≡ 0.1...11.5
		mA 0.4...23, with 500 Ω shunt
Input impedance	MΩ	2
Maximum distance of equipment	m	300
Internal resistance of signal source	Ω	≤ 500
Overvoltage protection	V	+ 15, - 4
Resolution		12-bit
Safety accuracy		± 2%
LED display		No

Analogue outputs

Decentralised mixed I/O module type			XPS MF3AIO8401
Number	Outputs not electrically isolated		4 non safety outputs with breaking of safety common
Signal	Nominal range	mA	4...20
	Usable range	mA	0...20
Load impedance		Ω	600 max.
Maximum distance of equipment		m	300
Resolution			12-bit
Relative error			± 1%
LED display			No

Communication

Ethernet network: safety communication using SafeEthernet protocol

Decentralised mixed I/O module type		XPS MF3DIO8801	XPS MF3DIO16801	XPS MF3DIO20802	XPS MF3AIO8401
Transmission	Communication ports	2 x RJ45 with integrated switch			
	Speed	Mbps	100		
Structure		10BASE-T/100BASE-TX			
Medium		Dual twisted pair cable			



XPS MF3DIO8801



XPS MF3DIO16801



XPS MF3DIO20802



XPS MF3AIO8401

Products referenced
XPS MF3●●●●●● are marked
HIMatrix F3... (manufactured by
Hima, sold by Schneider Electric).

References

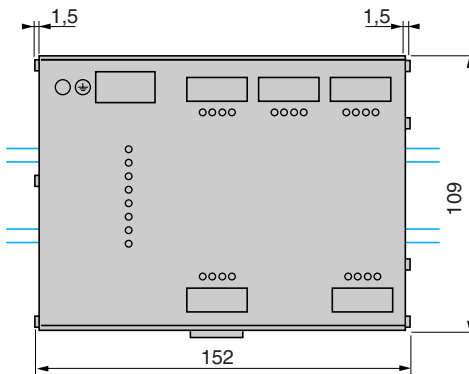
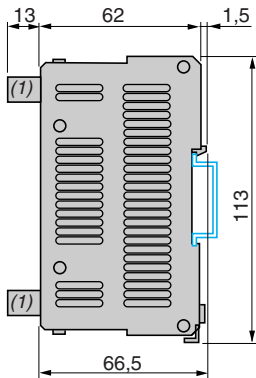
Decentralised mixed I/O modules (≡ 24 V supply)

For use with	Inputs		Outputs			Ports	Reference	Weight kg
	Digital	Analogue	Digital	Pulsed	Analogue			
Safety PLCs, modular XPS MF60 or compact XPS MF40 and XPS MF31/30/35	8	—	8 DO+ 2 DO-	2	—	2 x RJ45: access to Ethernet network	XPS MF3DIO8801	1.000
	16	—	8 x 2 or 16 x 1	2	—	2 x RJ45: access to Ethernet network	XPS MF3DIO16801	1.300
	20	—	8	—	—	2 x RJ45: access to Ethernet network	XPS MF3DIO20802	1.000
	—	8	—	—	4	2 x RJ45: access to Ethernet network	XPS MF3AIO8401	0.950

Connecting cables

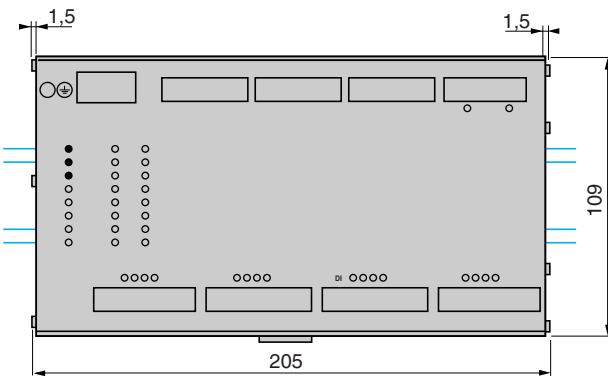
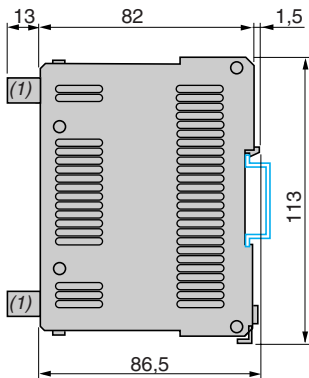
Description	For	Reference	Weight kg
Ethernet network connecting cables	Connection between decentralised mixed I/O modules XPS MF3●IO and compact or modular safety PLCs XPS MF RJ45 connector fitted at each end	See page 29	—

Dimensions
XPS MF3DIO8801



(1) Removable terminal blocks.

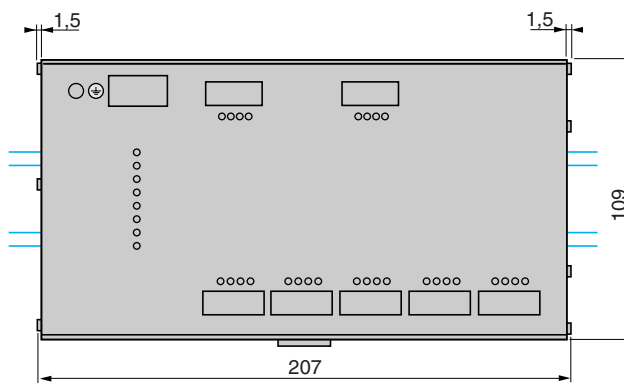
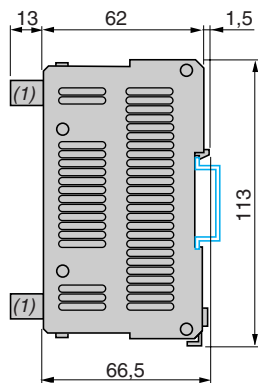
XPS MF3DIO16801



(1) Removable terminal blocks.

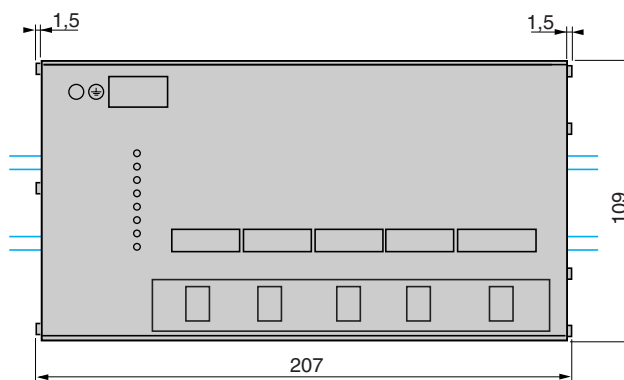
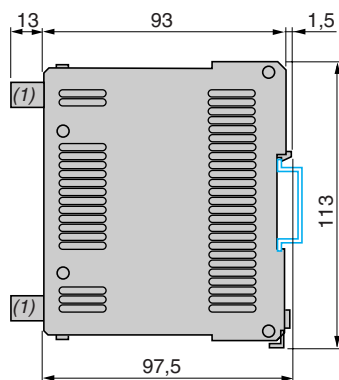
Dimensions

XPS MF3DIO20802



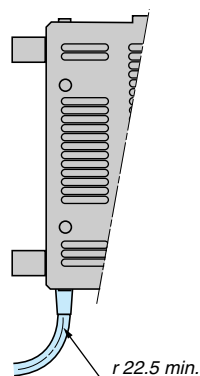
(1) Removable terminal blocks.

XPS MF3AIO8401



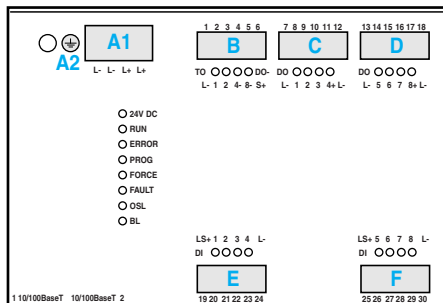
(1) Removable terminal blocks.

RJ45 connector for access to Ethernet network



Connections

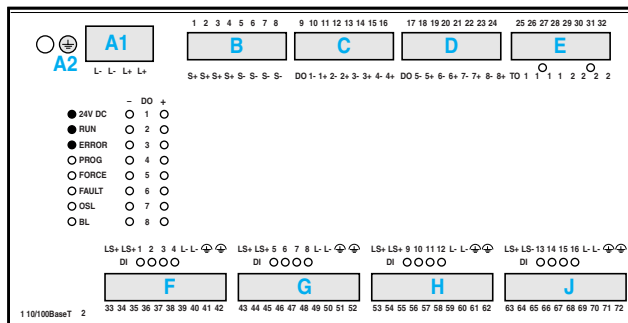
XPS MF3DIO8801



Item	Connection	Screw N°	Screw	Function
A1	Supply	–	L-	– 24 V (reference pole)
		–	L-	– 24 V (reference pole)
		–	L+	– 24 V
		–	L+	– 24 V
A2	Earth	–	⊥	Earth
B	Outputs - Pulsed/Digital	1	L-	Reference pole
		2	1	Pulsed output 1
		3	2	Pulsed output 2
		4	4-	Digital output 4- (for increased load)
		5	8-	Digital output 8- (for increased load)
		6	S+	Reference pole
C	Outputs - Digital	7	L-	Reference pole
		8	1	Digital output 1
		9	2	Digital output 2
		10	3	Digital output 3
		11	4+	Digital output 4+ (for increased load)
		12	L-	Reference pole
D	Outputs - Digital	13	L-	Reference pole
		14	5	Digital output 5
		15	6	Digital output 6
		16	7	Digital output 7
		17	8+	Digital output 8+ (for increased load)
		18	L-	Reference pole
E	Inputs - Digital	19	LS+	Sensor supply for inputs 1 to 4
		20	1	Digital input 1
		21	2	Digital input 2
		22	3	Digital input 3
		23	4	Digital input 4
		24	L-	Reference pole
F	Inputs - Digital	25	LS+	Sensor supply for inputs 5 to 8
		26	5	Digital input 5
		27	6	Digital input 6
		28	7	Digital input 7
		29	8	Digital input 8
		30	L-	Reference pole
Item	Connection	Type	Function	
G	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

Connections

XPS MF3DIO16801

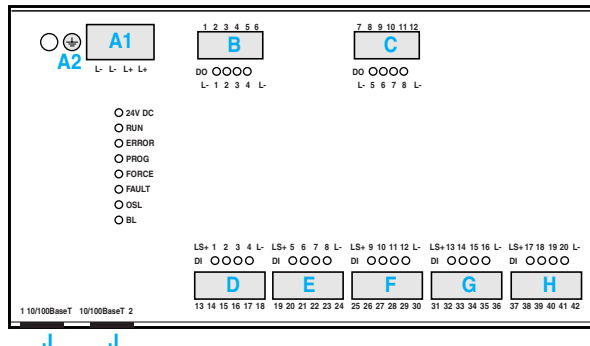


Item	Connection	Screw N°	Screw	Function
A1	Supply	—	L+	— 24 V
			L+	— 24 V
			L-	— 24 V (reference pole)
			L-	— 24 V (reference pole)
A2	Earth	—	↓	Earth
B	Supply of single-pole digital outputs	1	S+	—
		2	S+	—
		3	S+	—
		4	S+	—
		5	S-	—
		6	S-	—
		7	S-	—
		8	S-	—
C	Outputs - Digital	9	1-	Output 1
		10	1+	Output 1
		11	2-	Output 2
		12	2+	Output 2
		13	3-	Output 3
		14	3+	Output 3
		15	4-	Output 4
		16	4+	Output 4
D	Outputs - Digital	17	5-	Output 5
		18	5+	Output 5
		19	6-	Output 6
		20	6+	Output 6
		21	7-	Output 7
		22	7+	Output 7
		23	8-	Output 8
		24	8-	Output 8
E	Outputs - Pulsed	25	1	Output 1
		26	1	Output 1
		27	1	Output 1
		28	1	Output 1
		29	2	Output 2
		30	2	Output 2
		31	2	Output 2
		32	2	Output 2

Item (cont.)	Connection	Screw N°	Screw	Function
F	Inputs - Digital	33	LS+	Sensor supply for inputs 1 to 4 (not protected)
		34	LS+	Sensor supply for inputs 1 to 4 (protected)
		35	1	Input 1
		36	2	Input 2
		37	3	Input 3
		38	4	Input 4
		39	L-	— 24 V (reference pole)
		40	L-	— 24 V (reference pole)
		41	PA	Electrically clean earth
		42	PA	Electrically clean earth
G	Inputs - Digital	43	LS+	Sensor supply for inputs 5 to 8 (not protected)
		44	LS+	Sensor supply for inputs 5 to 8 (protected)
		45	5	Input 5
		46	6	Input 6
		47	7	Input 7
		48	8	Input 8
		49	L-	— 24 V (reference pole)
		50	L-	— 24 V (reference pole)
		51	PA	Electrically clean earth
		52	PA	Electrically clean earth
H	Inputs - Digital	53	LS+	Sensor supply for inputs 9 to 12 (not protected)
		54	LS+	Sensor supply for inputs 9 to 12 (protected)
		55	9	Input 9
		56	10	Input 10
		57	11	Input 11
		58	12	Input 12
		59	L-	— 24 V (reference pole)
		60	L-	— 24 V (reference pole)
		61	PA	Electrically clean earth
		62	PA	Electrically clean earth
J	Inputs - Digital	63	LS+	Sensor supply for inputs 13 to 16 (not protected)
		64	LS+	Sensor supply for inputs 13 to 16 (protected)
		65	5	Input 13
		66	6	Input 14
		67	7	Input 15
		68	8	Input 16
		69	L-	— 24 V (reference pole)
		70	L-	— 24 V (reference pole)
		71	PA	Electrically clean earth
		72	PA	Electrically clean earth
K	Communication	RJ45		Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.

Connections

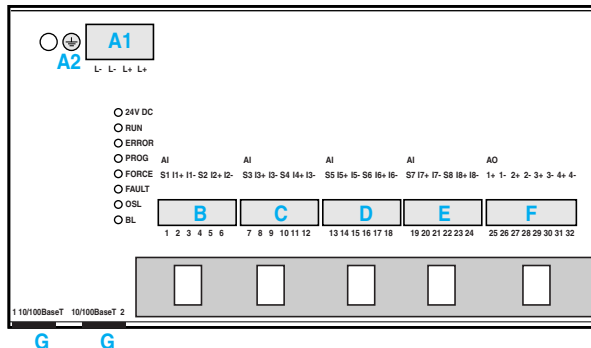
XPSMFDIO20802



Item	Connection	Screw N°	Screw	Function
A1	Supply	—	L+	24 V
			L+	24 V
			L-	24 V (reference pole)
			L-	24 V (reference pole)
A2	Earth	—	⊥	Earth
B	Outputs - Digital	1	L-	Outputs common
		2	1	Output 1
		3	2	Output 2
		4	3	Output 3
		5	4	Output 4 (for increased load)
		6	L-	Outputs common
C	Outputs - Digital	7	L-	Outputs common
		8	5	Output 5
		9	6	Output 6
		10	7	Output 7
		11	8	Output 8 (for increased load)
		12	L-	Outputs common
D	Inputs - Digital	13	LS+	Sensor supply for inputs 1 to 4
		14	1	Digital input 1
		15	2	Digital input 2
		16	3	Digital input 3
		17	4	Digital input 4
		18	L-	Inputs common
E	Inputs - Digital	19	LS+	Sensor supply for inputs 5 to 8
		20	5	Digital input 5
		21	6	Digital input 6
		22	7	Digital input 7
		23	8	Digital input 8
		24	L-	Inputs common
F	Inputs - Digital	25	LS+	Sensor supply for inputs 9 to 12
		26	9	Digital input 9
		27	10	Digital input 10
		28	11	Digital input 11
		29	12	Digital input 12
		30	L-	Inputs common
G	Inputs - Digital	31	LS+	Sensor supply for inputs 13 to 16
		32	13	Digital input 13
		33	14	Digital input 14
		34	15	Digital input 15
		35	16	Digital input 16
		36	L-	Inputs common
H	Inputs - Digital	37	LS+	Sensor supply for inputs 17 to 20
		38	17	Digital input 17
		39	18	Digital input 18
		40	19	Digital input 19
		41	20	Digital input 20
		42	L-	Inputs common
Item	Connection	Type	Function	
J	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

Connections

XPS MF3AIO8401



Item	Connection	Screw N°	Screw	Function
A1	Supply	–	L+	--- 24 V
			L+	--- 24 V
			L-	--- 24 V (reference pole)
			L-	--- 24 V (reference pole)
A2	Earth		⏏	Earth
B	Inputs - Analogue	1	S1	Transmitter supply 1
		2	I1+	Input 1
		3	I1-	Reference pole
		4	S2	Transmitter supply 2
		5	I2+	Input 2
		6	I2-	Reference pole
C	Inputs - Analogue	7	S3	Transmitter supply 3
		8	I3+	Input 3
		9	I3-	Reference pole
		10	S4	Transmitter supply 4
		11	I4+	Input 4
		12	I4-	Reference pole
D	Inputs - Analogue	13	S5	Transmitter supply 5
		14	I5+	Input 5
		15	I5-	Reference pole
		16	S6	Transmitter supply 6
		17	I6+	Input 4
		18	I6-	Reference pole
E	Inputs - Analogue	19	S7	Transmitter supply 7
		20	I7+	Input 7
		21	I7-	Reference pole
		22	S8	Transmitter supply 8
		23	I8+	Input 8
		24	I8-	Reference pole
F	Outputs - Analogue	25	O1+	Output 1
		26	O1-	Output 1 reference pole
		27	O2+	Output 2
		28	O2-	Output 2 reference pole
		29	O3+	Output 3
		30	O3-	Output 3 reference pole
		31	O4+	Output 4
		32	O4-	Output 4 reference pole
Item	Connection	Type	Function	
G	Communication	RJ45	Compact or modular safety PLCs XPS MF. Ethernet network. PC. Graphic terminal. Decentralised I/O modules.	

Machine Safety

Preventa safety PLCs

Compact and modular, type XPS MF

Communication on network and bus

Presentation

To communicate, Preventa compact and modular safety PLCs XPS MF are fitted with safety communication ports and/or industrial communication serial ports.

Safety communication

With the SafeEthernet safety communication protocol, two structures are possible:

■ Single network

The Ethernet network supports the SafeEthernet protocol: physically, a single network is required for communication between:

- safety products (SafeEthernet protocol),
- standard products (Ethernet protocol),
- safety products and standard products (Modbus TCP/IP protocol).

■ Double network: two separate cabling systems are established.

- An Ethernet network with Modbus TCP/IP protocol is used for communication between standard products.
- An Ethernet network with SafeEthernet protocol is used for communication between safety products.

Compact PLCs	Ports (number and type)	Communication on Ethernet network	
		safety using SafeEthernet protocol	non safety using Modbus TCP/IP protocol
XPS MF31222	4 x RJ45	■	■
XPS MF3022	4 x RJ45	■	■
XPS MF3502	4 x RJ45	■	■
XPS MF3522	4 x RJ45	■	■
XPS MF3542	4 x RJ45	■	■
XPS MF4000	2 x RJ45	■	—
XPS MF4002	2 x RJ45	■	■
XPS MF4020	2 x RJ45	■	—
XPS MF4022	2 x RJ45	■	■
XPS MF4040	2 x RJ45	■	—
XPS MF4042	2 x RJ45	■	■
Modular PLC	Ports (number and type)	Communication on Ethernet network	
		safety using SafeEthernet protocol	non safety using Modbus TCP/IP protocol
XPS MF3CPU22 (CPU of modular PLC XPS MF60)	4 x RJ45	■	■

Industrial communication

Compact PLCs	Serial port (number and type)	Industrial communication	
		On Modbus bus	On Profibus bus
XPS MF31222	—	—	—
XPS MF3022	FB3 (1 x SUB-D 9-pin female)	■ (slave)	—
XPS MF3502	—	—	—
XPS MF3522	FB3 (1 x SUB-D 9-pin female)	■ (slave)	—
XPS MF3542	FB3 (1 x SUB-D 9-pin female)	—	■ (slave)
XPS MF4000	—	—	—
XPS MF4002	—	—	—
XPS MF4020	TER (1 x RJ45)	■ (slave)	—
XPS MF4022	TER (1 x RJ45)	■ (slave)	—
XPS MF4040	BUS (1 x SUB-D 9-pin female)	—	■ (slave)
XPS MF4042	BUS (1 x SUB-D 9-pin female)	—	■ (slave)
Modular PLC	Serial port (number and type)	Industrial communication	
		On Modbus bus	On Profibus bus
XPS MF3CPU22 (CPU of modular PLC XPS MF60)	FB2 (1 x SUB-D 9-pin female)	■ (slave)	—

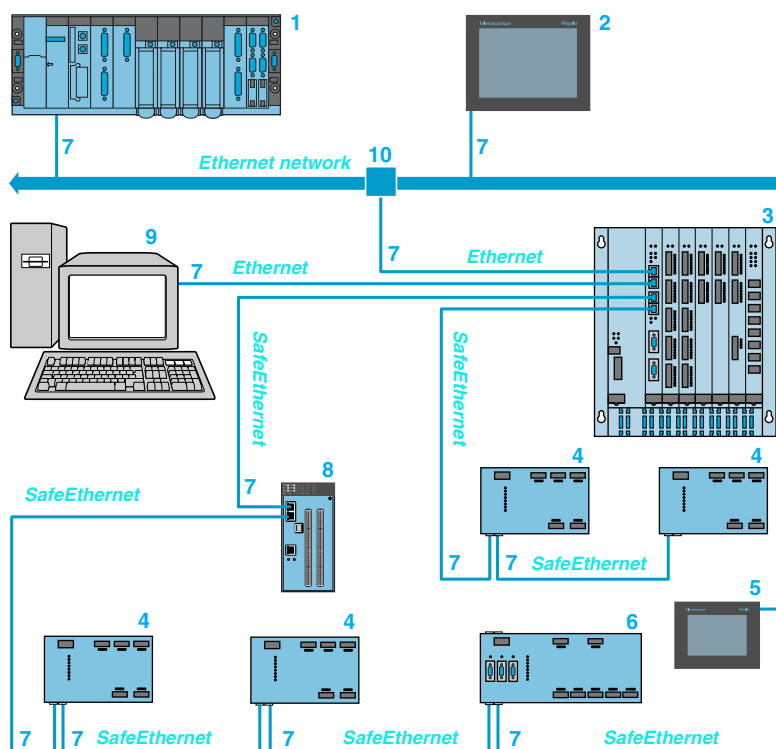
Machine Safety

Preventa safety PLCs

Compact and modular, type XPS MF

Communication on Ethernet network

Connection on Ethernet network



- 1 Premium processor **TSX P57 ●634M/●623M** (1) or module **TSX ETY 4103** (1) on Premium automation platform (1), master on Ethernet network.
- 2 Graphic supervision terminal **XBT GT5230**.
- 3 Modular safety PLC **XPS MF60**.
- 4 Decentralised I/O modules type **XPS MF1/2/3**.
- 5 Graphic supervision terminal **XBT GT2130**.
- 6 Compact safety PLCs type **XPS MF31/30/35**.
- 7 Straight through, shielded twisted pair cables **490 NTW 000 ●●**, lengths 2...80 m.
- 8 Compact safety PLCs type **XPS MF40**.
- 9 Programming PC.
- 10 Hubs **499 NEH 10410** (1).

(1) Please refer to our "Premium automation platform" catalogue.

Characteristics

Protocol		SafeEthernet	
Compatibility with compact and modular safety PLCs		XPS MF4000, XPS MF4002, XPS MF4020, XPS MF4022, XPS MF4040, XPS MF4042	XPS MF31222, XPS MF3022, XPS MF3502, XPS MF3522, XPS MF3542, XPS MF3CPU22 (CPU of modular PLC XPS MF60)
Transmission	Speed	10...100 Mbps	
	Communication ports	2 x RJ45 with integrated switch	4 x RJ45 with integrated switch
	Medium	Dual twisted pair cable	
Structure		10BASE-T/100BASE-TX	
Transparent Ready service	Class	A10	
	Standard Ethernet TCP/IP communication services (supported by compact and modular safety PLCs)	Modbus TCP/IP, Modbus serial	
		Modbus TCP/IP messaging (reading/writing of data words) Modbus identification requests	
	TCP port	Standard 502	
	Max. number of TCP connections	1 to 20	

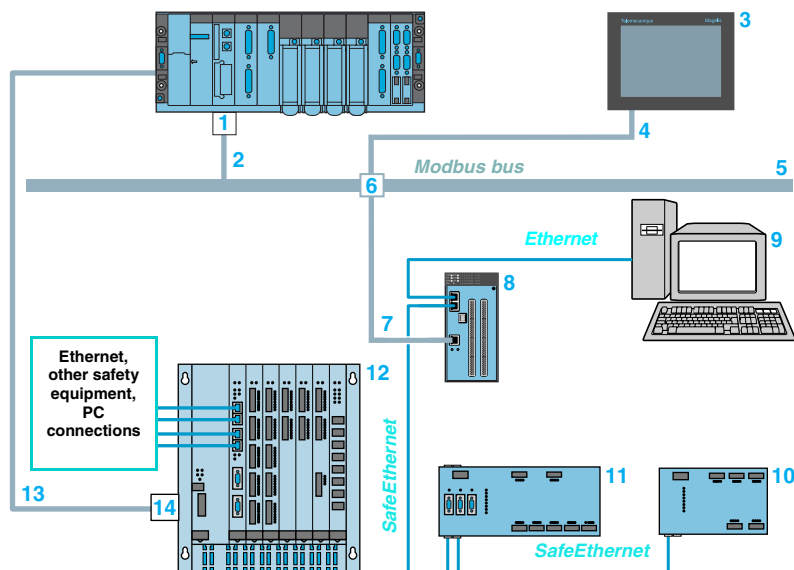
Machine Safety

Preventa safety PLCs

Compact and modular, type XPS MF

Communication on Modbus bus

Connection on Modbus bus



- 1 Premium module **TSX SCY 21601**: access to Modbus bus on a Premium automation platform, Modbus bus master.
- 2 Cable **TSX SCY CM6030**.
- 3 Graphic supervision terminal **XBT GT5230**.
- 4 Cable **XBT Z938** + adaptor **XBT ZG909**.
- 5 Cables **VW3 A83 ●6R●●** for Modbus bus, lengths 0.3...3 m.
- 6 Modbus splitter box **LU9 GC3** for equipment connection.
- 7 Cables **TSX SCA ●00** for Modbus bus, lengths 100...500 m.
- 8 Compact safety PLCs **XPS MF4020/MF4022**, Modbus bus slaves.
- 9 Programming PC.
- 10 Decentralised I/O modules type **XPS MF1/2/3**.
- 11 Compact safety PLCs **XPS MF3022/3522**.
- 12 Modular safety PLC **XPS MF60**, Modbus bus slave.
- 13 Direct connection cables **XPS MCSCY** for safety PLCs to Premium module **TSX SCY 21601**, length 0.3 m.
- 14 Connector **XPS MFADAPT** (RJ45/SUB-D 9-pin male) for connector FB2 or FB3 depending on PLC.

Characteristics

Bus type		Modbus serial		
Compatibility with compact and modular safety PLCs		XPS MF3022, XPS MF3522	XPS MF4020, XPS MF4022	XPS MF3022 (CPU of modular PLC XPSMF60)
Serial link port	Number and type	1 x SUB-D 9-pin female (FB3)	1 x RJ45 (TER)	1 x SUB-D 9-pin female (FB2)
	Status	Slave		
Addressing		122 slaves max. Addressing range: 1...247		
Medium		Shielded twisted pair cable		
Physical layer		RS 485		
Services		13 Modbus functions (reading/writing of bits and words, event counters, connection events, diagnostics, identification)		
Functions	Code	Modbus slave		
	01	Reading n bits of output		
	02	Reading n bits of inputs		
	03	Reading n words of output		
	04	Reading n words of inputs		
	23	Reading/writing variables		
	15	Writing bit variables		
	16	Writing word variables		
	05	Writing 1 bit of output		
	06	Writing 1 word of output		
	08	Diagnostics		
	43	Reading equipment identification		
Transmission	Binary transfer rate (bps)	115 200, 76 800, 62 500, 57 600, 38 400, 19 200, 9600, 4800, 2400, 1200, 600, 300. Default value: 57 600		
Elements	Parity	None. Odd. Even. Default value: even		
	Stop bit	Standard. 1 stop bit. 2 stop bits. Default value: standard		

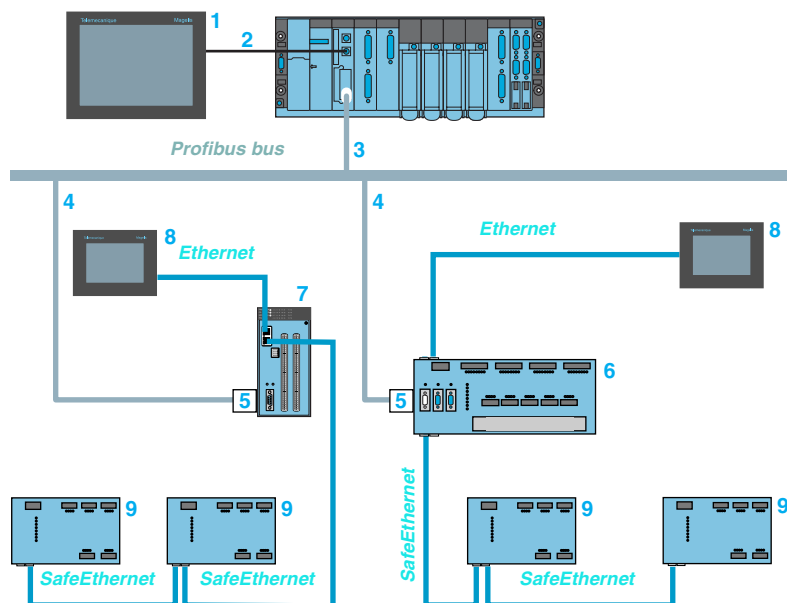
Machine Safety

Preventa safety PLCs

Compact and modular, type XPS MF

Communication on Profibus DP bus

Connection on Profibus bus



- 1 Graphic terminal connected to TER/AUX port of Premium automation platform.
- 2 Connecting cable **XBT Z968** (RS 485) + adaptor **XBT ZG909**.
- 3 Profibus module **TSX PBY 100** on Premium processor master of the Profibus bus.
- 4 Connecting cable **TSX PBS CA 000**, lengths 100 and 400 m.
- 5 Connector **490 NAD 911 03** (SUB-D 9-pin male) on the FB3 connector of safety PLC **XPS MF3542** or on the BUS connector of safety PLC **XPS MF4040/MF4042**.
- 6 Compact safety PLC **XPS MF3542**, Profibus bus slave.
- 7 Compact safety PLCs **XPS MF4040/MF4042**
- 8 Graphic terminal.
- 9 Decentralised I/O modules **XPS MF1/2/3**.

Characteristics

Bus type		Profibus DP	
Compatibility with compact safety PLCs		XPS MF3542	XPSMF4040, XPS MF4042
Serial port	Number and type	1 x SUB-D 9-pin female (FB3)	1 x SUB-D 9-pin female (BUS)
	Status	Slave	
Physical layer		RS 485	
Topology		Linear, with line terminators at each end	
Medium		Shielded twisted pair cable	
Number of slaves		32 slaves on each segment, 126 slaves maximum with repeaters	
Data exchange speed		9.6 Kbps...12 Mbps, depending on the length of the segment (1200 m...100 m)	

Machine Safety

Programming software XPSMFWIN for Preventa compact and modular safety PLCs type XPS MF

Presentation

Programming software XPSMFWIN conforms to standard IEC 61131-3 and is designed for compact safety PLCs XPS MF40, XPS MF31/30/35 and modular safety PLCs XPS MF60.

This safety software is part of the Safety Suite V2 software pack.

To create a program the user can either use predefined function blocks or elementary logic functions, by dragging the blocks into the software programming area.

The "drag and drop" operation of the Windows environment program enables quick and simple creation of configurations.

This ergonomic environment allows the user to create complete configurations for safe operation of the safety PLC.

On completion, the users program is loaded into the safety PLC using the programming unit running XPSMFWIN.

The conditions detailed in the software manual must be adhered to and a complete report accompanying the certificate must be established.

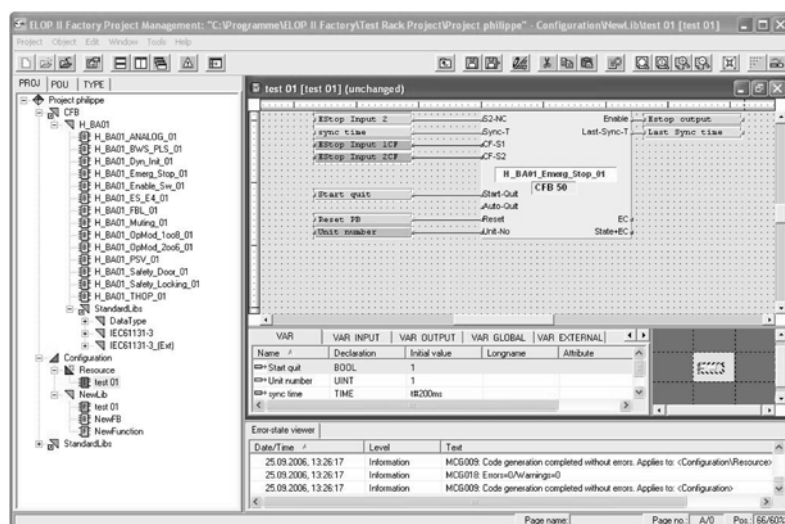
Reference

■ Reference SSV1XPSMFWIN is the full version of configuration software XPSMFWIN version 4.1 and must be installed if no previous version of this software has been installed.

■ Reference SSVXPSMFWINUP is an update for software XPSMFWIN and can be used if SSV1XPSMFWIN has been installed using Safety Suite V1. An update from version 4.1 to version 4.1-6150 for the software XPSMFWIN will then be performed.

Description	Operating system	Composition	Language	Reference	Weight kg
Configuration software XPSMFWIN for programming compact XPS MF40, XPS MF30 and modular XPSMF60 safety PLCs	Windows 2000, Windows XP	CD-ROM + user manual	English, German, French	SSV1XPSMFWIN <i>Available with Safety Suite V2 software pack for safety systems</i>	0.520
XPSMFWIN software update	Windows 2000, Windows XP	CD-ROM + user manual	English, German, French	SSVXPSMFWINUP <i>Software update available on Safety Suite V2 software pack</i>	0.520

Installation



Software XPSMFWIN: project management

Software XPSMFWIN uses an electronic key (dongle) for protection against unauthorised use.

This dongle is available in two versions, USB or serial. It must be connected before the software is installed. A driver must also be installed on the computer to recognise the dongle. Several appropriate drivers are included with software XPSMFWIN.

To install software XPSMFWIN:

- Install the appropriate driver from the XPSMFWIN CD-ROM in order to recognise the dongle.
- Check that the dongle is connected.
- Select the preferred language from the configuration menu.
- Follow the guided installation procedure for software XPSMFWIN.
- Restart the computer.
- Launch software XPSMFWIN by clicking on its desktop icon.

The computer hardware requirements are as follows:

- Processor (Intel Pentium II 400 MHz minimum, Intel Pentium III 800 MHz recommended).
- RAM (128 Mb minimum, 256 Mb recommended).
- Graphics card (2 Mb XGA, 1024 x 768, 256 colours minimum, 8 Mb XGA, 1280 x 1024 True colour recommended).
- Hard disk (110 Mb minimum).
- Operating system (Windows 2000 Professional with Service Pack 1 or better).

Machine Safety

Programming software XPSMFWIN for
Preventa compact and modular safety PLCs
type XPS MF

Communication

Safety related communication

Safety related communication for the safety systems is performed using SafeEthernet protocol.

SafeEthernet is a TCP/IP based protocol that uses highly intelligent switches to provide extremely reliable deterministic communication.

Transmission speeds of up to 100 Mbps can be achieved in half duplex mode and 10 Mbps in full duplex mode.

Connection is made automatically between the master and slaves when assigning the slaves to the corresponding masters.

When communicating between two masters, a Peer-Peer connection must be established between the two partners. This allows the two masters to send and receive signals to and from each other.

The connectivity of all the equipment enables centralised or decentralised networks to be established. It also enables masters and slaves to be connected anywhere on the network without having to assign each module to a physical location within the software. The only requirement is that each master or slave has an IP address.

Interface

XPSMFWIN features two distinct windows, one for internal configuration and one for hardware management.

■ Project management

This window enables creation, archiving and recalling of all the user programs. It contains all the logic functions and predefined function blocks.

■ Hardware management

This window enables all hardware specific data, inputs and outputs and signal transfer between master safety controllers to be defined, as well as the various safety PLCs being used or remote I/Os.

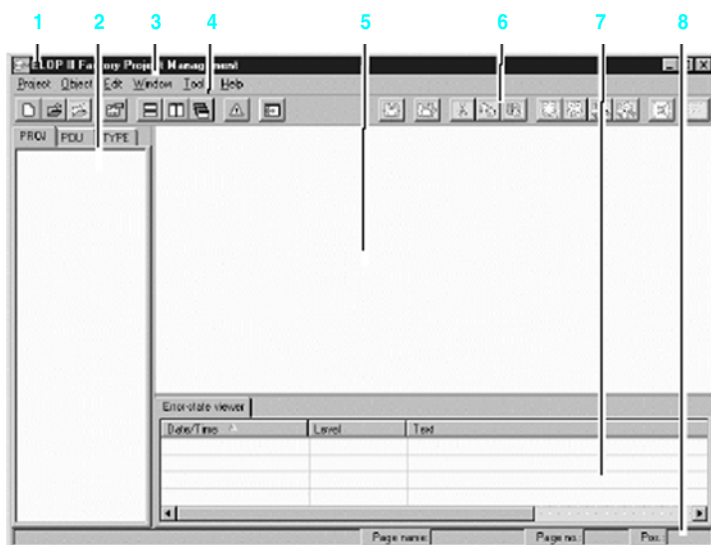
Items included in the XPSMFWIN interface

- Menu and title bar
- Toolbar and status bar
- Windows layout, structure window and work space
- Error display window

XPSMFWIN is a program offering numerous functions and features intuitive, Windows style, operation, making it a very user-friendly programming environment.

Project Management window layout

On launching software XPSMFWIN, the standard screen shown below opens. This screen generally includes the following items:

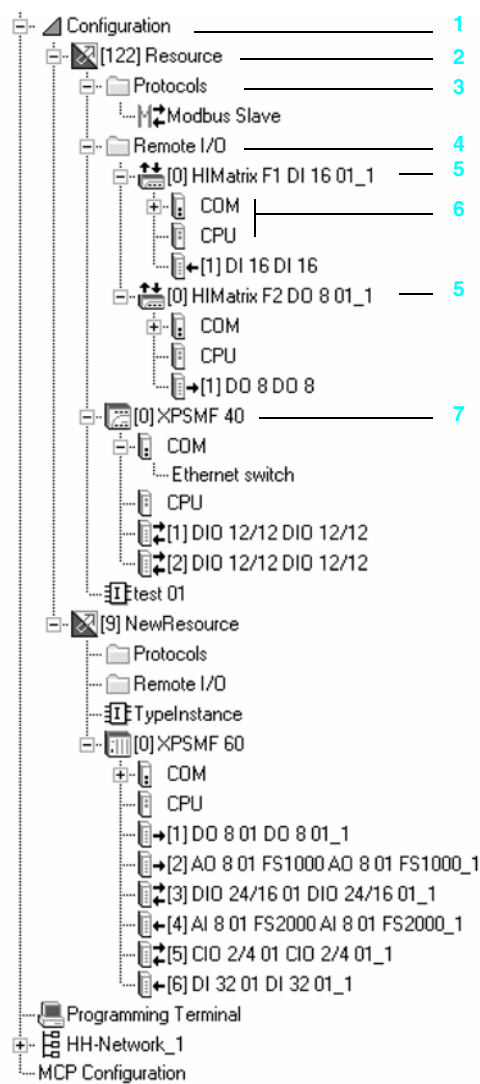


- 1 Title bar.
- 2 Structure window.
- 3 Menu bar.
- 4 Project management toolbar.
- 5 Work space.
- 6 FBD (Function Block Diagram) editor toolbar.
- 7 Error display window.
- 8 Status bar with coordinate information of the function plan editor.

Machine Safety

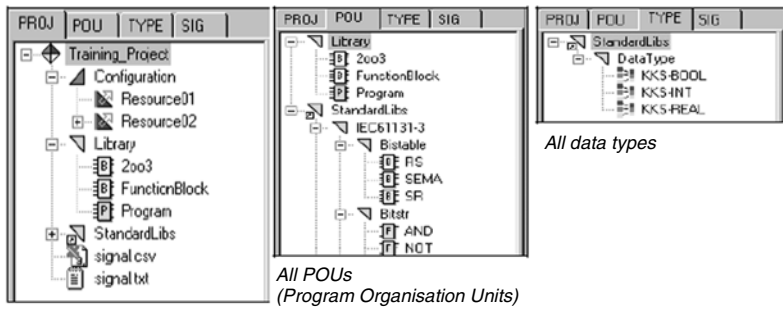
Programming software XPSMFWIN for
Preventa compact and modular safety PLCs
type XPS MF

Structure window



- 1 Configuration.
- 2 Resource folder.
- 3 Communication protocols.
- 4 Remote I/O folder.
- 5 Remote I/O type.
- 6 Components and modules.
- 7 Resource type.

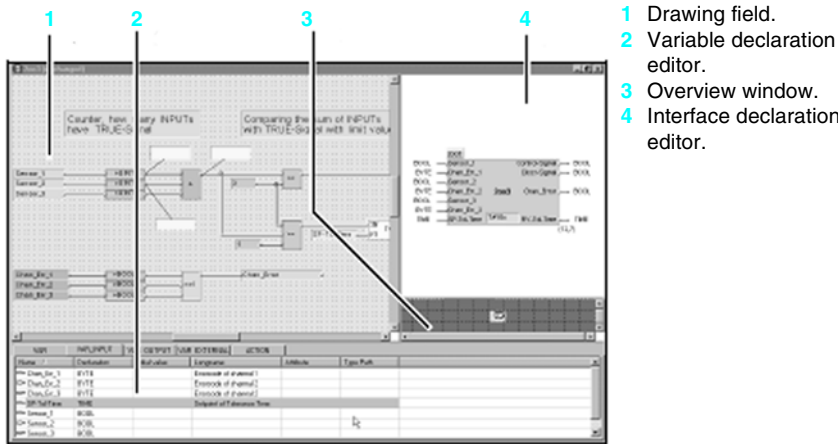
The structure window displays the hierarchical structure of the project. Selecting one of three views provides the user with different levels of detail.



Complete project

FBD (Function Block Diagram) editor

Using this editor, the user can create function blocks in FBD (Function Block Diagram) language or SFC (Sequential Function Chart) language. The FBD editor comprises the following panes:



Machine Safety

Programming software XPSMFWIN for Preventa compact and modular safety PLCs type XPS MF

Programming

Software XPSMFWIN enables programming of the entire range of Preventa safety PLCs type XPS MF.

The powerful and easy to use methodology of this software enables users to quickly and simply familiarise themselves with the product. The Windows based look and user-friendliness provides users with trouble free operation of the software.

On launching the software, the program's start-up assistant opens simultaneously. This assistant enables the user to easily open a new or existing file, delete a file or archive a file. Once a new or existing file is opened, the user quickly accesses the working environment.

Configuration

The user can begin creating a configuration as soon as a personal library is set-up, that will contain the user configuration(s).

Once the personal library is opened, the user can use the standard library function blocks (And, Or, Not, Flip-Flop, etc.) to create exactly what is required.

The user drags the function blocks into the configuration environment and places them where required. Once the function blocks are placed, the user can define specific signals or variables for the inputs and outputs.

The Hardware menu enables assigning of all the signals to the relevant inputs and outputs.

From within the Hardware menu the relevant safety PLCs are selected using the pull-down menu of each resource.

To add additional safety PLCs a new resource is easily created and assigned with the type of safety PLC.

Each safety PLC master can have remote I/O modules assigned to them. The maximum number of remote I/Os that can be connected to each master is fixed at 64. Once all the safety PLCs and remote I/Os have been selected, the signals can be simply connected to the relevant modules.

The "drag and drop" function enables defining of the inputs and outputs.

Therefore, configuration is very quick and simple.

Once all the inputs and outputs have been defined the user can compile the entire program, which is performed in the configuration menu.

Compilation must be performed twice and the results of both compilations printed and compared. If both results match, the program must be downloaded via the SafeEthernet communication port on any of the safety PLCs.

Program execution

The program will automatically be stored in all the master safety PLCs.

The safety PLCs can then execute the configuration and full diagnostics can be viewed on screen.

The software incorporates various diagnostic options that can be used to quickly identify the presence of errors. Some of these diagnostic options are "On-line test": which displays the logic condition of all the I/Os. Others allow the user to view the status of the transmission line, the cycle time and errors that have occurred on the communication line.

The programming tool enables the user to create and design to suit their needs. Other certified function blocks are available, which enable the overall configuration time to be further reduced. Included in these additional blocks are "Muting" and "Emergency stop" functions.

The following additional protocols (see page 102) are included in software XPSMFWIN and these can be used for non safety related data transfer.

Machine Safety

Programming software XPSMFWIN for
Preventa compact and modular safety PLCs
type XPS MF

Communication protocols

Profibus (non safety)



PROFIBUS-DP Master
Connect Signals
Validate
New
Copy
Paste
Delete
Print
Properties

To create the Profibus-DP master in a resource a project must be created first. The safety PLCs (XPS MF3542, XPSMF4040 and/or XPS MF4042) must be defined as one of the resources. In the Hardware management window, select: Protocols - New - Profibus Master.

The Profibus-DP Master menu contains the following fields:
Select Connect Signals for connecting the two signal indication states for program evaluation and detection of bus errors and status of the master.
The parameter settings of the master and slaves can be tested before code generation. Select Validate to display any errors or warnings in the error display window.
Nevertheless, validation is executed automatically before each code generation. If any error is identified, the code generation sequence is automatically aborted.

If the user selects New - Profibus Slave in the Profibus-DP Master menu, a Profibus-DP slave is added to the Profibus-DP master. Selecting Properties in the Profibus-DP Master menu makes many options available. The option enables the user to change time parameters and to view general information.

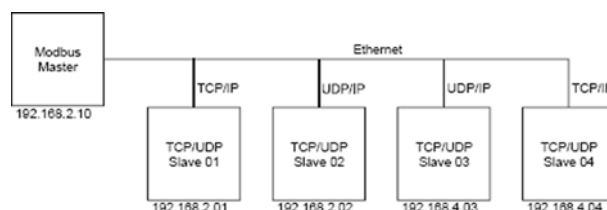
On completion, the program can be compiled and downloaded to the safety PLC via a SafeEthernet connection.

Machine Safety

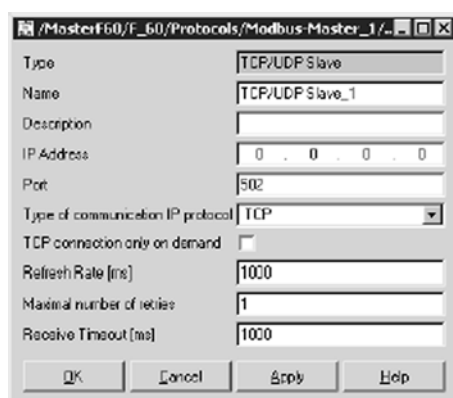
Programming software XPSMFWIN for
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Communication protocols (continued)

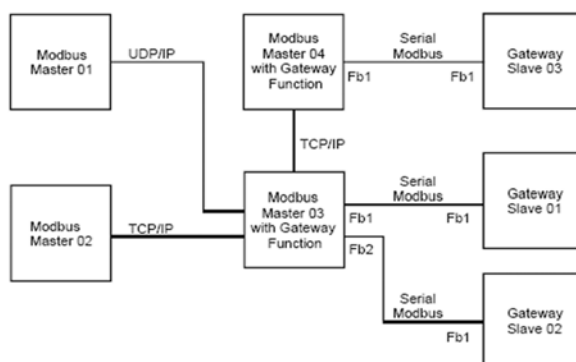
Ethernet TCP/UDP Modbus (non safety)



TCP/UDP slaves are created using the Modbus Masters directory "Ethernet Slaves". The Modbus master communicates with its slaves via TCP/IP or TCP/UDP protocols. In both cases, up to 32 slaves can be connected to a Modbus master.



To modify the TCP/UDP properties click on the relevant option in the contextual menu of the TCP/UDP slave and select the properties tag.

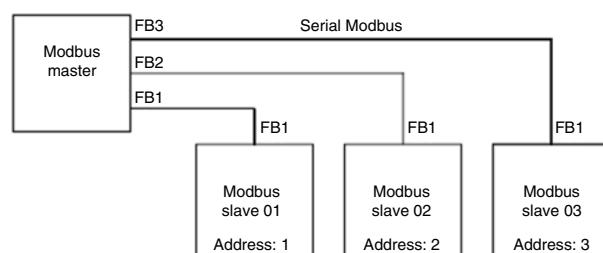


The Modbus master can serve as a TCP and UDP gateway simultaneously.

Modbus Gateway
Validate
New
Copy
Add
Delete
Print
Properties

When using the gateway of the Modbus master, the menu shown appears. The user can then define the gateway functions.

Serial Modbus



The Modbus serial interface is available on compact safety PLCs XPS MF4020, XPS MF4022, XPS MF3022, XPS MF3522 and modular safety PLC XPS MF60. It is configured using the Modbus master gateway and by selecting the serial properties in the Gateway contextual menu. The Modbus master communicates with its serial slave via a Modbus serial interface. The Modbus master is configured by initially selecting the Modbus Master option in the protocol sub-menu of the safety PLCs mentioned above.

Product reference index

170		STB		XPS MF3522	27
170 DTN 110 00	14 29 47	STB NDP 2112	14 29 47	XPS MF3542	27
467		TSX		XPS MF3AIO8401	87
467 NHP 811 00	14 47 29	TSX PBS CA 100	14 29 47	XPS MF3DIO16801	87
490		TSX PBS CA 400	14 29 47	XPS MF3DIO20802	87
490 NAD 911 03	14 29 47	TSX PBY 100	14 29 47	XPS MF3DIO8801	87
490 NAD 911 04	14 29 47	TSX SCA 200	14	XPS MF4000	12
490 NAD 911 05	14 29 47	TSX SCA 500	14	XPS MF4002	12
490 NAE 911 00	14 29 47	VW3		XPS MF4020	12
490 NTC 000 05	14 29 47	VW3 A8 306 R	14 29 47	XPS MF4022	12
490 NTC 000 15	14 29 47	VW3 A8 306 R03	29 47	XPS MF4040	12
490 NTC 000 40	14 29 47	VW3 A8 306 R10	29 47	XPS MF4042	12
490 NTC 000 80	14 29 47	VW3 A8 306 R30	29 47	XPS MFADAPT	29 47
490 NTC 000 80	14 29 47	VW3 A8 306 RC	14 29 47	XPS MFAI801	44 51
490 NTW 000 02	14 29 47	XBT		XPS MFAO801	44 53
490 NTW 000 05	14 29 47	XBT GT2130	13 46 28	XPS MFBLK	45
490 NTW 000 12	14 29 47	XBT GT2330	13 28 46	XPS MFCIO2401	44 55
490 NTW 000 40	14 29 47	XBT GT4330	13 28 46	XPS MFCPU22	44
490 NTW 000 80	14 29 47	XBT GT5230	13 28 46	XPS MFDI2401	44 57
ABL		XBT GT5330	13 28 46	XPS MFDI3201	44 59
ABL 1REM24042	13 28 46	XBT GT6330	13 28 46	XPS MFDIO241601	44 61
ABL 7RE2403	13 28 46	XBT GT7340	13 28 46	XPS MFDO801	44 63
ABL 7RE2405	13 28 46	XBT Z938	14 29 47	XPS MFGEH01	44
ABL 7RE2410	13 28 46	XBT ZG909	14 29 47	XPS MFPS01	44
SSV		XPS			
SSV1XPSMFWIN	12 27 45 98	XPS MCSCY	29 47		
SSVXPSMFWINUP	12 27 45 98	XPS MF1DI1601	68		
		XPS MF2DO1601	75		
		XPS MF2DO1602	75		
		XPS MF2DO401	75		
		XPS MF2DO801	75		
		XPS MF3022	27		
		XPS MF31222	27		
		XPS MF3502	27		

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