2

Preventa™ safety PLCs, XPS MF

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Safety automation system solutions

Preventa™ safety PLCs
Compact and modular, XPSMF

2

Presentation

*Products referenced **XPSMF31222, XPSMF3022** and **XPSMF35●●** are marked **HIMatrix® F31, HIMatrix® F30** and **HIMatrix® F35** (manufactured by Hima, sold by Schneider Electric).*

Compact PLCs:
- Designed for use with numerous machine safety functions and for the protection of personnel.
- Designed for use in safety related parts of control systems up to category 4 conforming to EN 954-1, up to performance level "e" conforming to EN/ISO 13849-1, and up to SIL 3 conforming to EN/IEC 61508.

User memory		Application	250 kB		
		Data	250 kB		
Response time			Depending on size of application		
Maximum power consumption			8 A		9 A
Supply			External ⎓ 24 V supply (with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)		
Inputs	**Digital**	Number of channels	**24**, configurable, not electrically isolated	**20**, not electrically isolated	**24**, not electrically isolated
		Current at state 0	1.5 mA max. at ⎓ 24 V	1.5 mA max., 1.25 mA at 5 V	
		Current at state 1	3.5 mA at ⎓ 24 V 4.5 mA at ⎓ 30 V	≥ 2 mA at ⎓ 15 V / > 2 mA at ⎓ 15 V	3.5 mA at ⎓ 24 V 4.5 mA at ⎓ 30 V
	Analog	Number of channels	–	– / –	**8**, single-pole
		Range: voltage/current	–	– / –	0…10 V/0…20 mA *(1)*
	Counting	Number of channels	–	– / –	**2**
		Current	–	– / –	1.4 mA at ⎓ 5 V, 6.5 mA at ⎓ 24 V
Outputs	**Digital**	Number of channels	**24**, configurable, not electrically isolated	**8** *(2)*, not electrically isolated	**8**, not electrically isolated
		Output current	Chnls. 1 to 3, 5 to 7, 9 to 11, 13 to 15, 17 to 19, 21 to 23: 0.5 A at 140 °F (60 °C) Channels 4, 8, 12, 16, 20 and 24: 1 A at 140 °F (60 °C), 2 A at 122 °F (50 °C)	Channels 1 to 3 and 5 to 7: 0.5 A at 140 °F (60 °C) Channels 4 and 8: 1 A at 140 °F (60 °C), 2 A at 122 °F (50 °C)	
	Analog	Number of channels	–	– / –	–
		Range: voltage/current	–	– / –	–
	Relay	Number	–	– / –	–
		Switching voltage	–	– / –	–
	Line control		**2 x 4**	*(2)* / *(2)*	–
Input/output connections			Removable screw terminals are provided with all Safety compact PLCs Reference **XPSMF40●●** is also provided with cage clamp terminal		
Communication on Ethernet network			**By integrated RJ45 switched Ethernet communication ports**		
■ **Safe communication** using SafeEthernet protocol			yes	yes / yes	yes
■ **Non safe communication** using Modbus® TCP/IP protocol, server (slave)			yes (**XPSMF4002/4022/4042**)	yes (**XPSMF31222**) / yes (**XPSMF3022**)	yes (**XPSMF3502/ MF3522/MF3542**)
Communication on fieldbus					
Non safety using Modbus® RTU protocol, slave (RS 485)			yes (**XPSMF4020/4022**)	– / yes (**XPSMF3022**)	yes (**XPSMF3522**)
Non safety using PROFIBUS DP protocol, (V0 slave)			yes (**XPSMF4040/4042**	– / –	yes (**XPSMF3542**)
Safety PLC type			**XPSMF400●/MF402●/ MF404●**	**XPSMF31222**	**XPSMF3022** / **XPSMF3502/ MF3522/MF3542**
See page			2/12	2/27	2/27 / 2/27
"In rack" card type			–	–	– / –
See page			–	–	– / –

(1) With 500 Ω jumper. (2) The digital outputs can be configured as line control outputs.

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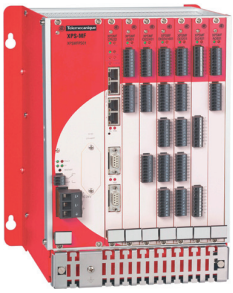
Modular PLC XPSMF60: metal rack **XPSMFGEH01** with slots for power supply module **XPSMFPS01**, central processing unit **XPSMFCPU22** and six “in rack” I/O cards.
- Designed for use with numerous machine safety functions and for the protection of personnel.
- Designed for use in safety related parts of control systems up to category 4 conforming to EN 954-1, up to performance level “e” conforming to EN/ISO 13849-1, and up to SIL 3 conforming to EN/IEC 61508.



500 kB						
500 kB						
Depending on size of application						
30 A max., 32 A external fuse						
External ⎓ 24 V supply (with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)						
–	–	–	**24**, electrically isolated	**32** *(2)*, electrically isolated	**24** *(2)*, electrically isolated	–
–	–	–	–	1 mA at 5 V	1 mA at 5 V	–
–	–	–	⩾ 2.2 mA at 79 V	2 mA at ⎓ 10 V, 5 mA at ⎓ 24 V	2 mA at ⎓ 10 V, 5 mA at ⎓ 24 V	–
8 single-pole or **4** 2-pole, configurable, electrically isolated	–	–	–	–	–	–
- 10…+ 10 V/0…20 mA *(1)*	–	–	–	–	–	–
–		**2**	–	–	–	–
–	–	0.8 A at ⎓ 3.3 V 0.1 A at ⎓ 5 V 0.1 A + output current at ⎓ 24 V	–	–	–	–
–	–	**4**	–	–	**16** *(3)*, electrically isolated	–
–	–	0.5 A per channel, 2 A max. per “in rack” card	–	–	2 A per channel at 86 °F (30 °C), 8 A max. at 86 °F (30 °C) per “in rack” card	–
–	**8**, electrically isolated	–	–	–	–	–
–	- 10…10 V / 0…20 mA	–	–	–	–	–
–	–	–	–	–	–	**8**
–	–	–	–	–	–	∼ 6…250 V
–	–	–	–	–	*(3)*	–
Removable screw terminals are provided with “in rack” I/O cards and Power supply module						
By integrated RJ45 switched Ethernet communication ports						
yes						
yes						
yes						
yes						

XPSMFGEH01 (rack) + XPSMFPS01 (power supply) + XPSMFCPU22 (central processing unit) + “in rack” I/O cards (to be selected from below)

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XPSMFAI801	XPSMFAO801	XPSMFCIO2401	XPSMFDI2401	XPSMFDI3201	XPSMFDIO241601	XPSMFDO801
2/51	2/53	2/55	2/57	2/59	2/61	2/63

(1) With 250 Ω or 500 Ω jumper. (2) Digital inputs can be supplied by the line control outputs of the same I/O card. (3) The digital outputs (n° 1… n° 16) can be configured as line control outputs.

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Safety automation system solutions
Preventa™ safety PLCs
Compact, XPSMF40

XPSMF4000
XPSMF4002

XPSMF4020
XPSMF4022

XPSMF4040
XPSMF4042

Presentation

Preventa™ compact safety PLCs **XPSMF40●●** enable the monitoring of simple to complex safety functions for all industrial applications relating to the protection of personnel and machine safety.

Designed for use with numerous machine safety functions, these compact safety PLCs are intended for use in safety related parts of control systems.
They can manage up to:
- category 4 conforming to EN 954-1,
- performance level “e” conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

The compact safety PLC range **XPSMF40●●** consists of 6 versions that are differentiated by their non safety related communication protocols.

Compact PLCs	Digital Inputs/Outputs	Line control outputs	Communication		
			On Ethernet network		On fieldbus
			Safety protocol	Non safety protocol	
XPSMF4000	24, configurable	8	SafeEthernet	–	–
XPSMF4002	24, configurable	8	SafeEthernet	Modbus® TCP/IP Server	–
XPSMF4020	24, configurable	8	SafeEthernet	–	Modbus® serial Slave (RTU)
XPSMF4022	24, configurable	8	SafeEthernet	Modbus® TCP/IP Server	Modbus® serial Slave (RTU)
XPSMF4040	24, configurable	8	SafeEthernet	–	PROFIBUS DP V0 slave
XPSMF4042	24, configurable	8	SafeEthernet	Modbus® TCP/IP Server	PROFIBUS DP V0 slave

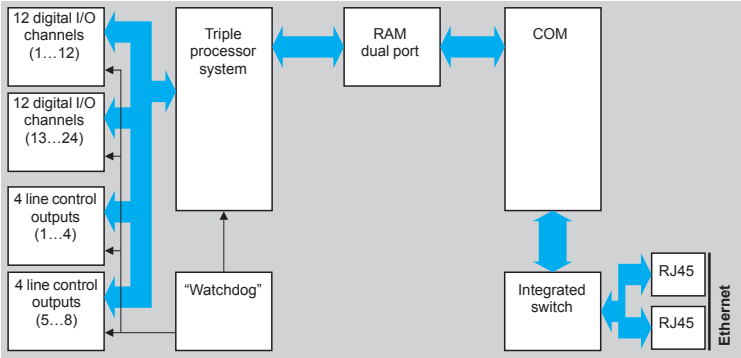
Safety PLCs

In order to meet safety requirements, the compact safety PLCs **XPSMF40●●** incorporate two essential functions (**Redundancy** and **Self-monitoring)** complying to category 4 conforming to EN 954-1 and performance level “e” conforming to EN/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between the safety PLCs and the safety remote I/O modules (**Special Switch**).

■ **Redundancy**: the triple processor integrated in the compact safety PLCs analyzes and compares the data received from the safety inputs and outputs. The incoming and outgoing data (programmed values and received values) are received in parallel by the three processors and compared in real-time.
■ **Self-monitoring (“Watchdog”)**: the compact safety PLCs continuously monitor the data processing cycle and the execution of tasks, and intervenes if the cycle time 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 data provided by the inputs and outputs of the safety PLCs on the Ethernet network, while avoiding signal collisions and excessive amounts of data on the network.

Functional diagrams

Compact safety PLCs XPS4000/MF4002



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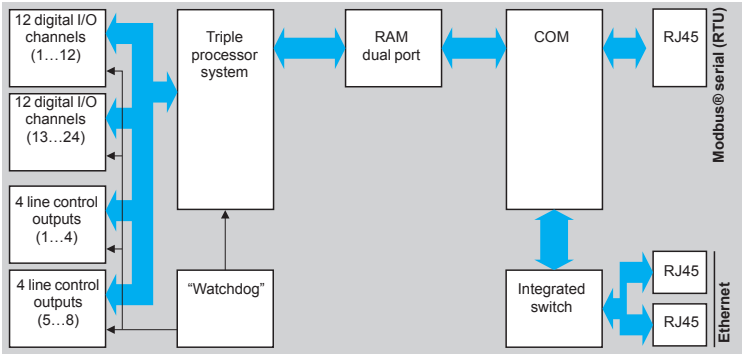
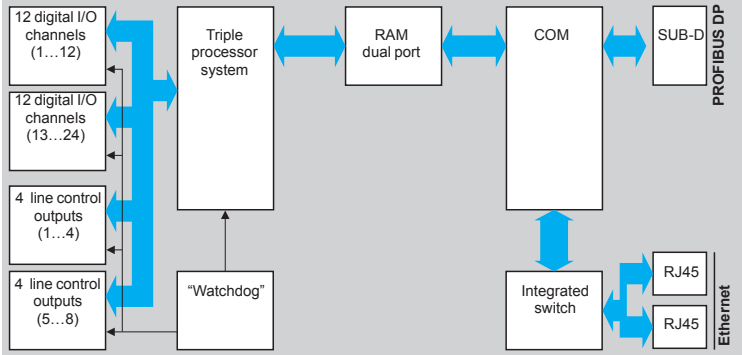
Functional diagrams *(continued)*

Compact safety PLCs XPSMF4020/MF4022



Compact safety PLCs XPSMF4040/MF4042



Line control for safety PLCs XPSMF40●●

Line control is a means of short-circuit and line break monitoring.
Using line control outputs enables SIL 3 (EN/IEC 61508) and category 4 (EN 954-1) safety to be achieved. The line control outputs send a high signal with a very short low signal, thus enabling a wiring anomaly (short-circuit, line break) to be seen at the inputs of the safety PLCs.

The line control outputs 1 to 8 are connected to the digital inputs of the same circuit.

Example: Emergency stop pushbutton with two normally closed (N.C.) contacts that are supplied by two different line control outputs connected via these two normally closed contacts and fed into the inputs of the safety PLCs

Programming automated safety functions

Software **XPSMFWIN** (reference SSV1XPSMFWIN) running on a PC enables the programming of all safety remote I/O modules and safety PLCs, as well as configuration of the communication settings.

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Safety automation system solutions
Preventa™ safety PLCs
Compact, XPSMF40

Compact safety PLCs **XPSMF40●●** incorporate:
- ■ 24 configurable I/O channels
- □ digital inputs
- □ or digital outputs
- ■ and 8 (2 x 4) line control output channels.

Digital inputs

Compact safety PLCs **XPSMF40●●** incorporate up to 24 digital inputs for the connection of safety related input devices, such as emergency stop contacts, magnetic switches, light curtains, etc.

Compact PLCs	Digital inputs		
	N°	Safety detection	Safety dialog
XPSMF4000	24	Limit switches, Guard switches, with reset and with actuator, Light curtains type 2 and type 4, Safety mats and sensing edges…	Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations…
XPSMF4002	24		
XPSMF4020	24		
XPSMF4022	24		
XPSMF4040	24		
XPSMF4042	24		

Digital outputs

Compact safety PLCs **XPSMF40●●** incorporate up to 24 digital outputs for the connection of safety related output devices, such as contactors, illuminated beacons, sirens, etc.

Compact PLCs	Digital outputs		
	N°	Safety actuators	Safety dialog
XPSMF4000	24	Contactors-motors, Contactors-reversing, Variable speed drives...	Beacons and indicator banks, Rotating mirror beacons, Sirens…
XPSMF4002	24		
XPSMF4020	24		
XPSMF4022	24		
XPSMF4040	24		
XPSMF4042	24		

Line control outputs

Compact PLCs	Line control outputs	
	N°	
XPSMF4000	8 (2 x 4)	Short-circuit and line break monitoring
XPSMF4002		
XPSMF4020		
XPSMF4022		
XPSMF4040		
XPSMF4042		

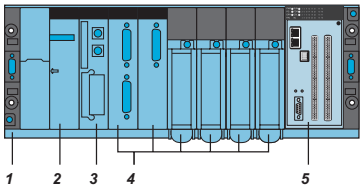
Remote inputs and outputs

In addition to the inputs/outputs integrated as standard, compact safety PLCs **XPSMF40●●** can be connected to safety remote input modules **XPSMF1** and/or safety remote output modules **XPSMF2** and/or safety remote mixed I/O modules **XPSMF3**.
The safety remote input, output and mixed I/O modules can be located within the vicinity of the machines to be monitored, thus reducing cabling.

Communication between these safety remote I/O modules and safety PLCs **XPSMF40●●** is performed on an Ethernet network using the SafeEthernet safety protocol, via the integrated RJ45 switched Ethernet communications ports.

Integrating safety PLCs XPSMF40 on a Premium™ automation platform

Designed for mechanical integration on a Premium™ automation platform, safety PLCs **XPSMF40●●** occupy 2 slots on the Premium™ rack **TSX RKY**.
There is interaction between the two programming environments (Unity and XPSMFWIN): the variables defined using software **XPSMFWIN** can be retrieved by Unity (platform programming software) by using a tool included in Safety Suite V2.



*Example of mechanical integration of a compact safety PLC **XPSMF40** on a Premium™ automation platform.*

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

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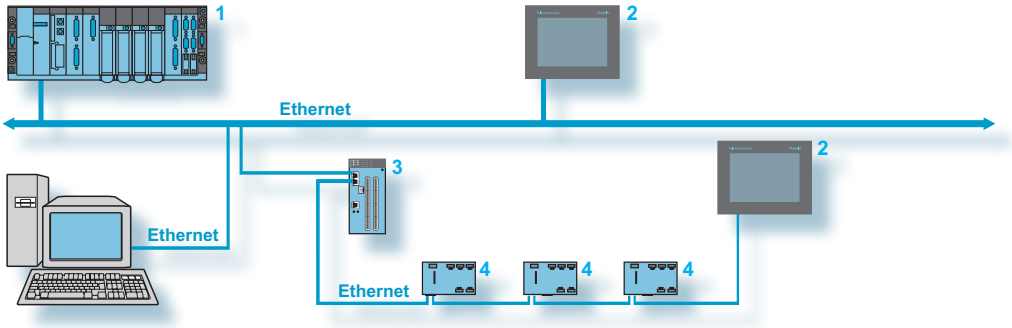
Safety communication on Ethernet network

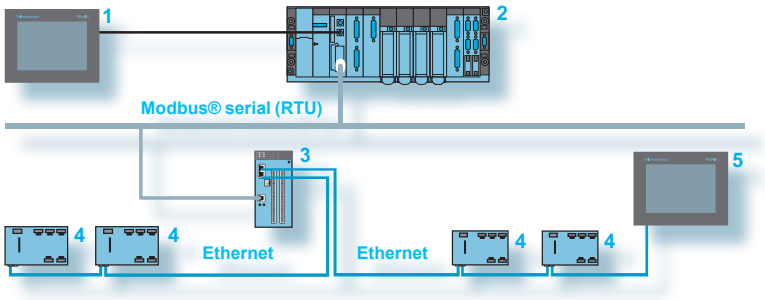
Communication between the PC, Magelis ® graphic terminals or automation platform (Premium™) and the compact safety PLCs **XPSMF40●●** is achieved by **Ethernet** network connection via the integrated RJ45 switched Ethernet communication ports of the compact PLCs.



1 Premium™ automation platform: Modbus® TCP/IP client.
2 Graphic terminal **XBTGT**: Modbus® TCP/IP client.
3 Safety PLCs **XPSMF40●●**: Modbus® TCP/IP servers.
4 Safety remote I/O modules **XPSMF1/2/3**. They communicate with safety PLCs **XPSMF40●2** using the SafeEthernet protocol.

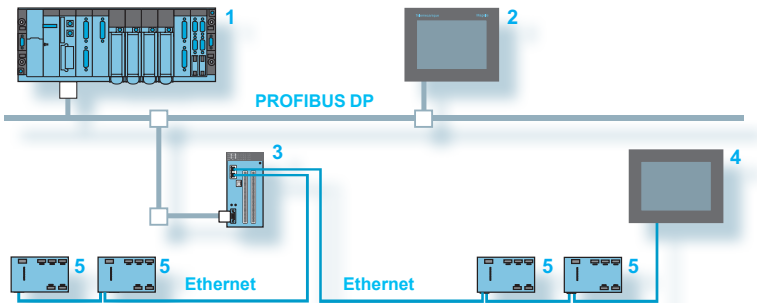
Communication on Modbus® serial (RTU) and PROFIBUS DP fieldbus

■ On **Modbus® serial (RTU)**, safety PLCs **XPSMF4020** and **XPSMF4022** are slaves of the Premium™ automation platform and Magelis ® graphic terminal.
They are connected to the Modbus® serial network via their RJ45 connector.



1 Graphic terminal **XBTGT**: Modbus® serial (RTU) master.
2 Premium™ automation platform: Modbus® serial (RTU) master.
3 Safety PLCs **XPSMF402●**: Modbus® serial (RTU) slave, Modbus® TCP/IP server.
4 Safety remote I/O modules **XPSMF1/2/3**. They communicate with safety PLCs **XPSMF402●** using the SafeEthernet protocol.
5 Graphic terminal **XBTGT**: Modbus® serial (RTU) client.

■ On **PROFIBUS DP**, safety PLCs **XPSMF4040** and **XPSMF4042** are slaves of the Premium™ automation platform and Magelis ® graphic terminal.
They are connected to the PROFIBUS DP network via their SUB-D 9-pin connector.



1 Premium™ automation platform: PROFIBUS DP master.
2 Graphic terminal **XBTGT**: PROFIBUS DP master.
3 Safety PLC **XPSMF404●**: PROFIBUS DP slave, Modbus® TCP/IP server.
4 Graphic terminal **XBTGT**: Modbus® TCP/IP client.
5 Safety remote I/O modules **XPSMF1/2/3**. They communicate with safety PLCs **XPSMF404●** using the SafeEthernet protocol.

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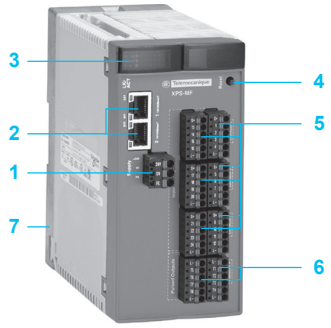
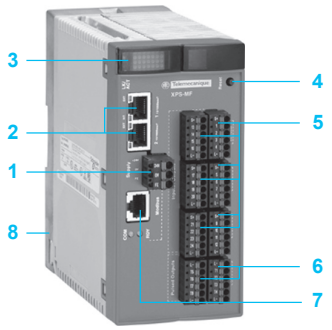


Description

Safety PLCs XPSMF4000/MF4002

On the front cover of the enclosure:

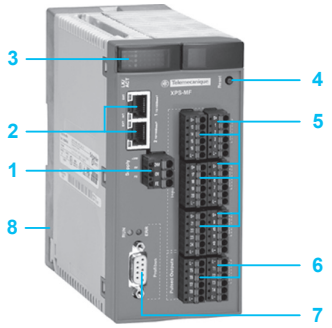
1 One terminal block *(1)* for ⎓ 24 V supply.
2 Two integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus® TCP/IP server protocol).
3 Process status LEDs.
4 One “Reset” button.
5 Six terminal blocks *(1)* for connection of configurable digital I/Os.
6 Two terminal blocks *(1)* for connection of line control outputs.
7 On the rear face: one removable plate with spring mounting for mounting on 35 mm ⊔ rail.



Safety PLCs XPSMF4020/MF4022

On the front cover of the enclosure:

1 One terminal block *(1)* for ⎓ 24 V supply.
2 Two integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus® server protocol).
3 Process status LEDs.
4 One “Reset” button.
5 Six terminal blocks *(1)* for connection of configurable digital I/Os.
6 Two terminal blocks *(1)* for connection of line control outputs.
7 One RJ45 connector for connection on Modbus® serial (RTU), with 2 process status LEDs.
8 On the rear face: one removable plate with spring mounting for mounting on 35 mm ⊔ rail.



Safety PLCs XPSMF4040/MF4042

On the front cover of the enclosure:

1 One terminal block *(1)* for ⎓ 24 V supply.
2 Two integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus® TCP/IP server protocol).
3 Process status LEDs.
4 One “Reset” button.
5 Six terminal blocks *(1)* for connection of configurable digital I/Os.
6 Two terminal blocks *(1)* for connection of line control outputs.
7 One SUB-D (9-pin female) connector for connection on PROFIBUS DP, with 2 process status LEDs.
8 On the rear face: one removable plate with spring mounting for mounting on 35 mm ⊔ rail.

*(1) Removable Screw and Cage clamp terminals are provided with compact safety PLCs **XPSMF40**.*

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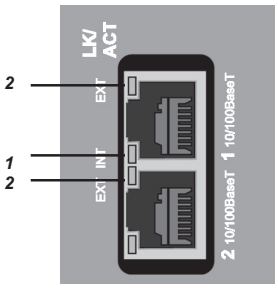
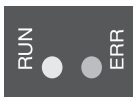
Process status LEDs



1 *Internal Ethernet LED*
2 *External Ethernet LEDs*

Modbus® serial (RTU) LEDs



PROFIBUS DP LEDs

LED details

LED	Color	Status	Meaning
Process status LEDs on safety PLCs XPSMF40●●			
1…24	Green	On	Channels configured as inputs: input signal being received. Channels configured as outputs: output signal being sent.
T1…T8	Green	On	Line control 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 anomaly 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 while 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-energized 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 XPSMF40●●			
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® serial (RTU) LEDs on safety PLCs XPSMF4020/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 DP LEDs on safety PLCs XPSMF4040/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 but no data exchange is possible. Bus disconnected or bus Master not available.
		Flashing	A configuration error has occurred and no data exchange is possible.

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2

Environment

Compact safety PLC type			XPSMF4000/4002, XPSMF4020/4022, XPSMF4040/4042
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1, EN/ISO 13849-1 and EN/IEC 61508)			Category 4 (EN 954-1), Performance level "e" (EN/ISO 13849-1), Safety integrity level: SIL 3 (EN/IEC 61508)
Product certifications			IEC 61511 part 1-3: 2004, DIN VDE 0116: 1989, EN 50156-1: 2004, EN 12067-2: 2004, EN 298: 2003, EN 230: 2005, NFPA 85: 2001, EN/IEC 61131-2: 2003, EN 61000-6-2: 2001, EN 61000-6-4: 2001
Ambient air temperature conforming to EN/IEC 61131-2	Operating	**°F (°C)**	+32… + 140 (0…+ 60)
	Storage	**°F (°C)**	-40… + 185 (- 40…+ 85)
Relative humidity			95% (supply not connected)
Degree of protection	Enclosure		IP 20
Pollution			Degree of pollution II
Altitude			6560 ft. (2,000 m)
Protection class			Class II, conforming to EN/IEC 61131-2
Electromagnetic compatibility			Conforming to EN/IEC 61131-2
Vibration resistance conforming to EN/IEC 61131-2	Operating		1 g, frequency 9…150 Hz
Shock resistance conforming to EN/IEC 61131-2	Operating		15 g (duration 11 ms), unit test while operating, 2 cycles per axis
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 (80 MHz…2 GHz), amplitude modulation 80%

Electrical characteristics

Supply	Voltage	**V**	⎓ 24 (external supply with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)
	Voltage limits		- 15…+ 20 %
Maximum power 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 size of application
Clock			Supplied by backup capacitor for 1 week following loss of supply
User memory	Application	**kB**	250
	Data	**kB**	250
LED display			Yes
Digital inputs			
Number	Inputs not electrically isolated		24, configurable channels
Permissible current	At state 0	**mA**	1.5 max. at ⎓ 24 V
	At state 1	**mA**	3.5 at ⎓ 24 V, 4.5 at ⎓ 30 V
Input supply			3 x ⎓ 20 V/100 mA (on 24 V)
Input resistance		**kΩ**	< 7
Overvoltage protection		**V**	- 10, + 35
LED display			Yes, see page 2/9
Maximum distance of equipment			984 ft. (300 m)
Digital outputs			
Number	Outputs not electrically isolated		24, configurable channels
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 140 °F (60 °C)
	Channels 4, 8, 12, 16, 20 and 24	**A**	1 at 140 °F (60 °C), 2 at 122 °F (50 °C)
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., shutdown of all outputs if exceeded with cyclic reconnection
LED display			Yes
Maximum distance of equipment			984 ft. (300 m)
Line control outputs			
Number	Outputs not electrically isolated		8 (2 x 4)
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

Presentation: page 2/4 | Characteristics: page 2/10 | References: page 2/12 | Dimensions, mounting: page 2/15 | Connections: page 2/16

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Communication

Ethernet network

Safety communication using SafeEthernet safety protocol			
Compatibility			**XPSMF4000/MF4002, XPSMF4020/MF4022, XPSMF4040/MF4042**
Transmission	Communication ports		Integrated 2 RJ45 switched Ethernet communications ports
	Baud rate	**Mbps**	100 Half duplex, 10 Full duplex, Autonegotiation
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable, category 5D or better (Ethernet)
Non safety communication using Modbus® TCP/IP protocol			
Compatibility			**XPSMF4002, XPSMF4022, XPSMF4042**
Connection ports	Number and type		Integrated 2 RJ45 switched Ethernet communications ports
	Baud rate	**Mbps**	100 Half duplex, 10 Full duplex, Autonegotiation
	Master/Slave		Server (slave)
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable, category 5D or better (Ethernet)
Transparent Ready ® service	Class		A10
	Standard Ethernet TCP/IP communication services (supported by compact safety PLCs XPSMF40)		Modbus® TCP/IP server. Modbus® TCP/IP messaging (reading/writing of data words) Modbus® identification requests
	TCP port		Standard 502
	Max. number of Modbus® TCP/IP connections		1 to 20
Modbus® serial (RTU)			
Compatibility			**XPSMF4020, XPSMF4022**
Serial link ports	Number and type		1 x RJ45
	Master/Slave		Slave, V0
Addressing			122 slave addresses
Physical layer			RS 485
Medium			Shielded dual twisted pair cable
PROFIBUS DP			
Compatibility			**XPSMF4040, XPSMF4042**
Serial link ports	Number and type		1 x SUB-D 9-pin female
	Master/Slave		Slave, V0
Physical layer			RS 485
Medium			Shielded dual twisted pair cable

Connections *(1)*

Type of connection			**Removable screw clamp terminal blocks** *(2)*	**Removable spring terminal blocks** *(2)*
Supply connection	Number of terminal blocks		1	1
	For 1 cable without cable end		Solid or flexible AWG 24-12 (0.2…2.5 mm²)	–
	For 1 flexible cable with or without plastic cable end		AWG 24-14 (0.25…2.5 mm²)	–
	For 2 cables of same diameter, without cable end		–	Solid or flexible AWG 24-12 (0.2…2.5 mm²)
	For 2 cables of same diameter, flexible without cable end		–	AWG 24-12 (0.25…2.5 mm²)
	For 2 cables of same diameter, flexible with plastic cable end		–	AWG 24-12 (0.25…2.5 mm²)
Cable connection	Tightening torque		4.43 lb-in (0.5 Nm)	–
	Bared length		0.39" (10 mm)	0.35" (9 mm)
Connection to digital input channels, digital output channels, line control output channels	Number of terminal blocks		8	8
	For 1 cable without cable end		Solid or flexible AWG 24-16 (0.14…1.5 mm²)	–
	For 1 flexible cable without cable end		AWG 24-16 (0.25…1.5 mm²)	–
	For 1 flexible cable with plastic cable end		AWG 24-20 (0.25…0.5 mm²)	–
	For 2 cables of same diameter, without cable end		–	Solid or flexible AWG 26-16 (0.14…1.5 mm²)
	For 2 cables of same diameter, flexible without cable end		–	AWG 22 (0.25…0.34 mm²)
	For 2 cables of same diameter, flexible with plastic cable end		–	AWG 20 (0.5 mm²)
Cable connection	Tightening torque		1.95...2.21 lb-in (0.22...0.25 Nm)	–
	Bared length		0.35" (9mm)	0.35" (9mm)

(1) AWG: American Wire Gauge.
*(2) Removable Screw and Cage Clamp terminals provided with safety PLCs **XPSMF40●●**.*

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Safety automation system solutions

Preventa™ safety PLCs
Compact, XPSMF40

XPSMF4000
XPSMF4002

XPSMF4020
XPSMF4022

XPSMF4040
XPSMF4042

Compact safety PLCs

⎓ 24 V supply

Digital Inputs or Outputs	Line control outputs	Communication on Ethernet network: SafeEthernet protocol	Communication on Ethernet network: Modbus® TCP/IP protocol	Communication on Modbus® serial (RTU)	Communication on PROFIBUS DP	Reference	Weight oz (kg)
0…24 configurable channels	2 x 4	Yes	–	–	–	**XPSMF4000**	35.273 (1.000)
			Yes, server	–	–	**XPSMF4002**	35.273 (1.000)
			–	Yes, slave	–	**XPSMF4020**	35.273 (1.000)
			Yes, server	Yes, slave	–	**XPSMF4022**	35.273 (1.000)
			–	–	Yes, slave	**XPSMF4040**	35.273 (1.000)
			Yes, server	–	Yes, slave	**XPSMF4042**	35.273 (1.000)

Configuration software

■ Reference **SSV1XPSMFWIN** contains the full version of the programming software XPSMFWIN software for the XPSMF Safety PLCs. The XPSMFWIN is part of our Safety Suite and is not available separately.

Description	Operating system	Details	Languages	Reference	Weight oz (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**	18.342 (0.520)

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ABL 8RPS24050

ABL 1REM24025

Phaseo ® regulated switch mode power supplies

Mains input voltage	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conformity to standard IEC EN 61000-3-2 and IEC EN 60950	Reference	Weight
V	⎓ V	W	A				oz (kg)
Universal range, single-phase (N-L1) **or 2-phase** (L1-L2) **connection**							
∼ **100…120 V/200...500** - 15%, + 10% 50/60 Hz	24...28.8	72	3	Auto/Manual	Yes	**ABL 8RPS24030**	10.582 (0.300)
		120	5	Auto/Manual	Yes	**ABL 8RPS24050**	24.692 (0.700)
		240	10	Auto/Manual	Yes	**ABL 8RPS24100**	35.273 (1.000)
Dedicated range, single-phase connection							
∼ **100…240** *(1)* wide range, 47…63 Hz	12	60	5	Auto	No	**ABL 1REM12050**	15.521 (0.440)
	24	60	2.5	Auto	No	**ABL 1REM24025**	15.521 (0.440)
∼ **100...120/200...240** *(2)*	24	240	10	Auto	No	**ABL 1REM24100**	31.041 (0.880)

Magelis ® multifunction graphic terminals with touch sensitive screen and on-board Ethernet *(1) (2)*

Supply voltage ⎓ 24 V

XBTGT2130, XBTGT2330

XBTGT4330

XBTGT5●30

XBTGT6330

XBTGT7340

	Description	Ports: serial and communication (type of link)	Application memory	Reference	Weight oz (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	**XBTGT2130**	35.273 (1.000)
	Color 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	**XBTGT2330**	35.273 (1.000)
7.5"	Color 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	**XBTGT4330**	63.493 (1.800)
10.4"	Color 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	**XBTGT5230**	105.822 (3.000)
	Color 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	**XBTGT5330**	105.822 (3.000)
12.1"	Color 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	**XBTGT6330**	105.822 (3.000)
15"	Color 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	**XBTGT7340**	197.534 (5.600)

(1) Service instructions, USB connectors locking device and mounting kit included.
(2) Other operator dialog terminals, industrial PCs: please refer to our "Human Machine Interface" catalog.

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2

490 NTW 000●●

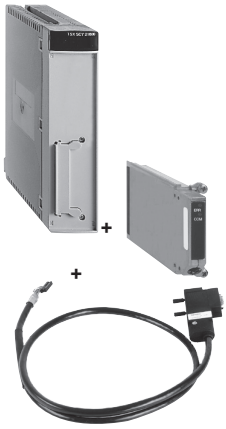
Connecting cables for network and bus

Connection to Ethernet network

Description	Pre-fitted connectors	Length ft. (m)	Reference	Weight oz (kg)
Shielded twisted pair cables, straight through	2 RJ45 connectors For connection to DTE (Data Terminal Equipment)	6.56 (2)	**490 NTW 000 02** *(1)*	–
		16.40 (5)	**490 NTW 000 05** *(1)*	–
		39.37 (12)	**490 NTW 000 12** *(1)*	–
		131.23 (40)	**490 NTW 000 40** *(1)*	–
		262.47 (80)	**490 NTW 000 80** *(1)*	–
Shielded twisted pair cables, crossed wires	2 RJ45 connectors For connection between hubs, switches and transceivers	16.40 (5)	**490 NTC 000 05** *(1)*	–
		49.21 (15)	**490 NTC 000 15** *(1)*	–
		131.23 (40)	**490 NTC 000 40** *(1)*	–
		262.47 (80)	**490 NTC 000 80** *(1)*	–

Connection to Modbus® serial link

Description	Use		Length ft. (m)	Reference	Weight lb (kg)
	From	To			
Trunk cables, shielded dual twisted pair, RS 485	Compact safety PLCs XPSMF4020/MF4022 (RJ45)	Modbus® splitter box LU9 GC3 (RJ45)	328 (100)	**TSX CSA 100**	12.522 (5.680)
			656 (200)	**TSX CSA 200**	24.030 (10.920)
			1640 (500)	**TSX CSA 500**	66.139 (30.000)
	Graphic terminals XBTGT (SUB-D 9-pin)	Modbus® splitter box LU9 GC3 (RJ45)	8.2 (2.5)	**XBTZ938** *(2)*	0.474 (0.210)
Adaptor for cable XBTZ938	SUB-D 9-pin (XBTGT)	XBTZ938 (SUB-D 25-pin)	0.66 (0.2)	**XBTZG909**	–



Description	Characteristics	Sold in lots of	Unit reference	Weight oz (kg)
End of line adaptors For RJ45 connector	R = 120 Ω, C = 1 nF	2	**VW3 A8 306 RC**	7.055 (0.200)
	R = 150 Ω	2	**VW3 A8 306 R**	0.353 (0.010)

PROFIBUS DP bus connection components

Description	Profile	Services	Reference	Weight oz (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**	30.688 (0.870)

Description	Use	Reference	Weight oz (kg)
Remote inputs/outputs on PROFIBUS DP bus	Advantys™ STB network interface module	**STB NDP 2112**	4.938 (0.140)
	Momentum™ communication module	**170 DTN 110 00**	–
Connectors for remote I/O communication module	Line terminators	**490 NAD 911 03**	–
	Intermediate connection	**490 NAD 911 04**	–
	Intermediate connection and terminal port	**490 NAD 911 05**	–

TSX PBY 100

Description	Length ft. (m)	Reference	Weight oz (kg)
PROFIBUS DP connecting cables	328 (100)	**TSX PBS CA 100**	–
	1312 (400)	**TSX PBS CA 400**	–

490 NAD 911 03

Description		Reference	Weight oz (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 **XBTZG909**.*

Presentation: page 2/4 | Characteristics: page 2/10 | References: page 2/12 | Dimensions, mounting: page 2/15 | Connections: page 2/16

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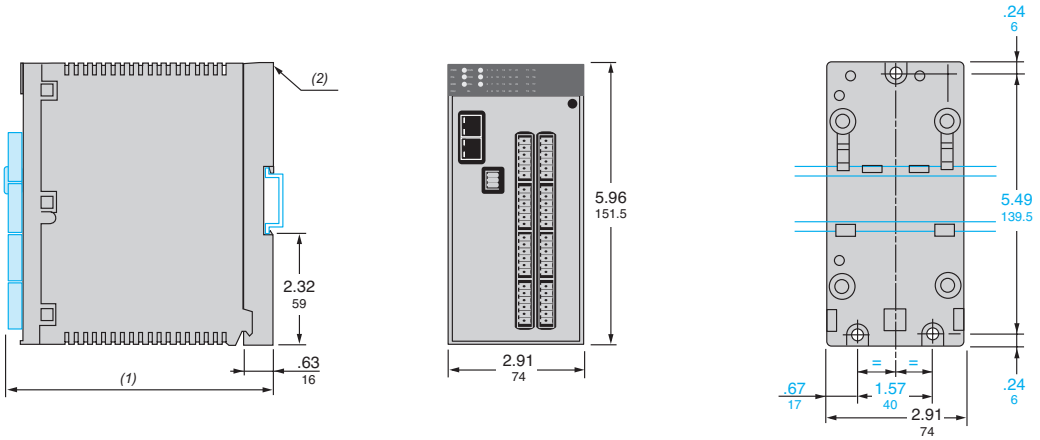
Dimensions

XPSMF40●●

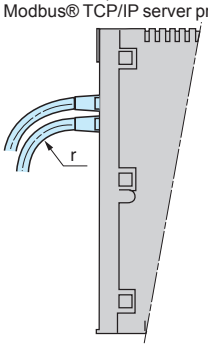


(1) 6.02 in (153 mm) with screw terminal block, 5.96 in (151.4 mm) with spring terminal block.
(2) Removable plate with spring mounting for mounting on 1.38 (35 mm) ⊥⊥ rail.

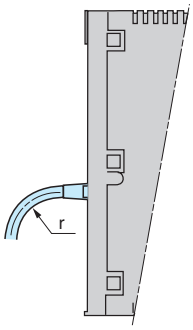
Mounting

Mounting precautions relating to connectors

Access to Ethernet network	Access to Modbus® serial link (RTU)	Access to Profibus DP bus
RJ45 socket (SafeEthernet protocol, Modbus® TCP/IP server protocol)	RJ45 socket	Connector 490 NAD 911 03 in SUB-D 9-pin socket



r = 22.5 min.



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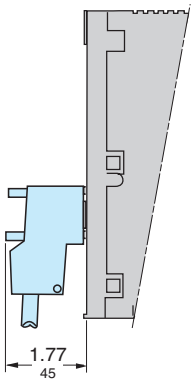
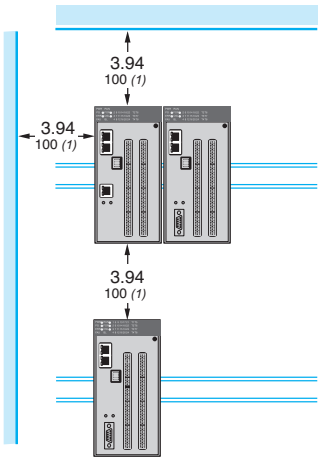
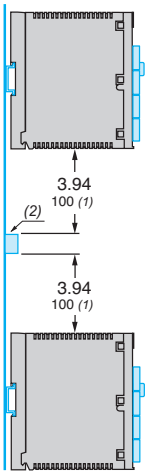


Dual Dimensions: INCHES / Millimieters

Mounting in panel or enclosure

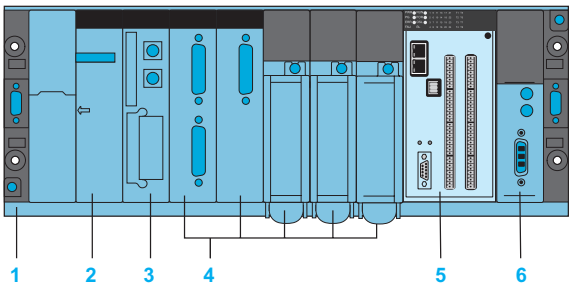




(1) Minimum recommended value.
(2) Prefabricated electrical ducting for passage of cables.

Mounting on Premium™ rack

Mechanical mounting only, without connection to either the back plane bus or to the Premium™ platform supply



1 Premium™ rack
2 Premium™ supply
3 Premium™ CPU
4 Premium™ I/O module
5 Safety PLC **XPSMF40●●** (occupies 2 slots)
6 Premium™ As-interface master

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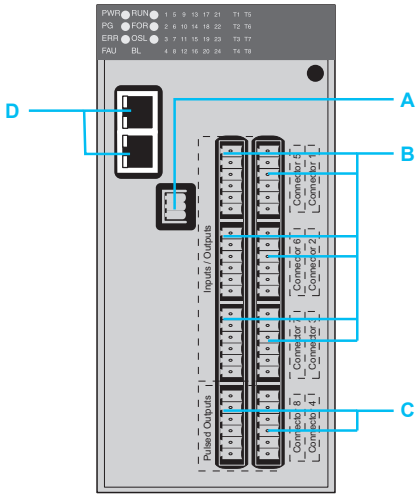
2

Connections



XPSMF4000/MF4002

XPSMF4000/MF4002, XPSMF4020/MF4022, XPSMF4040/MF4042

Item	Connection	Connector	Screw	Function
A	**Supply**	Supply	24 V	⎓ 24 V
			0 V	⎓ 24 V (reference pole)
			FE	Ground *(1)*
B	**Digital Inputs or Outputs**	Connector 1	S+	Supply to Inputs 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 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 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 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 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 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	**Line control outputs**	Connector 4	L-	Outputs 1 to 4 common
			1	Line control Output 1 (T1)
			2	Line control Output 2 (T2)
			3	Line control Output 3 (T3)
			4	Line control Output 4 (T4)
			L-	Outputs 1 to 4 common
		Connector 8	L-	Outputs 5 to 8 common
			5	Line control Output 5 (T5)
			6	Line control Output 6 (T6)
			7	Line control Output 7 (T7)
			8	Line control Output 8 (T8)
			L-	Outputs 5 to 8 common

(1) Grounded when mounting on plate or rail.

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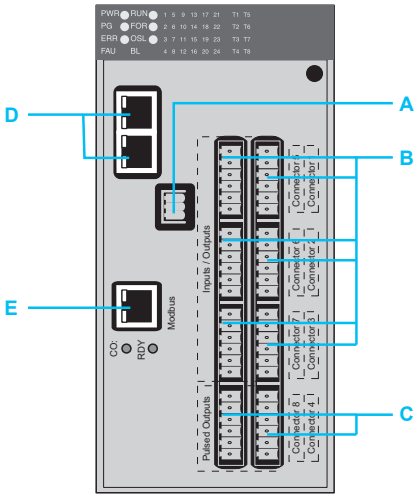
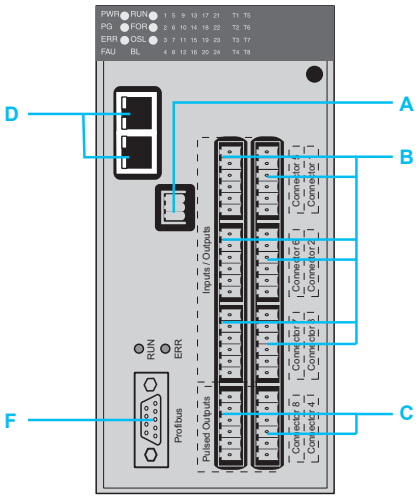
Connections *(continuous)*



XPSMF4020/MF4022

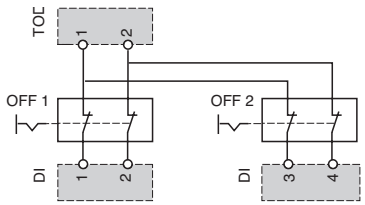


XPSMF4040/MF4042

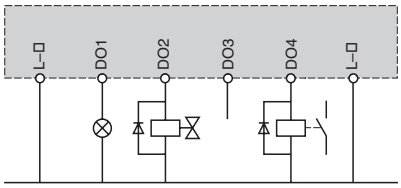
XPSMF4000/MF4002, XPSMF4020/MF4022, XPSMF4040/MF4042			
Item	Connection	Type	Function
D	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and the programming terminal in a point to point or via an Ethernet network for programming, setting IP address etc.
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.
	Non-Safe Communication available with references: XPSMF4002, XPSMF4022, XPSMF4042		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other non- safety related components (e.g HMI Magelis ®, standard PLCs, Scada systems,etc.) this can be established in a point to point way or via an Ethernet network.
XPSMF4020/MF4022			
E	**Communication**	RJ45 (Modbus®)	**XPSMF4020/MF4022**: slaves on Modbus® serial (RTU)
XPSMF4040/MF4042			
F	**Communication**	SUB-D 9-pin female (Profibus)	**XPSMF4040/MF4042**: slaves on PROFIBUS DP

Connections examples

Actuator connections to the outputs



Emergency stop connections (line control)



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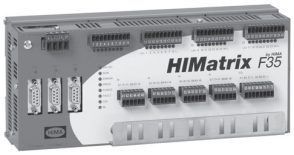
Safety automation system solutions

Preventa™ safety PLCs
Compact, XPSMF31/30/35

XPSMF31222

XPSMF3022



XPSMF35●●

*Products referenced **XPSMF31222, XPSMF3022** and **XPSMF35●●** are marked **HIMatrix® F31**, **HIMatrix® F30** and **HIMatrix® F35** (manufactured by Hima, sold by Schneider Electric).*

Presentation

Preventa™ compact safety PLCs **XPSMF31/30/35** enable the monitoring of simple to complex safety functions for all industrial applications relating to the protection of personnel and machine safety.

Designed for use with numerous machine safety functions, these compact safety PLCs are intended for use in safety related parts of control systems.
They can manage up to:
- category 4 conforming to EN 954-1,
- performance level “e” conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

The compact safety PLC range **XPSMF31/30/35** comprises 5 versions that are differentiated by their characteristics, detailed below.

Compact PLCs	Inputs			Outputs Digital	Communication	
	Digital	Analog	Counter		On Ethernet network	On fieldbus
XPSMF31222	20	–	–	8 *(1)*	For all compact PLCs XPSMF31/30/35 using SafeEthernet safety protocol, and with non safety protocol Modbus® TCP/IP server	–
XPSMF3022	20	–	–	8 *(1)*		Modbus® serial Slave (RTU)
XPSMF3502	24	8	2	8		–
XPSMF3522	24	8	2	8		Modbus® serial Slave (RTU)
XPSMF3542	24	8	2	8		PROFIBUS DP V0 slave

Safety PLCs

In order to meet safety requirements, the compact safety PLCs **XPSMF31/30/35** incorporate two essential functions (**Redundancy** and **Self-monitoring)** complying to category 4 conforming to EN 954-1 and performance level “e” conforming to EN/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between the safety PLCs and the safety remote I/O modules (**Special Switch**).

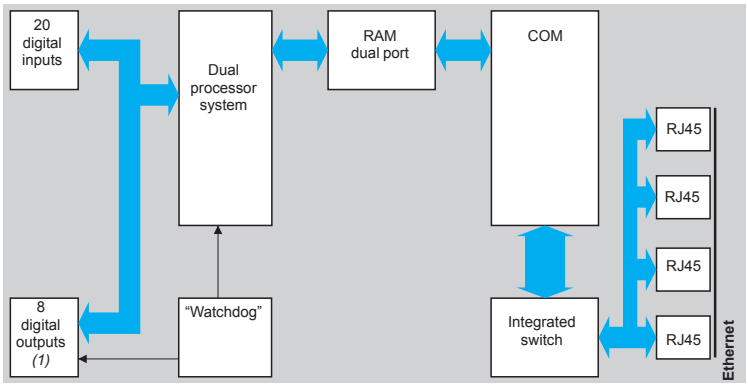
■ **Redundancy**: the dual processor integrated in the compact safety PLCs analyzes and compares the data received from the safety inputs and outputs.
The incoming and outgoing data (programmed values and received values) are received in parallel by the two processors and compared in real-time.

■ **Self-monitoring (“Watchdog”)**: the compact safety PLCs continuously monitor the data processing cycle and the execution of tasks, and intervenes if the cycle time 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 data provided by the inputs and outputs of the safety PLCs on the Ethernet network, while avoiding signal collisions and excessive amounts of data on the network.

Functional diagrams

Compact safety PLC XPSMF31222



(1) Digital outputs can be configured for line control.

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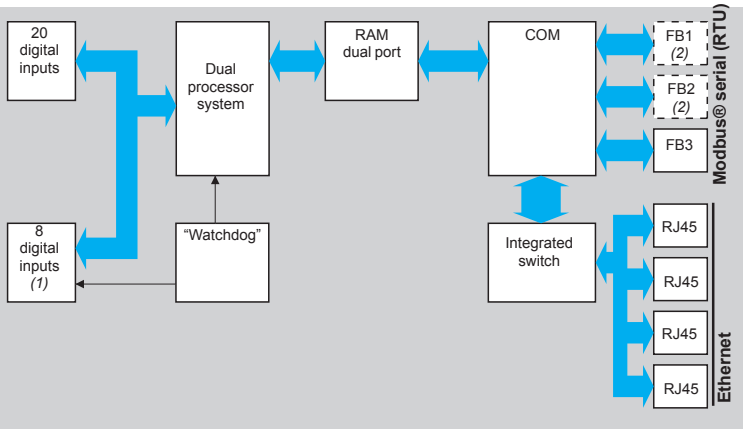
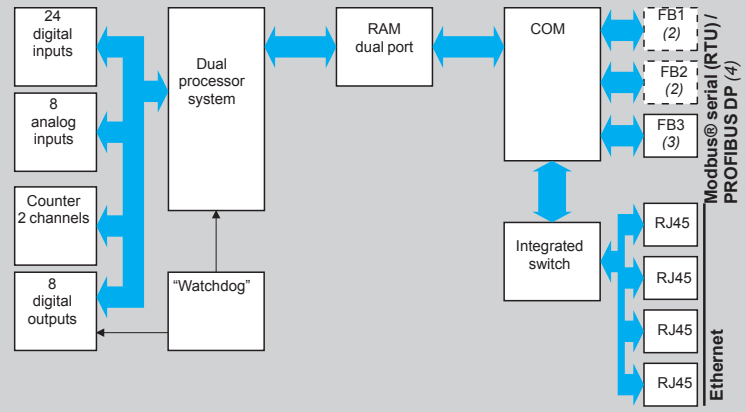
Functional diagrams *(continued)*

Compact safety PLC XPSMF3022



Compact safety PLCs XPSMF35●●



Line control for XPSMF31222 and XPSMF3022

Line control is a means of short-circuit and line break monitoring.
Using line control outputs enables SIL 3 (EN/IEC 61508) and category 4 (EN 954-1) safety to be achieved. The line control outputs send a high signal with a very short low signal, thus enabling a wiring anomaly (short-circuit, line break) to be seen at the inputs of the safety PLC inputs.

Digital outputs 1 to 8 are connected to the digital inputs of the same circuit.

Example: Emergency stop pushbutton with two normally closed (N.C.) contacts that are supplied by two different line control outputs connected via these two normally closed contacts and fed into the inputs of the safety PLCs.

Programming automated safety functions

Software **XPSMFWIN** (reference SSV1XPSMFWIN) running on a PC enables the programming of all safety remote I/O modules and safety PLCs, as well as configuration of the communication settings.

(1) Digital outputs can be configured for line control.
(2) FB1 and FB2 not used.
*(3) FB3 not available on safety PLC **XPSMF3502**.*
(4) Depending on model.

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Digital inputs

Compact safety PLCs **XPSMF3●●●●** incorporate up to 24 digital inputs for the connection of safety related input devices.

Compact PLCs	Digital inputs		
	N°	Safety detection	Safety dialog
XPSMF31222	20	Limit switches, Guard switches, with reset and with actuator, Light curtains type 2 and type 4, Safety mats and sensing edges…	Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations…
XPSMF3022	20		
XPSMF3502	24		
XPSMF3522	24		
XPSMF3542	24		

Analog inputs

Compact safety PLCs **XPSMF35●●** incorporate 8 analog measuring inputs that receive analog safety related signals from the machines to be monitored *(1)*.

Compact PLCs	Analog inputs with transmitter supply	
	N°	Functions
XPSMF3502	8	Closed circuit scanning of input channels, Single-pole measuring of 0 to 10 V voltages, Measuring 0 to 20 mA currents using jumper
XPSMF3522	8	
XPSMF3542	8	

Counter inputs

Compact safety PLCs **XPSMF35●●** incorporate 2 independent and configurable counting channels:
- as a counting function, independent to the direction of counting,
- as a counting function, dependent to the direction of counting,
- or as a counting function via an absolute encoder with Gray code.

Compact PLCs	Counting inputs		
	N°	⎓ 5 V	⎓ 24 V
XPSMF3502	2	Incremental encoders	Sensors, 2/3-wire PNP/NPN
XPSMF3522	2		
XPSMF3542	2		

Digital outputs

All compact safety PLCs **XPSMF●●●●** incorporate 8 digital outputs for connection to signalling equipment and machines to be controlled *(1)*.

Compact PLCs	Digital outputs		
	N°	Safety actuators	Safety dialog
XPSMF31222	8	Contactors-motors, Control relays, Variable speed drives.	Beacons and indicator banks, Rotating mirror beacons, Sirens…
XPSMF3022	8		
XPSMF3502	8		
XPSMF3522	8		
XPSMF3542	8		

Remote inputs and outputs

In addition to the inputs/outputs integrated as standard, compact safety PLCs **XPSMF31/30/35** can be connected to safety remote input modules **XPSMF1** and/or safety remote output modules **XPSMF2** and/or safety remote mixed I/O modules **XPSMF3**.
The safety remote input, output and mixed I/O modules can be located within the vicinity of the machines to be monitored, thus reducing cabling.
Communication between these safety remote I/O modules and compact safety PLCs **XPSMF31/30/35** is performed on an Ethernet network using the SafeEthernet safety protocol, via the Integrated RJ45 switched Ethernet communications ports.

(1) Use shielded dual twisted pair cables, maximum length 984.2 ft (300 m), short-circuit unused analog inputs.

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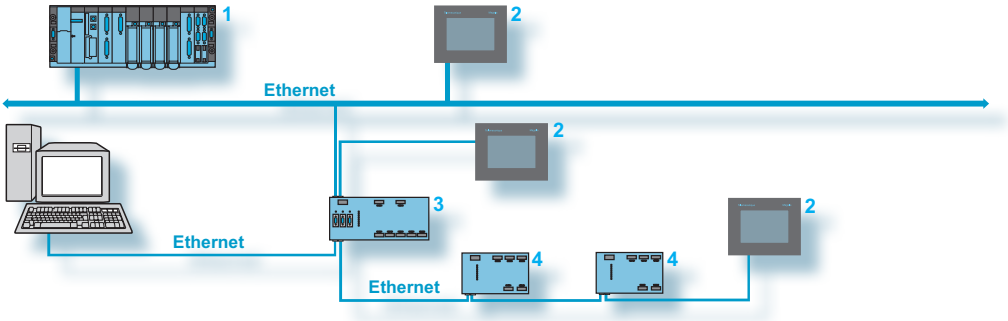
Safety communication on Ethernet network

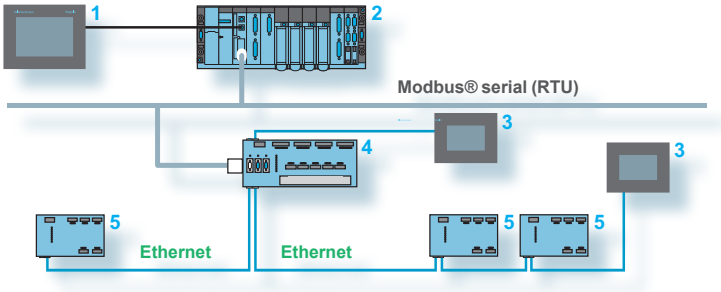
Communication between the PC, Magelis ® graphic terminal or automation platform (Premium™) and the compact safety PLCs is achieved by **Ethernet** network connection via the Integrated RJ45 switched Ethernet communications ports of compact PLCs **XPSMF31/30/35**.



1 Premium™ automation platform: Modbus® TCP/IP client.
2 Graphic terminal **XBTGT**: Modbus® TCP/IP client.
3 Safety PLC **XPSMF31/30/35**: Modbus® TCP/IP server.
4 Safety remote I/O modules **XPSMF1/2/3**. They communicate with safety PLCs **XPSMF31/30/35** using the SafeEthernet protocol.

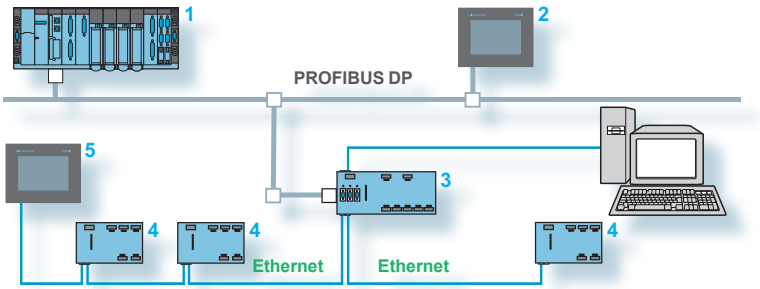
Communication on Modbus® serial (RTU) and PROFIBUS DP fieldbus

■ On **Modbus® serial (RTU)**, safety PLCs **XPSMF3022** and **XPSMF3522** are slaves of the Premium™ automation platform and Magelis ® graphic terminals.
They are connected to the Modbus® serial network via their SUB-D 9-pin connector (FB3).



1 Graphic terminal **XBTGT**: Modbus® serial (RTU) master.
2 Premium™ automation platform: Modbus® serial (RTU) master.
3 Graphic terminal **XBTGT**: Modbus® serial (RTU) client.
4 Safety PLC **XPSMF3022** or **XPSMF3522**: Modbus® serial (RTU) slave, Modbus® TCP/IP server.
5 Safety remote I/O modules **XPSMF1/2/3**. They communicate with safety PLCs **XPSMF3●●2** using the SafeEthernet protocol.

■ On **PROFIBUS DP**, safety PLC **XPSMF3542** is a slave of the Premium™ automation platform and Magelis ® graphic terminal.
It is connected to the PROFIBUS DP network via its SUB-D 9-pin connector (FB3).



1 Premium™ automation platform: PROFIBUS DP master.
2 Graphic terminal **XBTGT**: PROFIBUS DP master.
3 Safety PLC **XPSMF3542**: PROFIBUS DP slave, Modbus® TCP/IP server.
4 Safety remote I/O modules **XPSMF1/2/3**. They communicate with safety PLC **XPSMF3542** using the SafeEthernet protocol.
5 Graphic terminal **XBTGT**: Modbus® TCP/IP client.

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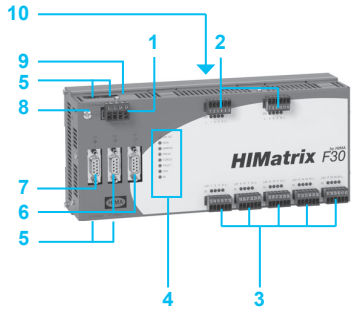
Safety automation system solutions

Preventa™ safety PLCs
Compact, XPSMF31/30/35

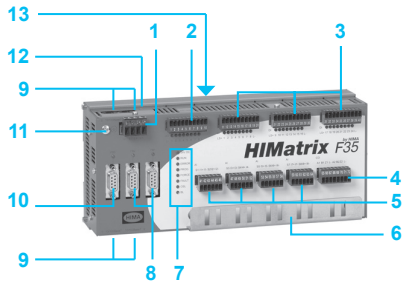


Description

Safety PLCs XPSMF31222 and XPSMF3022

On the front cover of the metal enclosure:

1 One terminal block *(1)* for ⎓ 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 integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus® TCP/IP server protocol).
6 On **XPSMF3022** only: two unused SUB-D connectors (FB1 and FB2).
7 On **XPSMF3022** only: one SUB-D 9-pin connector for connection on Modbus® serial (RTU) (FB3).
8 One ground connection screw.
9 On the top: one “Reset” button.
10 On the rear face: one spring operated mounting device for mounting on 35 mm ⊥ rail.



Safety PLCs XPSMF35●●

On the front cover of the metal enclosure:

1 One terminal block *(1)* for ⎓ 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 analog inputs.
6 One plate for securing shielded analog input connection cables.
7 Eight process status LEDs.
8 Two unused SUB-D connectors (FB1 and FB2).
9 Four integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus® TCP/IP server protocol).
10 One type SUB-D 9-pin connector (FB3) for connection on PROFIBUS DP (**XPSMF3542**) or Modbus® serial (RTU) (**XPSMF3522**).
11 One ground connection screw.
12 On the top: one “Reset” button.
13 On the rear face: one spring operated mounting device for mounting on 35 mm ⊥ rail.

*(1) Removable screw terminals are provided with compact safety PLCs **XPSMF31/30/35**.*

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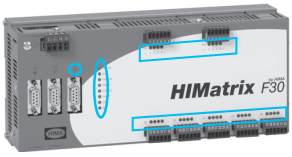
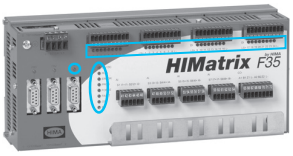
Safety automation system solutions

Preventa™ safety PLCs
Compact, XPSMF31/30/35





Status LED details

Compact safety PLCs XPSMF31222, XPSMF3022 and XPSMF35●●

LED	Color	Status	Meaning
FB1, FB2	–	–	Not used.
FB3	Orange	On	Communication on Modbus® serial or PROFIBUS DP *(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-energized state.
		Off	The CPU is in “ERROR” state (see ERROR).
ERROR	Red	On	Software error or hardware anomaly 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 while 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.

(1) Depending on PLC model.

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2

Environment

Compact safety PLC type			XPSMF31222	XPSMF3022	XPSMF3502, XPSMF3522, XPSMF3542
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1, EN/ISO 13849-1 and EN/IEC 61508)			Category 4 (EN 954-1), Performance level "e" (EN/ISO 13849-1), Safety integrity level: SIL 3 (EN/IEC 61508)		
Product certifications			IEC 61511: 2004, DIN VDE 0116: 1989, EN 50156-1: 2004, EN 12067-2: 2004, EN 298: 2003, EN 230: 1990, NFPA 85: 2001, EN/IEC 61131-2: 2003, EN 61000-6-2: 2001, EN 61000-6-4: 2001		IEC 61511: 2004, DIN VDE 0116: 1989, EN 50156-1: 2004, EN 12067-2: 2004, EN 298: 2003, EN 230: 1990, NFPA 85: 2001, EN/IEC 61131-2: 2003, EN 61000-6-2: 2001, EN 61000-6-4: 2001, EN 54-2: 1997, NFPA 72: 2002
Ambient air temperature conforming to EN 61131-2	For operation	**°F(°C)**	+32… + 140 (0…+ 60)		
	For storage	**°F(°C)**	-40… + 185 (- 40…+ 85)		
Relative humidity			95% (supply not connected)		
Degree of protection	Enclosure		IP 20		
Pollution			Degree of pollution II		
Altitude			6560 ft (2000 m)		
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 g, frequency 9…150 Hz		
Shock resistance conforming to EN 61131-2	Operating		15 g (duration 11 ms), unit test while operating, 2 cycles per axis		
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 (80 MHz…2 GHz), amplitude modulation 80%		

Electrical characteristics

Supply	Voltage	**V**	⎓ 24 (external supply with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)		
	Voltage limits		- 15…+ 20%		
Maximum power 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 size of application		
Clock			Supplied by backup capacitor for 1 week following loss of supply		
User memory	Application	**kB**	250		
	Data	**kB**	250		
LED display			Yes		
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 (on 24 V)		20 V/100 mA
Input protection			Protected against short-circuits, short-circuits to ground		
Overvoltage protection		**V**	500, conforming to IEC 61000-4-5		
Switching point		**V**	Typically 7.5		–
Current		**mA**	> 2 (⎓ 15 V)		–
LED display			Yes		
Maximum distance of equipment			328 ft (100 m)		
Digital outputs					
Number	Outputs not electrically isolated		8, configurable for line control		8
Output voltage		**V**	⎓ 24 ± 2		
Output current	Channels 1 to 3 and 5 to 7	**A**	0.5 at 140 °F (60 °C)		
	Channels 4 and 8	**A**	1 at 140 °F (60 °C), 2 at 122 °F (50 °C)		
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., shutdown of all outputs if exceeded with cyclic reconnection		
LED display			Yes		
Maximum distance of equipment			328 ft (100 m)		

Characteristics: page 2/24
References: page 2/27
Dimensions, mounting: page 2/30
Connections: page 2/32
Presentation: page 2/18

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Electrical characteristics *(continued)*

Compact safety PLC type			XPSMF3502, XPSMF3522, XPSMF3542
Analog inputs			
Number	Inputs not electrically isolated		8, single-pole
External jumper		Ω	250 or 500 depending on application
Input values	Nominal value	V	⎓ 0…10
		mA	0…20, with 500 Ω jumper
	Service value	V	⎓ 0.1…11.5
		mA	0/4…23, with 500 Ω jumper
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
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			1640 ft (500 m), 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

Communication

Compatibility			XPSMF31222	XPSMF3022	XPSMF3502, XPSMF3522, XPSMF3542
Ethernet network: safety communication using SafeEthernet protocol					
Transmission	Communication ports		Integrated 4 RJ45 switched Ethernet communications ports		
	Baud rate	Mbps	100 Half duplex, 10 Full duplex, Autonegotiation		
Structure			10BASE-T/100BASE-TX		
Medium			Dual twisted pair cable, category 5D or better (Ethernet)		
Ethernet network: Non-safety related communication using Modbus® TCP/IP protocol					
Connection Ports	Number and type		Integrated 4 RJ45 switched Ethernet communication ports		
	Baud rate	Mbps	100 Half Duplex, 10 Full Duplex, Autonegotiation		
	Master/Slave		Server (slave)		
Structure			10BASE-T/100BASE-TX		
Medium			Dual twisted pair cable, category 5D or better (Ethernet)		
Transparent Ready ® Services	Class		A10		
	Standard Ethernet TCP/IP communication services		Modbus® TCP/IP Server		
			Modbus® TCP/IP messaging (reading/writing of data words)		
			Modbus® identification request		
	TCP port		Standard 502		
	Max. number of Modbus® TCP/IP connections		1 to 20		
Modbus® serial (RTU)					
Serial link ports	Number and type		–	1 x SUB-D 9-pin female (FB3)	
	Master/Slave		–	Slave	
Addressing			–	122 slave addresses	
Physical layer			–	RS 485	
Medium			–	Shielded dual twisted pair cable	
PROFIBUS DP					
Serial link ports	Number and type		–	–	1 x SUB-D 9-pin female
	Master/Slave		–	–	Slave, V0
Physical layer			–	–	RS 485
Medium			–	–	Shielded dual twisted pair cable

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Connections *(1)*

Safety PLC type		XPSMF31222	XPSMF3022	XPSMF3502, XPSMF3522, XPSMF3542
Type of connection		Screw clamp terminal blocks *(2)*		
Supply connection	Number of terminal blocks	1		
	For 1 cable without cable end	Solid or flexible AWG 24-12 (0.2…2.5 mm²)		
	For 1 flexible cable with or without plastic cable end	AWG 22-16 (0.25…2.5 mm²)		
	For 2 cables of same diameter, without cable end	Solid or flexible AWG 24-12 (0.2…1.5 mm²)		
	For 2 cables of same diameter, flexible without cable end	AWG 22-18 (0.25…1.0 mm²)		
	For 2 cables of same diameter, flexible with plastic cable end	AWG 22-16 (0.5…1.5 mm²)		
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 AWG 28-16 (0.14…1.5 mm²)		
	For 1 flexible cable without cable end	AWG 22-16 (0.25…1.5 mm²)		
	For 1 flexible cable with plastic cable end	AWG 22-20 (0.25…0.5 mm²)		
	For 2 cables of same diameter, without cable end	Solid: AWG 28-20 (0.14…0.5 mm²) Flexible: AWG 28-18 (0.14…0.75 mm²)		
	For 2 cables of same diameter, flexible without cable end	AWG 22 (0.25…0.34 mm²)		
	For 2 cables of same diameter, flexible with plastic cable end	AWG 20 (0.5 mm²)		
Analog input channel connection	Number of terminal blocks	–	–	4
	For 1 cable without cable end	–	–	Solid or flexible AWG 28-16 (0.14…1.5 mm²)
	For 1 flexible cable without cable end	–	–	AWG 22-16 (0.25…1.5 mm²)
	For 1 flexible cable with plastic cable end	–	–	AWG 22-20 (0.25…0.5 mm²)
	For 2 cables of same diameter, without cable end	–	–	Solid: AWG 28-20 (0.14…0.5 mm²) Flexible: AWG 28-18 (0.14…0.75 mm²)
	For 2 cables of same diameter, flexible without cable end	–	–	AWG 22 (0.25…0.34 mm²)
	For 2 cables of same diameter, flexible with plastic cable end	–	–	AWG 20 (0.5 mm²)
Counting channel connection	Number of terminal blocks	–	–	1
	For 1 cable without cable end	–	–	Solid or flexible AWG 28-16 (0.14…1.5 mm²)
	For 1 flexible cable without cable end	–	–	AWG 22-16 (0.25…1.5 mm²)
	For 1 flexible cable with plastic cable end	–	–	AWG 22-20 (0.25…0.5 mm²)
	For 2 cables of same diameter, without cable end	–	–	Solid: AWG 28-20 (0.14…0.5 mm²) Flexible: AWG 28-18 (0.14…0.75 mm²)
	For 2 cables of same diameter, flexible without cable end	–	–	AWG 22 (0.25…0.34 mm²)
	For 2 cables of same diameter, flexible with plastic cable end	–	–	AWG 20 (0.5 mm²)
Cable connection	Tightening torque	1.9…2.2 lb-in (0.22…0.25 Nm)		
	Bared length	0.35 in. (9 mm)		

(1) AWG: American Wire Gauge.
*(2) Removable screw terminals are provided with compact safety PLCs **XPSMF31/30/35**.*

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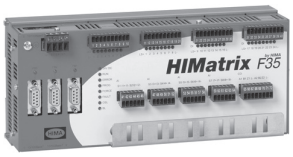
Safety automation system solutions

Preventa™ safety PLCs
Compact, XPSMF31/30/35

XPSMF31222

XPSMF3022



XPSMF35●●

*Products referenced **XPSMF31222, XPSMF3022** and **XPSMF35●●** are marked **HIMatrix® F31**, **HIMatrix® F30** and **HIMatrix® F35** (manufactured by Hima, sold by Schneider Electric).*

Compact safety PLCs

⎓ 24 V supply

Inputs			Outputs Digital	Communication on				Reference	Weight oz (kg)
				Ethernet network		Modbus® serial (RTU)	PROFIBUS DP		
Digital	Analog	Counting		Safe Ethernet protocol	Modbus® TCP/IP server protocol				
20	–	–	8	Yes	Yes	–	–	**XPSMF31222**	35.273 (1.000)
						Yes Slave	–	**XPSMF3022**	42.328 (1.200)
24	8	2	8	Yes	Yes	–	–	**XPSMF3502**	42.328 (1.200)
						Yes Slave	–	**XPSMF3522**	42.328 (1.200)
						–	Yes slave	**XPSMF3542**	42.328 (1.200)

Configuration software

■ Reference **SSV1XPSMFWIN contains the full version of the programming software XPSMFWIN software for the XPSMF Safety PLCs. The XPSMFWIN is part of our Safety Suite and is not available seperately.**

Description	Operating system	Details	Languages	Reference	Weight oz (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**	18.342 (0.520)

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Safety automation system solutions

Preventa™ safety PLCs
Compact, XPSMF31/30/35

ABL 8RPS24050

ABL 1REM24025

Phaseo ® regulated switch mode power supplies

Mains input voltage	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conformity to standard IEC EN 61000-3-2 and IEC EN 60950	Reference	Weight
V	⎓ V	W	A				oz (kg)
Universal range, single-phase (N-L1) **or 2-phase** (L1-L2) **connection**							
∼ **100…120 V/200...500** - 15%, + 10% 50/60 Hz	24...28.8	72	3	Auto/Manual	Yes	**ABL 8RPS24030**	10.582 (0.300)
		120	5	Auto/Manual	Yes	**ABL 8RPS24050**	24.692 (0.700)
		240	10	Auto/Manual	Yes	**ABL 8RPS24100**	35.273 (1.000)
Dedicated range, single-phase connection							
∼ **100…240** *(1)* wide range, 47…63 Hz	12	60	5	Auto	No	**ABL 1REM12050**	15.521 (0.440)
	24	60	2,5	Auto	No	**ABL 1REM24025**	15.521 (0.440)
∼ **100...120/200...240** *(2)*	24	240	10	Auto	No	**ABL 1REM24100**	31.041 (0.880)

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 oz (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	**XBTGT2130**	35.273 (1.000)
	Color 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	**XBTGT2330**	35.273 (1.000)
7.5"	Color 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	**XBTGT4330**	63.493 (1.800)
10.4"	Color 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	**XBTGT5230**	105.822 (3.000)
	Color 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	**XBTGT5330**	105.822 (3.000)
12.1"	Color 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	**XBTGT6330**	105.822 (3.000)
15"	Color 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	**XBTGT7340**	197.534 (5.600)

XBTGT2130, XBTGT2330

XBTGT4330

XBTGT5●30

XBTGT6330

XBTGT7340

(1) Service instructions, USB connectors locking device and mounting kit included.

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490 NTW 000●●

Connecting cables for network and bus

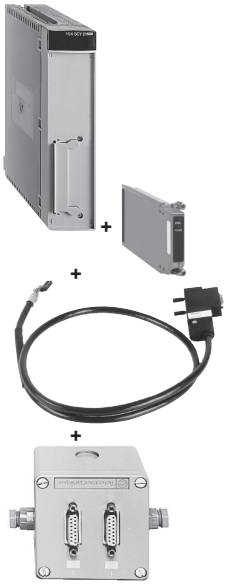
Connection to Ethernet network

Description	Pre-fitted connectors	Length ft (m)	Reference	Weight oz (kg)
Shielded twisted pair cables, straight through	2 RJ45 connectors For connection to DTE (Data Terminal Equipment)	6.6 (2)	**490 NTW 000 02** *(1)*	–
		16.4 (5)	**490 NTW 000 05** *(1)*	–
		39.4 (12)	**490 NTW 000 12** *(1)*	–
		131.2 (40)	**490 NTW 000 40** *(1)*	–
		262.5 (80)	**490 NTW 000 80** *(1)*	–
Shielded twisted pair cables, crossed wires	2 RJ45 connectors For connection between hubs, switches and transceivers	16.4 (5)	**490 NTC 000 05** *(1)*	–
		49.2 (15)	**490 NTC 000 15** *(1)*	–
		131.2 (40)	**490 NTC 000 40** *(1)*	–
		262.5 (80)	**490 NTC 000 80** *(1)*	–

Connection to Modbus® serial link

Description	Use: From	Use: To	Length ft. (m)	Reference	Weight oz (kg)
Modbus® serial link connecting cables	Compact PLCs XPSMF3022/3522 + adaptor XPSMFADAPT (RJ45)	Modbus® splitter box LU9 GC3 (RJ45)	1.0 (0.3)	**VW3 A8 306 R03**	0.882 (0.025)
			3.28 (1)	**VW3 A8 306 R10**	2.116 (0.060)
			9.84 (3)	**VW3 A8 306 R30**	74.640 (1.130)
		Premium™ module TSX SCY 21601 (SUB-D 25-pin)	1.0 (0.3)	**XPSMCSCY**	–
	Graphic terminals XBTGT (SUB-D 9-pin)	Modbus® splitter box LU9 GC3 (RJ45)	8.2 (2.5)	**XBTZ938** *(2)*	7.408 (0.210)
Adaptor for cable XBTZ938	SUB-D 9-pin (XBTGT)	XBTZ938 (SUB-D 25-pin)	0.66 (0.2)	**XBTZG909**	–
Adaptor SUB-D 9-pin/RJ45	Compact PLCs (SUB-D 9-pin)	Connecting cables for Modbus® serial link (RJ45)	–	**XPSMFADAPT**	–

Description	Characteristics	Sold in lots of	Unit reference	Weight oz (kg)
End of line adaptors For RJ45 connector	R = 120 Ω, C = 1 nF	2	**VW3 A8 306 RC**	7.055 (0.200)
	R = 150 Ω	2	**VW3 A8 306 R**	0.353 (0.010)



TSX PBY 100

PROFIBUS DP bus connection components

Description	Profile	Services	Reference	Weight oz (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**	30.688 (0.870)

Description	Use	Reference	Weight oz (kg)
Remote inputs/outputs on PROFIBUS DP bus	Advantys™ STB network interface module	**STB NDP 2112**	4.938 (0.140)
	Momentum™ communication module	**170 DTN 110 00**	–
Connectors for remote I/O communication module	Line terminators	**490 NAD 911 03**	–
	Intermediate connection	**490 NAD 911 04**	–
	Intermediate connection and terminal port	**490 NAD 911 05**	–

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

490 NAD 911 03

Description		Reference	Weight oz (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 XBTZG909.

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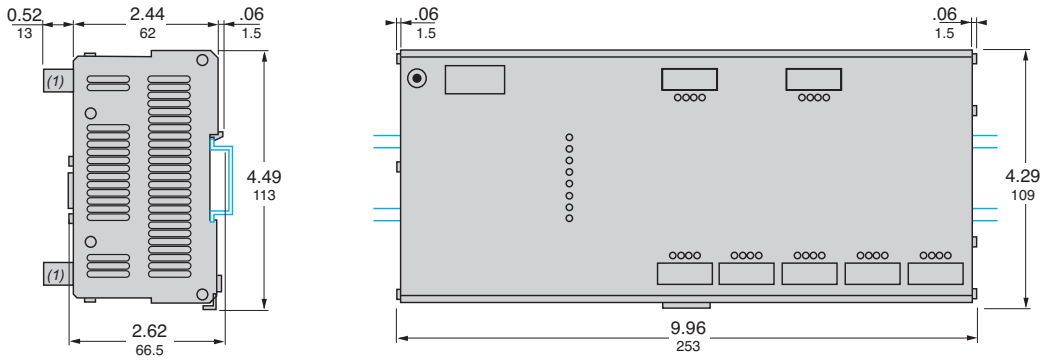
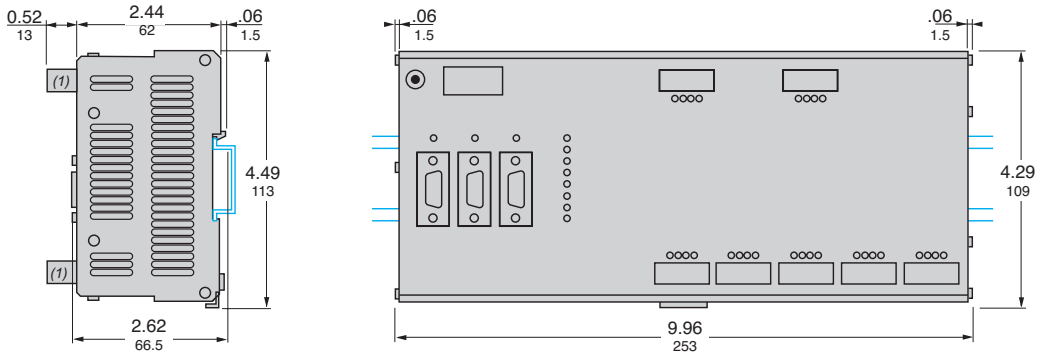
Dimensions

XPSMF31222



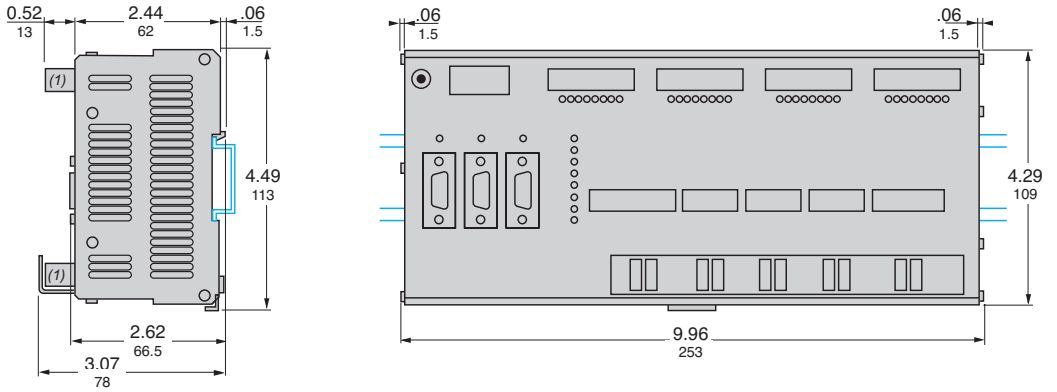
*(1) Removable screw terminals are provided with compact safety PLC **XPSMF31222**.*

XPSMF3022



*(1) Removable screw terminals are provided with compact safety PLC **XPSMF3022**.*

XPSMF35●●



Dual Dimensions: INCHES / Millimeters

*(1) Removable screw terminals are provided with compact safety PLC **XPSMF35●●**.*

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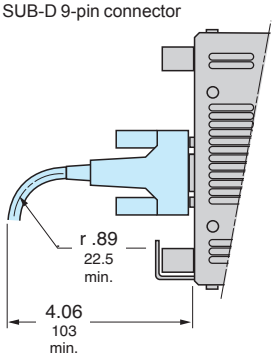
Mounting

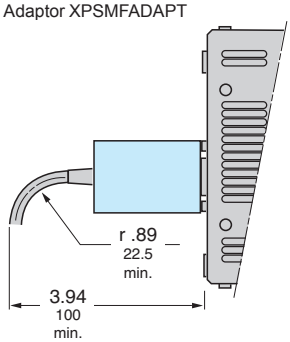
Mounting precautions relating to connectors

Access to Modbus® serial link (RTU)

SUB-D 9-pin connector

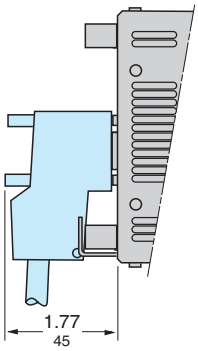


Adaptor XPSMFADAPT



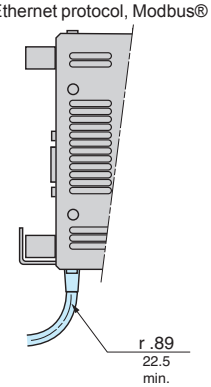
A ccess to PROFIBUS DP

Connector 490 NAD 911 03



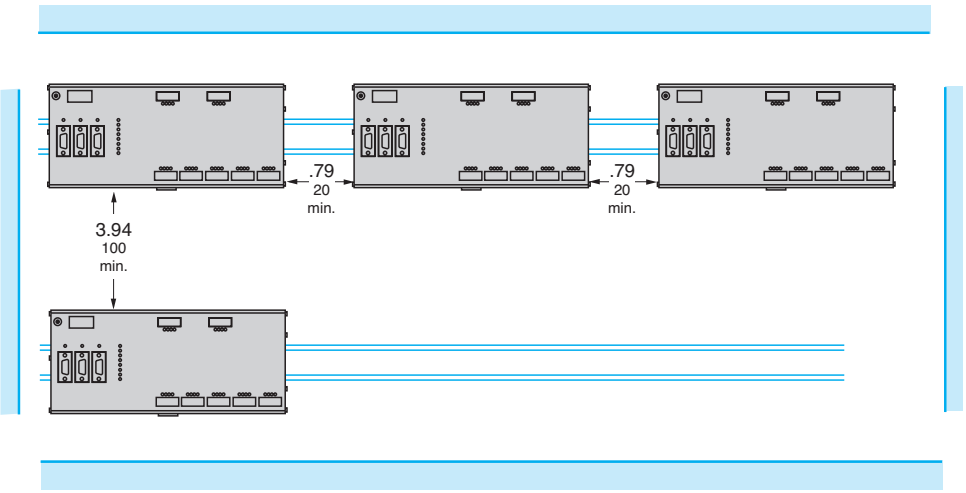
Access to Ethernet network

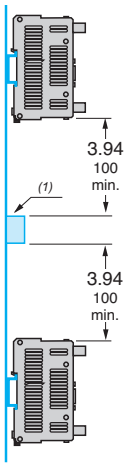
RJ45 socket (SafeEthernet protocol, Modbus® TCP/IP server protocol)



Dual Dimensions: INCHES
Millimieters

Mounting in panel or enclosure





(1) Prefabricated electrical ducting for passage of cables.

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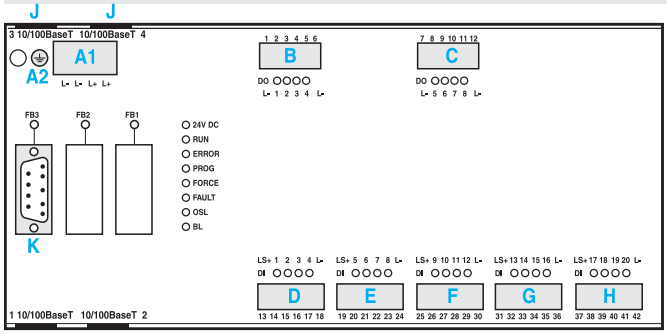
2

Connections

XPSMF31222, XPSMF3022



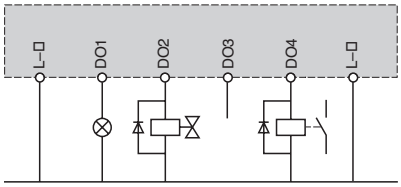
Item	Connection	Screw N°	Screw	Function
A1	**Supply**	–	L+	⎓ 24 V
			L+	⎓ 24 V
			L-	⎓ 24 V (reference pole)
			L-	⎓ 24 V (reference pole)
A2	**Ground**		⏚	Ground
B	**Outputs Digital**	1	L-	Outputs common
		2	1	Output 1
		3	2	Output 2
		4	3	Output 3
		5	4	Output 4 (for increased load)
		6	L-	Outputs 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

Item	Connection	Screw N°	Screw	Function
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

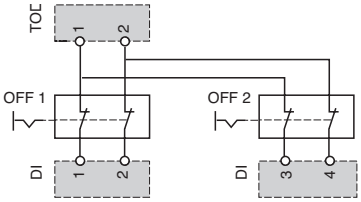
Item	Connection	Type	Function
K	**Communication**	SUB-D 9-pin (FB3)	**XPSMF3022**: slave on Modbus® serial (RTU)
J	**Programming**	Integrated 4 RJ45 switched Ethernet Communication ports	Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and the programming terminal in a point to point or via an Ethernet network for programming, setting IP address etc.
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.
	Non-Safe Communication available with references: XPSMF3022, and XPSMF31222		Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and other non- safety related components (e.g HMI Magelis ®, standard PLCs, Scada systems,etc.) this can be established in a point to point way or via an Ethernet network.

Connection examples

Actuator connections to the outputs



Emergency stop connections (line control)



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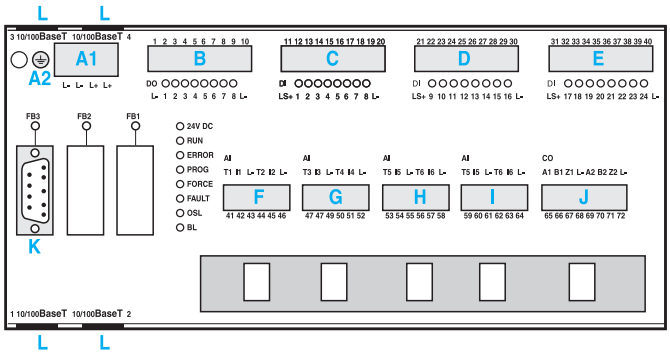
Connections

XPSMF35●●



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	**Ground**	–	⏚	Ground
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 - Analog**	41	T1	Transmitter supply 1
		42	I1	Analog input 1
		43	L-	Inputs common
		44	T2	Transmitter supply 2
		45	I2	Analog input 2
		46	L-	Inputs common
G	**Inputs - Analog**	47	T3	Transmitter supply 3
		48	I3	Analog input 3
		49	L-	Inputs common
		50	T4	Transmitter supply 4
		51	I4	Analog input 4
		52	L-	Inputs common
H	**Inputs - Analog**	53	T5	Transmitter supply 5
		54	I5	Analog input 5
		55	L-	Inputs common
		56	T6	Transmitter supply 6
		57	I6	Analog input 6
		58	L-	Inputs common
I	**Inputs - Analog**	59	T7	Transmitter supply 7
		60	I7	Analog input 7
		61	L-	Inputs common
		62	T8	Transmitter supply 8
		63	I8	Analog 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**	SUB-D 9-pin (FB3)	**XPS3522**: slave on Modbus® serial (RTU) **XPS3542**: slave V0 on PROFIBUS DP
L	**Programming**	Integrated 4 RJ45 switched Ethernet Communication ports	Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and the programming terminal in a point to point or via an Ethernet network for programming, setting IP address etc.
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.
	Non-Safe Communication available with references: XPSMF3502, XPSMF3522 and XPSMF3542		Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and other non- safety related components (e.g HMI Magelis ®, standard PLCs, Scada systems,etc.) this can be established in a point to point way or via an Ethernet network.

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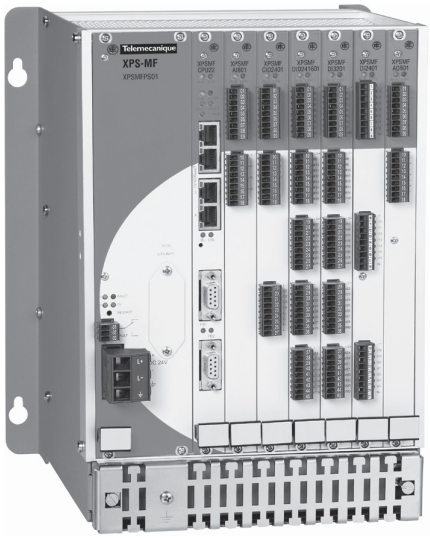
Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
Rack, power supply and CPU



Modular safety PLC XPSMF60, fitted with 6 different "in rack" I/O cards

Presentation

Safety PLC **XPSMF60** offers a modular solution for monitoring simple to complex safety functions for all industrial applications relating to the protection of personnel and machine safety.

Designed for use with numerous machine safety functions, this modular safety PLC is intended for use in safety related parts of control systems.
It can manage up to:
- category 4 conforming to EN 954-1,
- performance level "e" conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

Modularity

The safety PLC **XPSMF60** is a modular system consisting of a metal housing or rack, fitted with a power supply module, a CPU and "in rack" I/O cards.
■ Various types of "in rack" I/O cards are catalog listed and are selected according to the application.
■ Mounting the "in rack" cards is a simple operation using the guide rails (6 slots). Electrical connection is automatic and assured by the back plane bus of the rack.
■ The mounting order of the "in rack" I/O cards is open to the user, but the order, however, must correspond to the programming software.
■ The removal of the "in rack" cards, performed with the supply switched-off, is facilitated by a grip at the base of the cards.
■ Covering plates for unused "in rack" I/O card slots are available to protect the system in polluted environments.

Composition of the modular safety PLC XPSMF60

Minimum basic equipment	Optional "in rack" I/O cards	
	Type	Details
Metal rack XPSMFGEH01 with back plane bus assuring electrical connection of components installed + metal securing plate for shielded cables (EMC), two cooling fans **+** **a power supply module (⎓ 24 V) XPSMFPS01**, **+** **a central processing unit XPSMFCPU22** with 4 x RJ45 integrated switched Ethernet ports for Programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus® TCP/IP server protocol) and in addition a SUB-D (FB2) connector for communication on Modbus® serial (RTU)	XPSMFAI801	8 single-pole analog inputs or 4 2-pole analog inputs
	XPSMFAO801	8 analog outputs
	XPSMFCIO2401	2 counting inputs, 4 digital outputs
	XPSMFDI2401	24 digital inputs (⎓ 110 V / ∼ 127 V)
	XPSMFDI3201	32 digital inputs
	XPSMFDIO241601	24 digital inputs, 16 digital outputs
	XPSMFDO801	8 relay outputs (≂ 6…250 V)

Safety PLCs

In order to meet safety requirements, the modular safety PLC **XPSMF60** incorporates two essential functions (**Redundancy** and **Self-monitoring)** complying to category 4 conforming to EN 954-1 and performance level "e" conforming to EN/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between the safety PLCs and the safety remote I/O modules (**Special Switch**).
■ **Redundancy**: the 2 processors integrated in the modular safety PLC analyze and compare the data received from the safety inputs and outputs.
The incoming and outgoing data (programmed values and received values) are received in parallel by the two processors and compared in real-time.
■ **Self-monitoring ("Watchdog")**: the modular safety PLC continuously monitors the data processing cycle and the execution of tasks, and intervenes if the cycle time 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 data provided by the inputs and outputs of the safety PLC on the Ethernet network, while avoiding signal collisions and excessive amounts of data on the network.

Presentation: page 2/34 | Characteristics: page 2/42 | References: page 2/44 | Dimensions, mounting: page 2/48 | Connections: page 2/49

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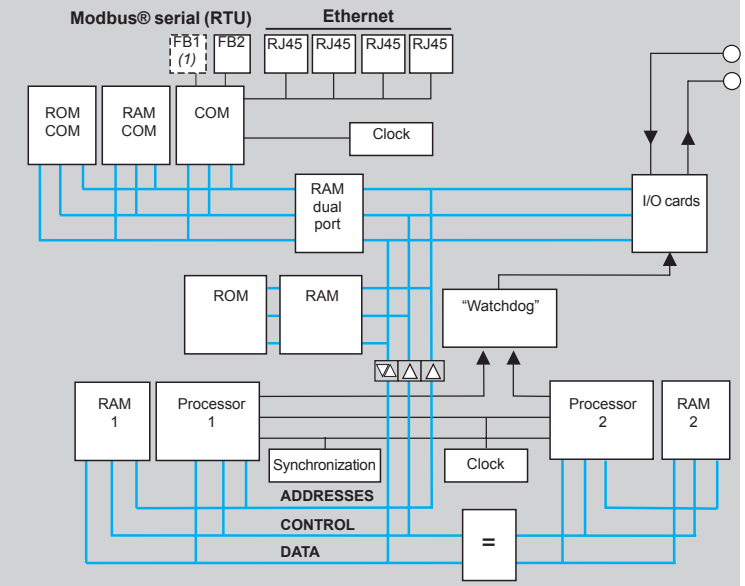
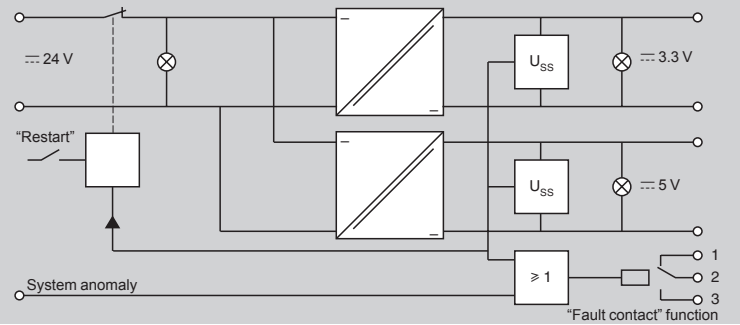
Functional diagrams

Central processing unit XPSMFCPU22



Power supply module XPSMFPS01



Line control for "in rack" I/O card XPSMFDIO241601 and "in rack" input card XPSMFDI3201

Line control is a means of short-circuit and line break monitoring.
Using line control outputs enables SIL 3 (EN/IEC 61508) and category 4 (EN 954-1) safety to be achieved. The line control outputs send a high signal with a very short low signal, thus enabling a wiring anomaly (short-circuit, line break) to be seen at the inputs of the safety PLCs.
The digital outputs 1 to 16 of card **XPSMFDIO241601** are connected to the digital inputs of the same card or to the digital inputs of card **XPSMFDI3201**.

(1) FB1 not used.

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2

Safety inputs and outputs (continued)

Programming automated safety functions

Software **XPSMFWIN** (reference SSV1XPSMFWIN) running on a PC enables the programming of all safety remote I/O modules and the modular safety PLCs, as well as configuration of the communication settings.

Safety inputs and outputs

The modularity of the PLC **XPSMF60** allows the user to select and install, in the six slots of the rack, various input, output and input/output cards to alter the number and type of safety inputs and/or outputs to be monitored.
6 identical cards can be installed in the same rack.
The cards listed (see below and next page) indicate the number of inputs and outputs available for connection to the machines to be monitored.

XPSMFDI2401

XPSMFDI3201

XPSMFAI801

Digital input cards *(1)*

Cards	Digital inputs		
	N°	Type	
		Safety detection	Safety dialog
XPSMFDI2401	24	Limit switches, Guard switches, with reset and with actuator, Light curtains type 2 and type 4, Safety mats and sensing edges…	Mushroom head emergency stops, Enclosures for control and signalling units, Two-hand control stations…
XPSMFDI3201	32		

Analog input card *(1) (2)*

Card	Analog measuring inputs	
	N°	Functions
XPSMFAI801	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) Removable screw terminal blocks are provided with the power supply and "in rack" I/O cards.
(2) Use shielded dual twisted pair cables, maximum length 984 ft (300m), short-circuit unused analog inputs.

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XPSMFCIO2401

XPSMFDIO241601

XPSMFAO801

XPSMFDO801

Safety inputs and outputs *(continued)*

Mixed I/O cards *(1)*

Card	Counting inputs			Digital outputs	
	N°	⎓ 5 V	⎓ 24 V	N°	Type
XPSMFCIO2401	2	Incremental encoders	Sensors 2/3-wire PNP/NPN	4	**Safety actuators** Contactors-motors, Control relays, Variable speed drives. **Safety dialog** Beacons and indicator banks, Rotating mirror beacons, Sirens…
		Independent and configurable counting inputs (one channel for counting and one channel for increasing or decreasing counting direction)			

Card	Digital inputs		Digital outputs	
	N°	Type	N°	Type
XPSMFDIO241601	24	**Safety detection** Limit switches, Guard switches, with reset and with actuator, Light curtains type 2 and type 4, Safety mats and sensing edges… **Safety dialog** Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations…	16	**Safety actuators** Contactors-motors, Control relays, Variable speed drives. **Safety dialog** Beacons and indicator banks, Rotating mirror beacons, Sirens…

Analog output card *(1) (2)*

Card	Analog outputs	
	N°	Functions
XPSMFAO801	8	Closed circuit scanning of output channels, Single-pole measuring of 0 to 10 V voltages, Measuring, using jumper, 0/4 to 20 mA currents (with 500 Ω external resistor)

Relay output card *(1) (2)*

Card	Relay outputs	
	N°	Type
XPSMFDO801	8	**Safety actuators** Contactors-motors, Control relays, Variable speed drives. **Safety dialog** Beacons and indicator banks, Rotating mirror beacons, Sirens…

Remote inputs and outputs

In addition to the inputs/outputs available as standard on the optional “in rack” cards, the modular safety PLC **XPSMF60** can be connected to safety remote input modules **XPSMF1** and/or safety remote output modules **XPSMF2** and/or safety remote mixed I/O modules **XPSMF3**.
The safety remote input, output and mixed I/O modules can be located within the vicinity of the machines to be monitored, thus reducing cabling.
Communication between these safety modules and the safety PLC **XPSMF60** is performed on an Ethernet network using the SafeEthernet safety protocol, via the integrated RJ45 switched Ethernet communications ports.

(1) Removable screw terminal blocks are provided with the power supply and “in rack” I/O cards.
(2) Use shielded dual twisted pair cables, maximum length 984 ft (300 m), short-circuit unused analog inputs.

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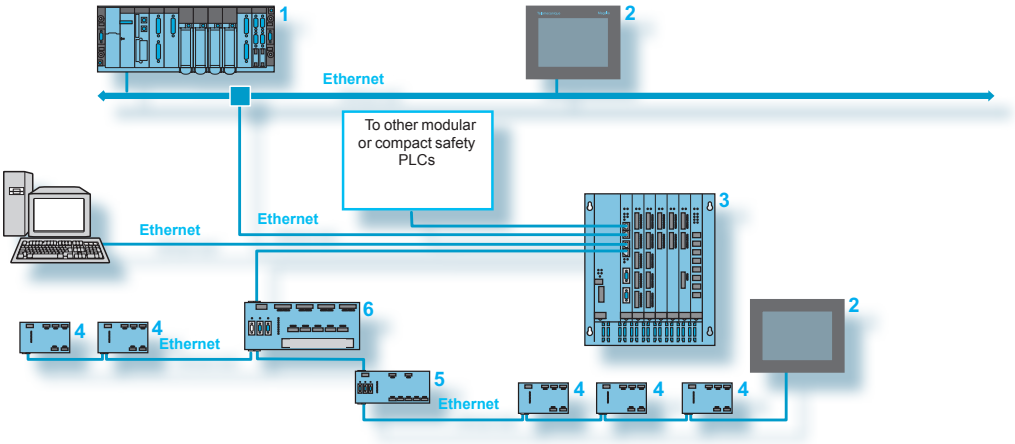
2

Communication

Safety communication on Ethernet network

Communication between the PC, Magelis ® graphic terminals or automation platform (Premium™) and the modular safety PLC is achieved by the **Ethernet** network connection via the integrated RJ45 switched Ethernet communications ports of the modular safety PLC.

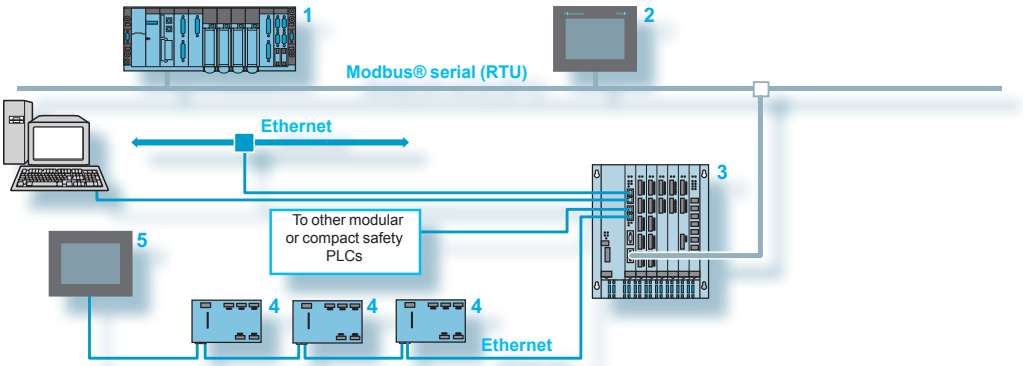
Modular PLC	Communication protocols	
	safety	non safety
XPSCPU22	SafeEthernet	Modbus® TCP/IP server (slave)



1 Premium™ automation platform: Modbus® TCP/IP client.
2 Graphic terminal **XBTGT**: Modbus® TCP/IP client.
3 Modular safety PLC: Modbus® TCP/IP server.
4 Safety remote I/O modules **XPSMF1/2/3**. They communicate with compact and modular safety PLCs using the SafeEthernet protocol.
5 Compact safety PLC **XPSMF31/30**: Modbus® TCP/IP server.
6 Compact safety PLC **XPSMF35●●**: Modbus® TCP/IP server.

Communication on Modbus® serial (RTU) fieldbus

On Modbus® serial (RTU), the modular safety PLC is a slave of the Premium™ automation platform and Magelis ® graphic terminal.
It is connected to the Modbus® serial network via its SUB-D 9-pin connector (FB2).



1 Graphic terminal **XBTGT**: Modbus® serial (RTU) master.
2 Premium™ automation platform: Modbus® serial (RTU) master.
3 Modular safety PLC: Modbus® serial (RTU) slave, Modbus® TCP/IP server.
4 Safety remote I/O modules **XPSMF1/2/3**. They communicate with the modular safety PLC using the SafeEthernet protocol.
5 Graphic terminal **XBTGT**: Modbus® serial (RTU) client.

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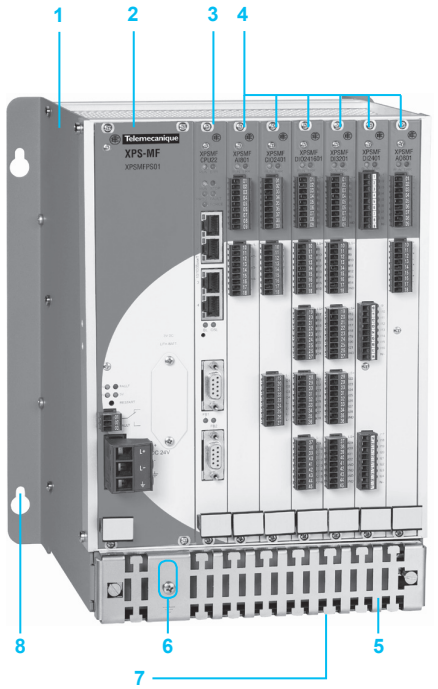
Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
Rack, power supply and CPU

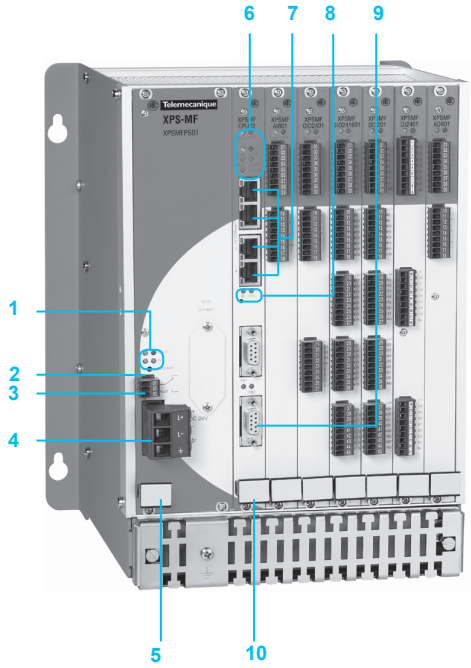


Description

Modular safety PLC

Modular assembly consisting of:

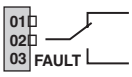
1 A metal rack **XPSMFGEH01**.
2 A ⎓ 24 V power supply module **XPSMFPS01**.
3 A central processing unit **XPSMFCPU22**.
4 Six optional "in rack" I/O cards (back plane bus assures the electrical connection of "in rack" cards installed, the power supply module and the CPU).
5 A metal plate for securing shielded analog input connection cables (EMC),
6 One ground connection screw.
7 Two cooling fans (beneath the metal rack).
8 Four Ø 0.55 in (14 mm) elongated holes for mounting the rack on a vertical support.



Power supply module XPSMFPS01 and Central processing unit XPSMFCPU22 consisting of:

1 Four voltage status LEDs (FAULT, 24 V, 3.3 V or 5 V).
2 A RESTART button (accessible using fine pointed tool).
3 A 3-pole terminal block (3 captive screws) for "Fault contact" function *(1)*.
4 A ⎓ 24 V supply terminal block, including ground connection *(2)*.
5 A grip to assist installation/removal of the power supply module.
6 Seven process status LEDs.
7 Four integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for Programming, and for Safety and non-safety related communication on Ethernet. (safety related using SafeEthernet protocol and Non-safety related using Modbus® TCP server protocol).
8 Two process status LEDs.
9 A SUB-D 9-pin connector (FB2) for connection on Modbus® serial (RTU) (FB1 not used), with process status LED.
10 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 analyzed on the programming PC:*



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

(2) Removable screw terminal blocks are provided with the power supply and "in rack" I/O cards.

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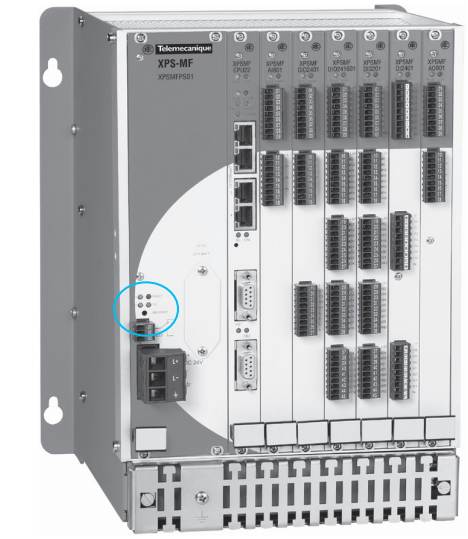

LED details

Power supply module XPSMFPS01

LED	Color	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.

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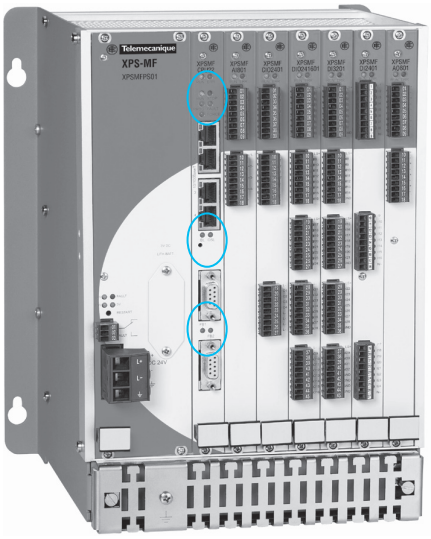
Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
Rack, power supply and CPU



LED details *(continued)*

Central processing unit XPSMFCPU22

LED	Color	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 anomaly 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® serial link 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. 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 while 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.

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
Rack, power supply and CPU

Environment

Modular safety PLC			Rack XPSMFGEH01 + power supply module XPSMFPS01 and central processing unit XPSMFCPU22
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1, EN/ISO 13849-1 and EN/IEC 61508)			Category 4 (EN 954-1), Performance level "e" (EN/ISO 13849-1), Safety integrity level: SIL 3 (EN/IEC 61508)
Product certifications			EN/IEC 61508, part 1-7: 2000, IEC 61511 part 1-3: 2004, DIN VDE 0116: 1989, EN 50156-1: 2004, EN 12067-2: 2004, EN 298: 2003, EN 230: 1990, NFPA 85: 2001, EN/IEC 61131-2: 2003, EN 61000-6-2: 2001, EN 61000-6-4: 2001 EN 54-2: 1997, NFPA 72: 2002
Ambient air temperature conforming to EN 61131-2	Operating	**°F (°C)**	Rack, power supply module and CPU: +32… + 140 (0…+ 60)
	Storage	**°F (°C)**	■ Rack **XPSMFGEH01**: -40… + 185 (- 40…+ 85), ■ Power supply module **XPSMFPS01**: □ -40… + 185 (- 40…+ 85), without backup battery □ -22… + 185 (- 30…+ 85), with backup battery ■ Central processing unit **XPSMFCPU22**: -40… + 185 (- 40…+ 85)
Relative humidity			95% (supply not connected)
Degree of protection	Enclosure		IP 20 with covering plate on unused "in rack" I/O card slots
Pollution			Degree of pollution II
Altitude			6560 ft (2000 m)
Protection class			Class II, conforming to EN/IEC 61131-2
Electromagnetic compatibility			Conforming to EN/IEC 61131-2
Vibration resistance conforming to EN 61131-2	Operating		1 g, frequency 10…150 Hz, unit test while operating, 10 cycles per axis
Shock resistance conforming to EN 61131-2	Operating		15 g (duration 11 ms), unit test while operating, 2 cycles per axis
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 (External supply with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)
	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 power consumption		**A**	30 max., 32 A external fuse
Immunity to momentary supply interruptions		**ms**	10
Protection			Internal fuse
Response time		**ms**	Depending on size of application
Backup capacitor			Approximately 1 week for diagnostics and time information Program is not effected
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

Communication

Ethernet network: safety communication using SafeEthernet protocol

Compatibility			Central processing unit XPSMFCPU22
Transmission	Communication ports		Integrated 4 RJ45 switched Ethernet communications ports
	Baud rate	**Mbps**	100 Half duplex, 10 Full duplex, Autonegotiation
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable, category 5D or better (Ethernet)
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 & outputs

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Communication *(continuous)*

Compatibility			Central processing unit XPSMFCPU22
Ethernet network: Non-safety related communication using Modbus® TCP/IP protocol			
Connection Ports	Number and type		Integrated 4 RJ45 switched Ethernet communication ports
	Baud rate	**Mbps**	100 Half duplex, 10 Full duplex, Autonegotiation
	Master/Slave		Server (slave)
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable, category 5D or better (Ethernet)
Transparent Ready ® Services	Class		A10
	Standard Ethernet TCP/IP communication services		Modbus® TCP/IP Server
			Modbus® TCP/IP messaging (reading/writing of data words)
			Modbus® identification requests
	TCP port		standard 502
	Max. number of Modbus® TCP/IP connections		1 to 20
Modbus® serial (RTU)			
Serial link ports	Number and type		1 x SUB-D 9-pin female (FB2)
	Master/Slave		Slave
Addressing			122 slave addresses
Physical layer			RS 485

Connections *(1)*

Power supply module			XPSMFPS01
Type of connection			Removable screw terminal blocks *(2)*
Supply connection	Number of terminal blocks		1
	For 1 cable without cable end		Solid or flexible AWG 20 (0.75…16 mm²)
	For 1 flexible cable with or without plastic cable end		AWG 20 (0.5…16 mm²)
	For 2 cables of same diameter, without cable end		Solid or flexible AWG 20 (0.75…6 mm²)
	For 2 cables of same diameter, flexible without cable end		AWG 20 (0.5…4 mm²)
	For 2 cables of same diameter, flexible with plastic cable end		AWG 20 (0.5…6 mm²)
"In rack" I/O card			**XPSMFAI801, XPSMFAO801, XPSMFCIO2401, XPSMFDI2401, XPSMFDI3201, XPSMFDIO241601, XPSMFDO801**
Type of connection			Removable screw terminal blocks *(2)*
Digital input channel and output channel connection	Number of terminal blocks		Depending on "in rack" I/O card type
	For 1 cable without cable end		Solid or flexible: AWG 28-16 (0.14…1.5 mm²)
	For 1 flexible cable without cable end		AWG 22-16 (0.25…1.5 mm²)
	For 1 flexible cable with plastic cable end		AWG 22-20 (0.25…0.5 mm²)
	For 2 cables of same diameter, without cable end		Solid: AWG 28-20 (0.14…0.5 mm²) Flexible: AWG 28-18 (0.14…0.75 mm²)
	For 2 cables of same diameter, flexible without cable end		AWG 22 (0.25…0.34 mm²)
	For 2 cables of same diameter, flexible with plastic cable end		AWG 20 (0.5 mm²)
Analog input channel and output channel connection	Number of terminal blocks		Depending on "in rack" I/O card type
	For 1 cable without cable end		Solid or flexible: AWG 28-16 (0.14…1.5 mm²)
	For 1 flexible cable without cable end		AWG 22-16 (0.25…1.5 mm²)
	For 1 flexible cable with plastic cable end		AWG 22-20 (0.25…0.5 mm²)
	For 2 cables of same diameter, without cable end		Solid: AWG 28-20 (0.14…0.5 mm²) Flexible: AWG 28-18 (0.14…0.75 mm²)
	For 2 cables of same diameter, flexible without cable end		AWG 22 (0.25…0.34 mm²)
	For 2 cables of same diameter, flexible with plastic cable end		AWG 20 (0.5 mm²)
Counting channel connection	Number of terminal blocks		Depending on "in rack" I/O card type
	For 1 cable without cable end		Solid or flexible: AWG 28-16 (0.14…1.5 mm²)
	For 1 flexible cable without cable end		AWG 22-16 (0.25…1.5 mm²)
	For 1 flexible cable with plastic cable end		AWG 22-20 (0.25…0.5 mm²)
	For 2 cables of same diameter, without cable end		Solid: AWG 28-20 (0.14…0.5 mm²) Flexible: AWG 28-18 (0.14…0.75 mm²)
	For 2 cables of same diameter, flexible without cable end		AWG 22 (0.25…0.34 mm²)
	For 2 cables of same diameter, flexible with plastic cable end		AWG 20 (0.5 mm²)
Cable connection	Tightening torque		1.9…2.2 lb-in (0.22…0.25 Nm)
	Bared length		0.35 in (9mm)

(1) AWG: American Wire Gauge.
(2) Removable screw terminal blocks are provided with the power supply and "in rack" I/O cards.

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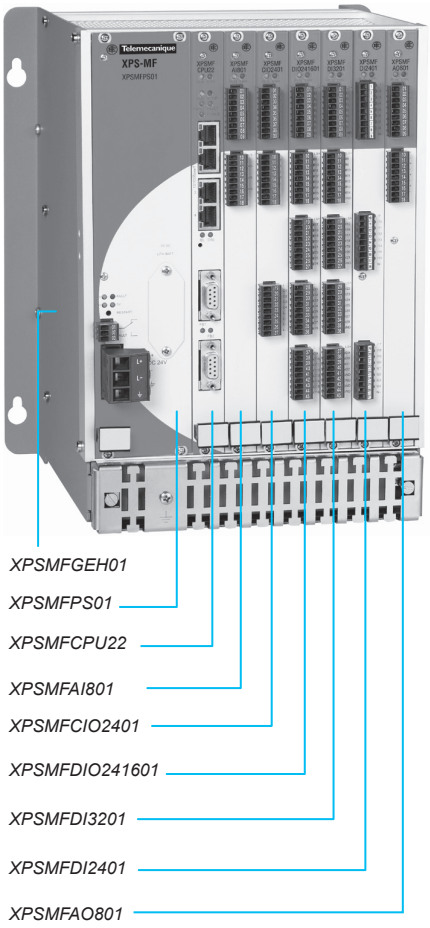
Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
Rack, power supply and CPU



Modular PLC (⎓ 24 V supply)

Minimum basic equipment

Description	Reference	Weight oz (kg)
Metal rack *(1)* **fitted with:** □ a back plane bus, assuring electrical connection of components installed: power supply module, CPU and "in rack" cards □ two cooling fans □ a metal securing plate for shielded cables (EMC)	**XPSMFGEH01**	–
⎓ **24 V power supply module** *(1)*	**XPSMFPS01**	28.925 (0.820)
CPU *(1)* **fitted with:** □ 4 x integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for Programming, and for Safety and non-safety related communication on Ethernet. (safety related using SafeEthernet protocol and Non-safety related using Modbus® TCP/IP server protocol □ 1 x SUB-D 9-pin port (FB2) for access to Modbus® serial (RTU)	**XPSMFCPU22**	9.877 (0.280)

Optional "in rack" I/O cards

Description	Functions		Reference	Weight oz (kg)
	Inputs	Outputs		
"In rack" I/O card *(1)*	Analog: 8 single-pole or 4 2-pole, configurable	–	**XPSMFAI801**	8.466 (0.240)
	–	8 analog	**XPSMFAO801**	9.877 (0.280)
	2 counting	4 digital	**XPSMFCIO2401**	9.171 (0.260)
	24 digital (⎓ 110 V / ∿ 127 V)	–	**XPSMFDI2401**	9.171 (0.260)
	32 digital	–	**XPSMFDI3201**	9.171 (0.260)
	24 digital	16 digital *(2)*	**XPSMFDIO241601**	9.171 (0.260)
	–	8 relay ∿ 6…250 V	**XPSMFDO801**	21.164 (0.600)

(1) Removable screw terminal blocks are provided with the power supply and "in rack" I/O cards.
(2) Configurable for line control.

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Configuration software

■ Reference **SSV1XPSMFWIN** contains the full version of the programming software XPSMFWIN software for the XPSMF Safety PLCs. The XPSMFWIN is part of our Safety Suite and is not available seperately.

Description	Operating system	Details	Languages	Reference	Weight oz (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**	18.342 (0.520)

Accessories for modular PLC

Description	For use with	Reference	Weight oz (kg)
Covering plate	Unused “in rack” I/O card slots	**XPSMFBLK**	–

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
Rack, power supply and CPU

ABL 8RPS24050

ABL 1REM24025

Phaseo ® regulated switch mode power supplies

Mains input voltage	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conformity to standard IEC EN 61000-3-2 and IEC EN 60950	Reference	Weight
V	⎓ V	W	A				oz (kg)
Universal range, single-phase (N-L1) **or 2-phase** (L1-L2) **connection**							
∼ **100…120 V/200...500** - 15%, + 10% 50/60 Hz	24...28.8	72	3	Auto/Manual	Yes	**ABL 8RPS24030**	10.582 (0.300)
		120	5	Auto/Manual	Yes	**ABL 8RPS24050**	24.692 (0.700)
		240	10	Auto/Manual	Yes	**ABL 8RPS24100**	35.273 (1.000)
Dedicated range, single-phase connection							
∼ **100…240** *(1)* wide range, 47…63 Hz	12	60	5	Auto	No	**ABL 1REM12050**	15.521 (0.440)
	24	60	2.5	Auto	No	**ABL 1REM24025**	15.521 (0.440)
∼ **100...120/200...240** *(2)*	24	240	10	Auto	No	**ABL 1REM24100**	31.041 (0.880)

Magelis ® multifunction graphic terminals with touch sensitive screen and on-board Ethernet *(1)*

Supply voltage ⎓ 24 V

	Description	Ports: serial and communication (type of link)	Application memory	Reference	Weight oz (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	**XBTGT2130**	35.273 (1.000)
	Color 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	**XBTGT2330**	35.273 (1.000)
7.5"	Color 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	**XBTGT4330**	63.493 (1.800)
10.4"	Color 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	**XBTGT5230**	105.822 (3.000)
	Color 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	**XBTGT5330**	105.822 (3.000)
12.1"	Color 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	**XBTGT6330**	105.822 (3.000)
15"	Color 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	**XBTGT7340**	197.534 (5.600)

(1) Service instructions, USB connectors locking device and mounting kit included.

XBTGT2130, XBTGT2330

XBTGT4330

XBTGT5●30

XBTGT6330

XBTGT7340

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
Rack, power supply and CPU

490 NTW 000●●

Connecting cables for network and bus

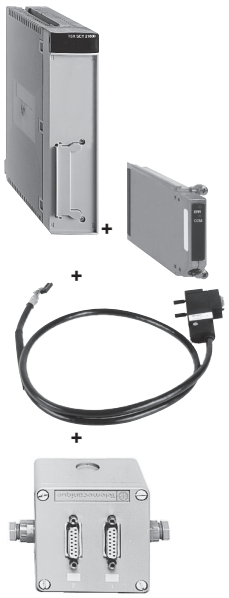
Connection to Ethernet network

Description	Pre-fitted connectors	Length ft (m)	Reference	Weight oz (kg)
Shielded twisted pair cables, straight through	2 RJ45 connectors For connection to DTE (Data Terminal Equipment)	6.6 (2)	**490 NTW 000 02** *(1)*	–
		16.4 (5)	**490 NTW 000 05** *(1)*	–
		39.4 (12)	**490 NTW 000 12** *(1)*	–
		131.2 (40)	**490 NTW 000 40** *(1)*	–
		262.5 (80)	**490 NTW 000 80** *(1)*	–
Shielded twisted pair cables, crossed wires	2 RJ45 connectors For connection between hubs, switches and transceivers	16.4 (5)	**490 NTC 000 05** *(1)*	–
		49.2 (15)	**490 NTC 000 15** *(1)*	–
		131.2 (40)	**490 NTC 000 40** *(1)*	–
		262.5 (80)	**490 NTC 000 80** *(1)*	–

Connection to Modbus® serial link

Description	Use		Length ft. (m)	Reference	Weight lb (kg)
	From	To			
Trunk cables, shielded dual twisted pair, RS 485	Compact safety PLCs XPSMF4020/MF4022 (RJ45)	Modbus® splitter box LU9 GC3 (RJ45)	328 (100)	**TSX CSA 100**	12.522 (5.680)
			656 (200)	**TSX CSA 200**	24.074 (10.920)
			1640 (500)	**TSX CSA 500**	66.139 (30.000)
	Graphic terminals XBTGT (SUB-D 9-pin)	Modbus® splitter box LU9 GC3 (RJ45)	8.2 (2.5)	**XBTZ938** *(2)*	0.441 (0.210)
Adaptor for cable XBTZ938	SUB-D 9-pin (XBTGT)	XBTZ938 (SUB-D 25-pin)	0.66 (0.2)	**XBTZG909**	–
Adaptor SUB-D 9-pin/RJ45	Compact PLCs (SUB-D 9-pin)	Connecting cables for Modbus® serial link (RJ45)	–	**XPSMFADAPT**	–

Description	Characteristics	Sold in lots of	Unit reference	Weight oz (kg)
End of line adaptors For RJ45 connector	R = 120 Ω, C = 1 nF	2	**VW3 A8 306 RC**	7.055 (0.200)
	R = 150 Ω	2	**VW3 A8 306 R**	0.353 (0.010)



TSX PBY 100

PROFIBUS DP bus connection components

Description	Profile	Services	Reference	Weight oz (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**	30.688 (0.870)

Description	Use	Reference	Weight oz (kg)
Remote inputs/outputs on PROFIBUS DP bus	Advantys™ STB network interface module	**STB NDP 2112**	4.938 (0.140)
	Momentum™ communication module	**170 DTN 110 00**	–
Connectors for remote I/O communication module	Line terminators	**490 NAD 911 03**	–
	Intermediate connection	**490 NAD 911 04**	–
	Intermediate connection and terminal port	**490 NAD 911 05**	–

Description	Length ft (m)	Reference	Weight oz (kg)
PROFIBUS DP connecting cables	328 (100)	**TSX PBS CA 100**	–
	1312 (400)	**TSX PBS CA 400**	–

Description		Reference	Weight oz (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 XBTZG909.

490 NAD 911 03

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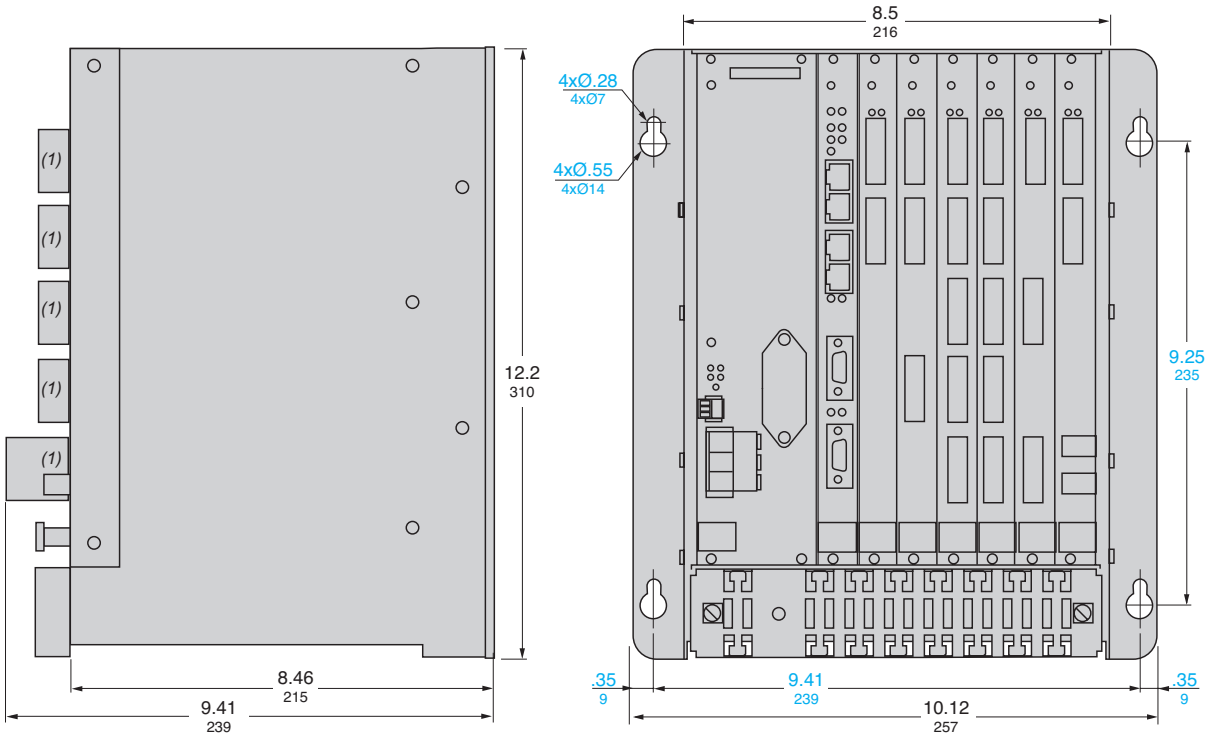
2

Dimensions

XPSMF60

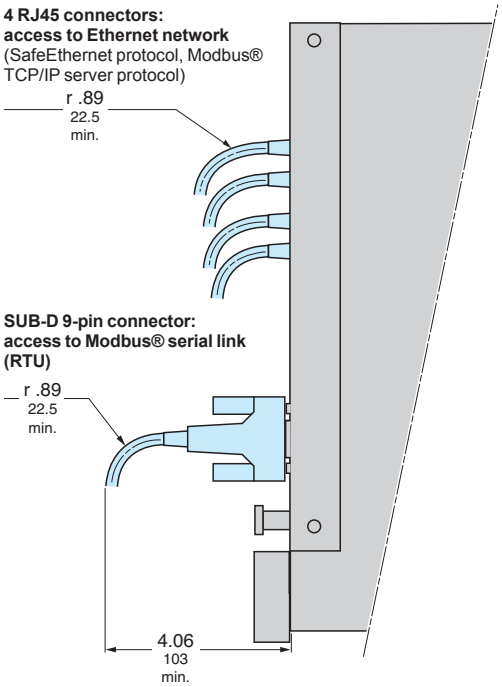


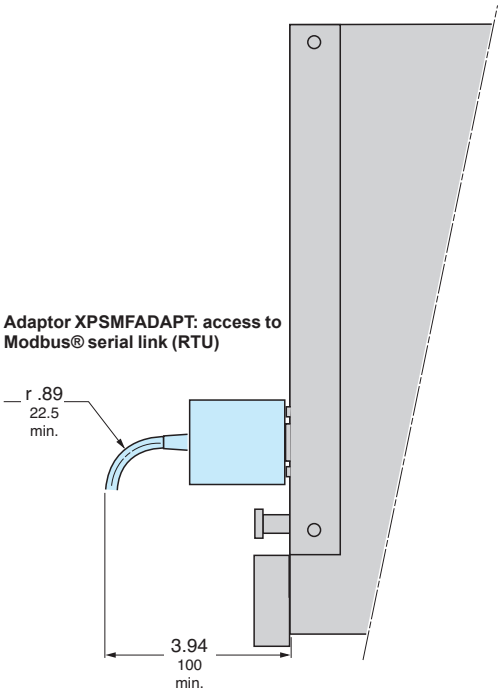
(1) Removable screw terminal blocks are provided with the power supply and "in rack" I/O cards.

Dual Dimensions: INCHES / Millimeters

Mounting precautions relating to connectors

Access to Modbus® serial link (RTU) and Ethernet network





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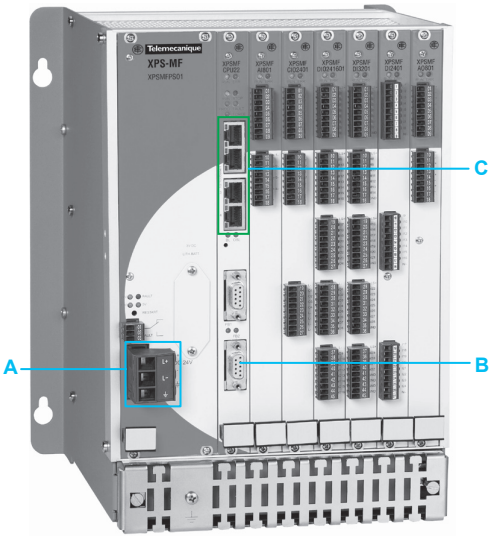
Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
Rack, power supply and CPU

Connections

Power supply module and CPU

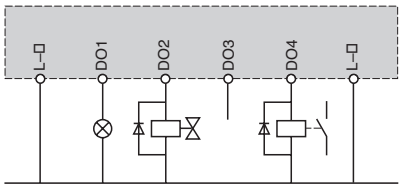


Item	Connection	Screw	Function
A	**Supply**	L+	⎓ 24 V
		L-	⎓ 24 V (reference pole)
		⏚	Ground

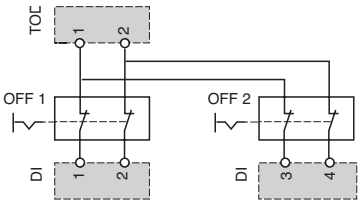
Item	Connection	Type	Function
B	**Communication**	SUB-D 9-pin female (FB2)	**XPSMFCPU22**: slave on Modbus® serial (RTU)
C	**Programming**	Integrated 4 RJ45 switched Ethernet Communication ports	Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and the programming terminal in a point to point or via an Ethernet network for programming, setting IP address etc.
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.
	Non-Safe Communication available with: XPSMF60 (reference XPSMFCPU22		Either of the four switched Ethernet ports can be used to create a connection between the safety PLC and other non- safety related components (e.g HMI Magelis ®, standard PLCs, Scada systems,etc.) this can be established in a point to point way or via an Ethernet network.

Connection examples

Actuator connections to the outputs



Emergency stop connections (line control)



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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" analog input card

Presentation

The "in rack" analog input card **XPSMFAI801** is designed to manage up to:
- category 4 conforming to EN 954-1,
- performance level "e" conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

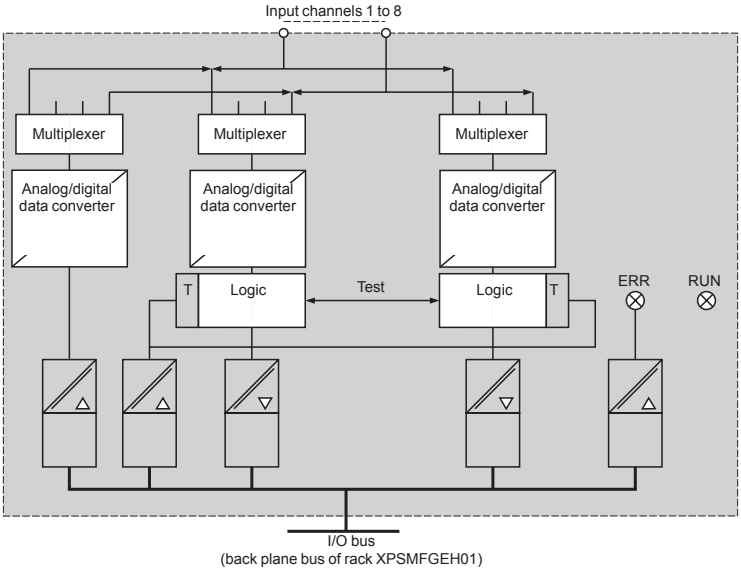
■ It incorporates 8 analog inputs:
□ electrically isolated from the back plane bus of rack **XPSMFGEH01**,
□ configured by choice of connection for managing eight single-pole or four 2-pole functions.

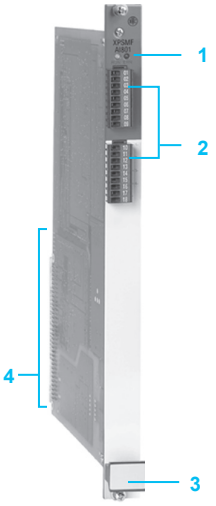
■ The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

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 0 to 20 mA currents using jumper
4 inputs	2-pole	± 10 V	–	± 1000	Closed circuit scanning of input channels

Functional diagram





Description

On the front cover of the card:
1 Two process status LEDs (RUN, ERR).
2 Two removable screw terminal blocks (9 terminals per block) for connection of inputs *(4)*.
3 Grip to assist installation/removal.
4 On the rear: terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

LED details

LED	Color	Status	Meaning
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Card defect or external error, diagnostics response.
		Off	No error regarding the card or on the channels.

(1) The unused input channels must be short-circuited on the reference pole (L-).
(2) With 250 Ω external jumper.
(3) With 500 Ω external jumper.
*(4) Removable screw terminals are provided with the "in rack" card **XPSMFAI801**.*

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" analog input card

Characteristics

Card type			XPSMFAI801
Number of analog inputs			8 single-pole inputs (± 10 V / 0…20 mA) or 4 2-pole inputs (± 10 V), electrically isolated, configurable by choice of connection
Supply	Voltage	**V**	⎓ 24, supplied by rack XPSMFGEH01 incorporating power supply module XPSMFPS01
	Voltage limits		- 15…+ 20%
Signal	Usable range	**V**	± 10.25
		mA	0...+ 20.5 (with jumper)
	Nominal value	**V**	± 10
		mA	0...+ 20 (with jumper)
Maximum input signal		**V**	± 10.7
Jumper for current measurement		Ω	250 or 500
Overvoltage protection		**V**	⎓ - 15…+ 15 (30 V range)
Input resistance	d.c.	**MΩ**	1
Operational data			⎓ 24 V/380 mA ⎓ 3.3 V/150 mA
Ambient air temperature conforming to EN 61131-2	Operating	**°F (°C)**	+32… + 140 (0…+ 60)
	Storage	**°F (°C)**	- 40… + 185 (- 40…+ 85)
Resolution	Effective		9-bit
	Maximum		12-bit
Output voltage			± 1% max.
Safety accuracy			± 1% max.
Transient deviation			± 1% max.
Value acquisition renewal			Once per CPU cycle
Processing time			Approximately 45 µs
Connections			See page 2/43

References

Description	Number of channels	Voltage Current	Reference	Weight oz (kg)
Analog input card	8 single-pole	± 10 V 0...20 mA *(1)*	**XPSMFAI801**	8.466 (0.240)
	4 2-pole	± 10 V		

XPSMFAI801

Connections

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

Configuration of analog 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 Ω or 500 Ω external jumper.

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" analog output card

Presentation

The analog output card **XPSMFAO801** is designed to manage up to:
- category 4 conforming to EN 954-1,
- performance level "e" conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

■ It incorporates 8 configurable analog 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.

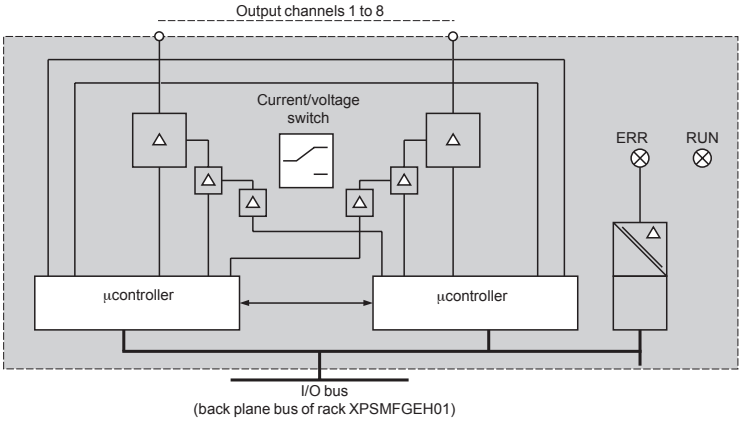
Switch position	Outputs	
	Voltage ± 10 V	Current 0…+ 20 mA
1	–	On
2	–	On
3	–	On
4	On	–
5	On	–
6	On	–

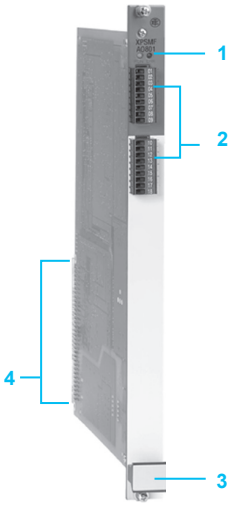
□ Selection of measuring scale using software **XPSMFWIN**: the "Properties" sub-menu displays the scale options in the "Type" window (…FS1000 or …FS2000).

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

■ The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Functional diagram





Description

On the front cover of the card:
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.
4 **On the rear**: terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

LED details

LED	Color	Status	Meaning
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Card defect or external error, diagnostics response.
		Off	No error regarding the card or on the channels.

*(1) Removable screw terminals are provided with the "in rack" card **XPSMFAO801**.*

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" analog output card

Characteristics

Card type			XPSMFAO801
Number of outputs			8 analog outputs
Supply	Voltage	**V**	⎓ 24 (supplied by rack XPSMFGEH01 incorporating power supply module XPSMFPS01)
	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	**°F (°C)**	+32… + 140 (0…+ 60)
	Storage	**°F (°C)**	-40… + 185 (- 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 2/43

References

Description	Number of channels	Configuration		Reference	Weight oz (kg)
		Current	Voltage		
Analog output card	8	0...20 mA	- 10…+ 10 V	**XPSMFAO801**	9.877 (0.280)

XPSMFAO801

Connections

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

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" mixed card: counting inputs/digital outputs

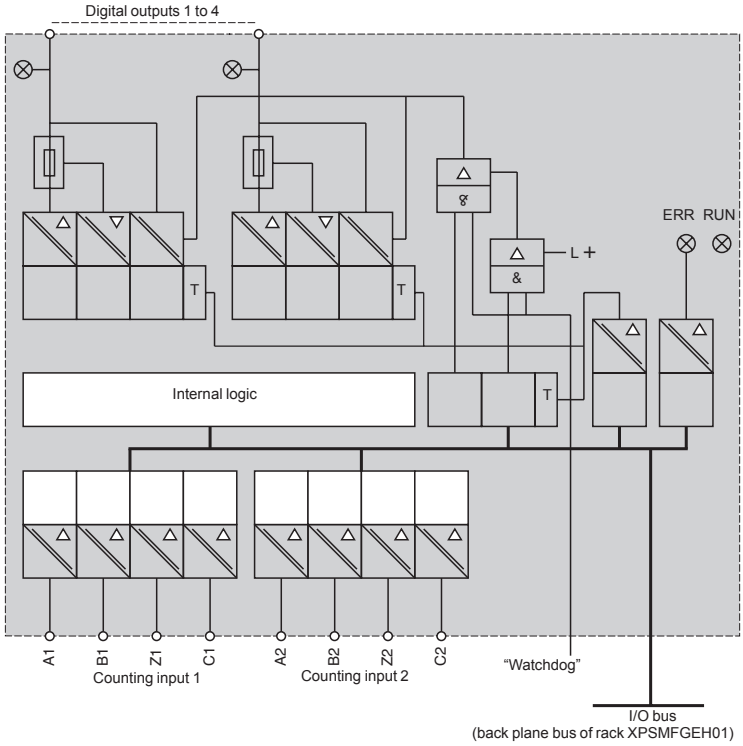
Presentation

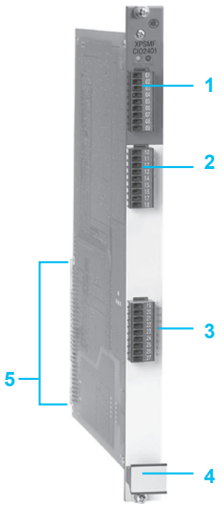
The mixed counting input and digital output card **XPSMFCIO2401** is designed to manage up to:
- category 4 conforming to EN 954-1,
- performance level "e" conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

■ It incorporates:
□ 2 24-bit independent and configurable counting channels (one channel for counting and one channel for increasing or decreasing counting direction). They are configured using software **XPSMFWIN**.
□ 4 digital outputs.

■ The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Functional diagram





Description

On the front cover of the card:
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.
5 **On the rear**: terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

LED details

LED	Color	Status	Meaning
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Card defect or external error, diagnostics response.
		Off	No error regarding the card or on the channels.

*(1) Removable screw terminals are provided with the "in rack" card **XPSMFCIO2401**.*

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" mixed card: counting inputs/digital outputs

Characteristics

Mixed card type			XPSMFCIO2401
Supply	Voltage	**V**	⎓ 24 (supplied by rack XPSMFGEH01 incorporating power supply module XPSMFPS01)
	Voltage limits		- 15…+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	**°F (°C)**	+32… + 140 (0…+ 60)
	Storage	**°F (°C)**	- 40… + 185 (- 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			1640 ft (500 m), with shielded dual twisted pair cable
Input connections			See page 2/43
Digital outputs			
Number			4
Output voltage		**V**	⎓ 18.4…26.8
Output current		**A**	0.5 per channel, 2 max. per card. 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 power consumption		**V**	⎓ 24 / 0.1 A + output current
Output connections			See page 2/43

References

Description	Characteristics	Reference	Weight oz (kg)
Mixed I/O card	■ 2 x 24-bit counting inputs, configurable: 5 V…24 V ■ 4 digital outputs	**XPSMFCIO2401**	9.171 (0.260)

XPS MFCIO2401

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

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Safety automation system solutions

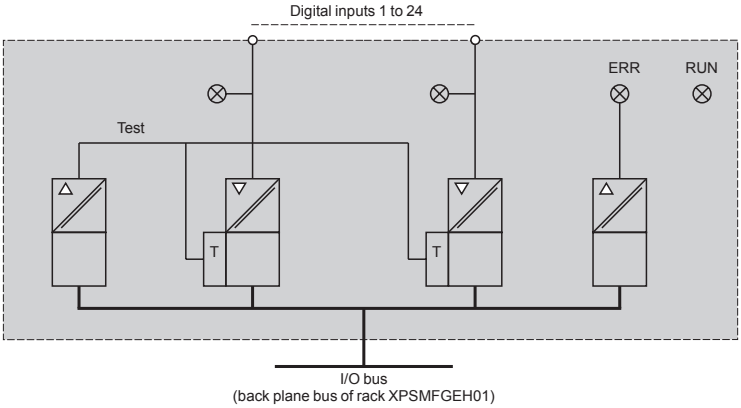
Preventa™ safety PLCs
Modular, XPSMF60
"In rack" digital input card

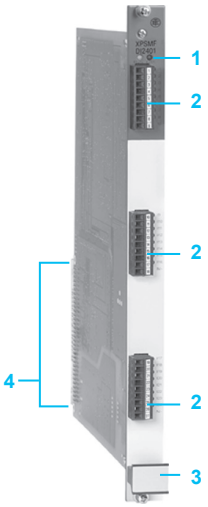
Presentation

The digital input card **XPSMFDI2401** is designed to manage up to:
- category 4 conforming to EN 954-1,
- performance level "e" conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

■ It incorporates 24 ⎓ 110 / ∿ 127 V digital inputs that are configurable using software **XPSMFWIN**.
■ The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Functional diagram





Description

On the front cover of the card:
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.
4 On the rear: terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

LED details

LED	Color	Status	Meaning
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Card defect or external error, diagnostics response.
		Off	No error regarding the card or on the channels.

*(1) Removable screw terminals are provided with the "in rack" card **XPSMFDI2401**.*

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" digital input card

Characteristics

Input card type			XPSMFDI2401
Supply	Voltage	**V**	⎓ 24 (supplied by rack XPSMFGEH01 incorporating power supply module XPSMFPS01)
	Voltage limits		- 15…+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	**°F (°C)**	+32… + 140 (0…+ 60)
	Storage	**°F (°C)**	-40… + 185 (- 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 0.47 in (12 mm) max. cable with connection to ground of rack XPSMFGEH01

References

Description	Characteristics	Reference	Weight oz (kg)
Input card	24 digital inputs ⎓ 110 V / ∼ 127 V	**XPSMFDI2401**	9.171 (0.260)

XPS MFDI2401

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

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Safety automation system solutions

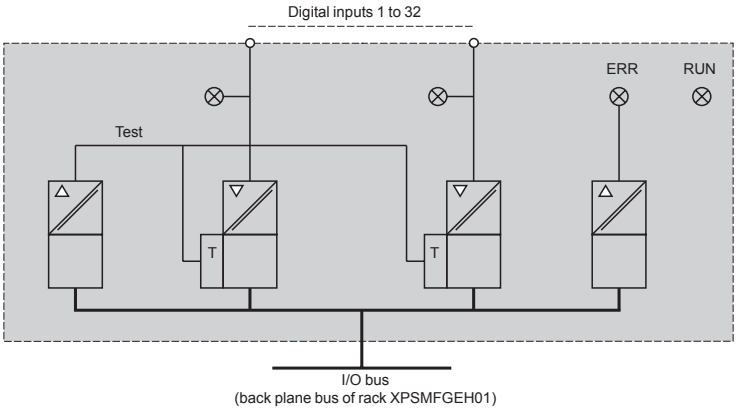
Preventa™ safety PLCs
Modular, XPSMF60
"In rack" digital input card

Presentation

The digital input card **XPSMFDI3201** is designed to manage up to:
- category 4 conforming to EN 954-1,
- performance level "e" conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

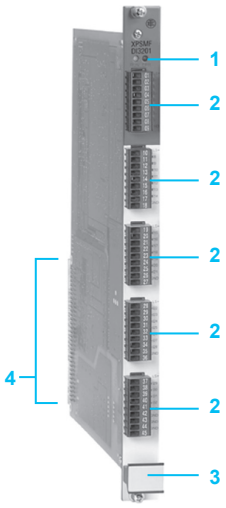
■ It incorporates 32 digital inputs that are configurable using programming software **XPSMFWIN**.
■ The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Functional diagram



Line control for card XPSMFDI3201

Line control is a means of short-circuit and line break monitoring.
Using line control outputs enables SIL 3 (EN/IEC 61508) and category 4 (EN 954-1) safety to be achieved. The line control outputs send a high signal with a very short low signal, thus enabling a wiring anomaly (short-circuit, line break) to be seen at the inputs of the safety PLCs.



Description

On the front cover of the card:
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.
4 On the rear: terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

LED details

LED	Color	Status	Meaning
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Card defect or external error, diagnostics response.
		Off	No error regarding the card or on the channels.

*(1) Removable screw terminals are provided with the "in rack" card **XPSMFDI3201**.*

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Safety automation system solutions

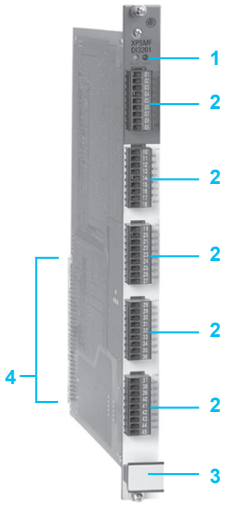
Preventa™ safety PLCs
Modular, XPSMF60
"In rack" digital input card

Characteristics

Input card type			XPSMFDI3201
Supply	Voltage	**V**	⎓ 24, supplied by rack XPSMFGEH01 incorporating power supply module XPSMFPS01
	Voltage limits		- 15…+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	**°F (°C)**	+32… + 140 (0…+ 60)
	Storage	**°F (°C)**	-40… + 185 (- 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 0.47 in (12mm) max. cable with connection to ground of rack XPSMFGEH01

References

Description	Characteristics	Reference	Weight oz (kg)
Input card	32 digital inputs	**XPSMFDI3201**	9.171 (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**	37	LS+	Supply for inputs 29 to 32
		38	I29	Input 29
		39	I30	Input 30
		40	I31	Input 31
		41	I32	Input 32
		42	EGND	Reference pole
		43	EGND	Reference pole
		44	EGND	Reference pole
		45	EGND	Reference pole

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" digital I/O card

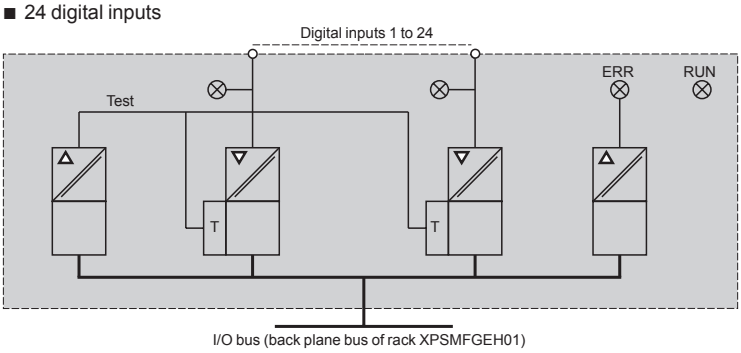
Presentation

The digital I/O card **XPSMFDIO241601** is designed to manage up to:
- category 4 conforming to EN 954-1,
- performance level "e" conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

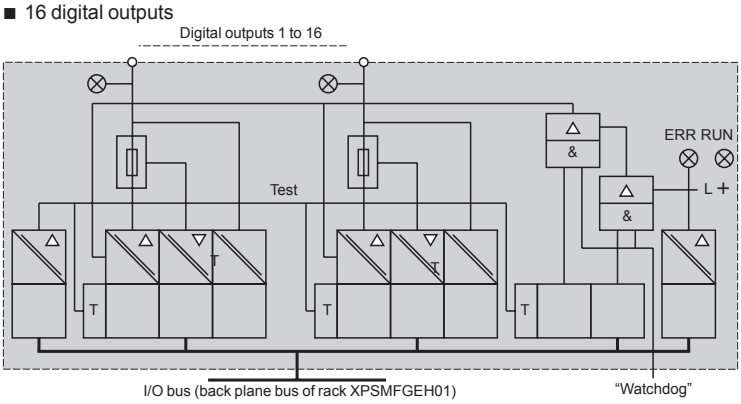
■ It incorporates 24 digital inputs and 16 digital outputs.
■ The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Functional diagrams

■ 24 digital inputs

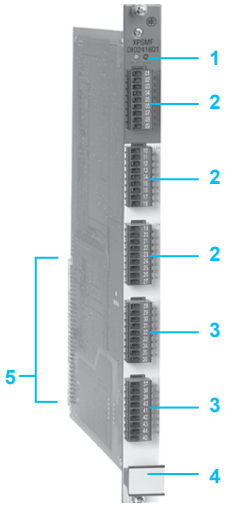


■ 16 digital outputs



Line control for card XPSMFDIO241601

Line control is a means of short-circuit and line break monitoring.
Using line control outputs enables SIL 3 (EN/IEC 61508) and category 4 (EN 954-1) safety to be achieved. The line control outputs send a high signal with a very short low signal, thus enabling a wiring anomaly (short-circuit, line break) to be seen at the inputs of the safety PLCs.



Description

On the front cover of the card:
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.
5 On the rear: terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

LED details

LED	Color	Status	Meaning
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Card defect or external error, diagnostics response.
		Off	No error regarding the card or on the channels.

*(1) Removable screw terminals are provided with the "in rack" card **XPSMFDIO241601**.*

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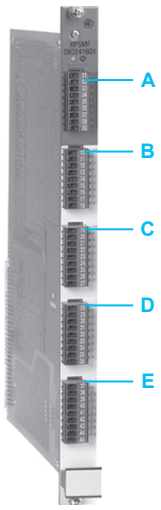
Characteristics

I/O card type			XPSMFDIO241601
Supply	Voltage	V	⎓ 24, supplied by rack XPSMFGEH01 incorporating power supply module XPSMFPS01
	Voltage limits		- 15…+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	°F (°C)	+32… + 140 (0…+ 60)
	Storage	°F (°C)	-40… + 185 (- 40…+ 85)
Digital input and output connections			Shielded dual twisted pair cable recommended to provide protection against electromagnetic interference, or Ø 0.47 in (12mm) max. cable with connection to ground of rack XPSMFGEH01
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 86 °F (30 °C)	A	2 per output channel, 8 max. per card. Continuous short-circuit proof
Minimum current		mA	2 per channel
Permissible current	At state 0	mA	1 max. at 2 V



XPSMFDIO241601

References

Description	Characteristics	Reference	Weight oz (kg)
I/O card	■ 24 digital inputs ■ 16 digital outputs, configurable for line control	**XPSMFDIO241601**	9.171 (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

Item	Connection	Screw N°	Screw	Function
D	**Digital outputs**	28	L-	Reference pole for outputs 1 to 8
		29	O1	Output 1
		30	O2	Output 2
		31	O3	Output 3
		32	O4	Output 4
		33	O5	Output 5
		34	O6	Output 6
		35	O7	Output 7
		36	O8	Output 8

Item	Connection	Screw N°	Screw	Function
E	**Digital outputs**	37	L-	Reference pole for outputs 9 to 16
		38	O9	Output 9
		39	O10	Output 10
		40	O11	Output 11
		41	O12	Output 12
		42	O13	Output 13
		43	O14	Output 14
		44	O15	Output 15
		45	O16	Output 16

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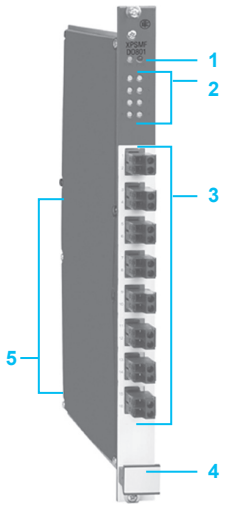
Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" relay output card

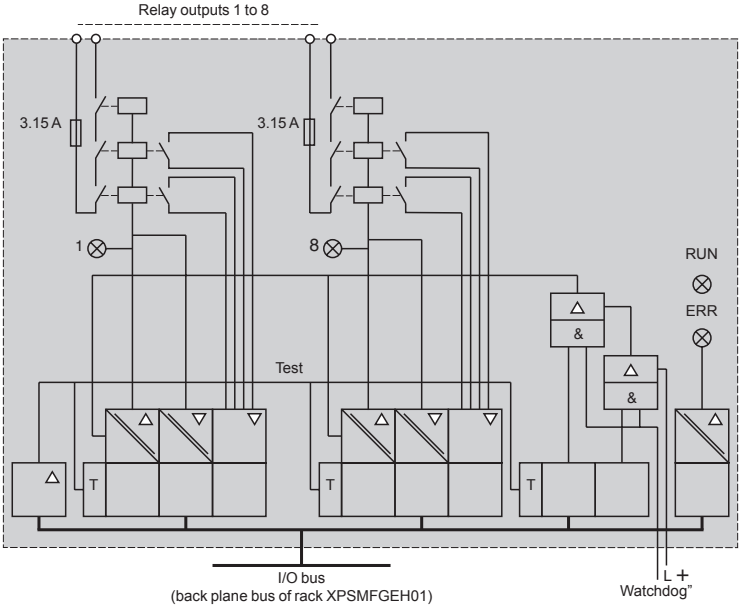


Presentation

The relay output card **XPSMFDO801** is designed to manage up to :
- category 4 conforming to EN 954-1,
- performance level "e" conforming to EN/ISO 13849-1,
- SIL 3 (safety integrity level) conforming to EN/IEC 61508.

■ It incorporates 8 relay safety outputs (3.15 A fuse) that are configurable using software **XPSMFWIN**.
■ The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Functional diagram



Description

On the front cover of the card:
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.
5 On the rear: terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH0**.

LED details

LED	Color	Status	Meaning
RUN	Green	On	Voltage present.
		Off	No voltage.
ERR	Red	On	Card defect or external error, diagnostics response.
		Off	No error regarding the card or on the channels.

*(1) Removable screw terminals are provided with the "in rack" card **XPSMFDO801**.*

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Safety automation system solutions

Preventa™ safety PLCs
Modular, XPSMF60
"In rack" relay output card

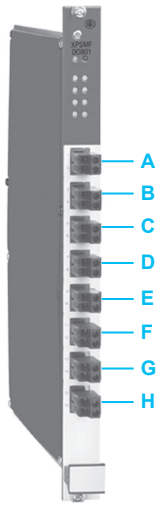
Characteristics

Output card type			XPSMFDO801
Supply	Voltage	**V**	⎓ 24, supplied by rack XPSMFGEH01 incorporating power supply module XPSMFPS01
	Voltage limits		- 15…+ 20%
Ambient air temperature conforming to EN 61131-2	Operating	**°F (°C)**	+ 32… + 122 (0…+ 50) *(1)*
	Storage	**°F (°C)**	- 40… + 185 (- 40…+ 85)
Number and type of outputs			8 relay outputs, relay hard contact, 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 life		⩾ 250 000 operating cycles on full load (resistive) and ⩽ 0.1 operating cycles/s
Switching voltage		**V**	∿ 6 V…250 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. (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 0.47 in (12 mm) max. cable with connection to ground of rack XPSMFGEH01

(1) Limited system data.

References

Description	Characteristics	Reference	Weight oz (kg)
Output card	8 relay outputs ∿ 6 V…250 V	**XPSMFDO801**	21.164 (0.600)



XPSMFDO801

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

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Safety automation system solutions

Preventa™ safety PLCs
Compact and modular, XPSMF
Communication on network and bus

Presentation

To communicate, Preventa™ compact and modular safety PLCs **XPSMF** are fitted with:
- Integrated 2 or 4 RJ45 Ethernet switched ports for transfer Safety and Non-safety related data (Safety Related using SafeEthernet protocol, Non-Safety Related using Modbus® TCP/IP protocol),
- and/or serial communication ports for transferring non safety related data.

Safety communication on a single network
The Ethernet network supports the SafeEthernet protocol: physically, a single network is possible for communication between:
- safety products (SafeEthernet protocol),
- non safety related products (Modbus® TCP/IP and other protocols),
- safety related and non safety related products (Modbus® TCP/IP protocol).

Communication on more than one network: a minimum of two separate cabling systems are established.
- An Ethernet network with Modbus® TCP/IP protocol is used for communication between non safety related products and the safety PLCs.
- An Ethernet network with SafeEthernet protocol is used for communication between the safety PLCs **XPSMF** and safety remote I/O modules **XPSMF1/2/3**.
- A Modbus® serial network with Modbus® serial (RTU) protocol is used for communication between the safety PLCs **XPSMF** and non safety related products.
- A PROFIBUS DP network with PROFIBUS protocol is used for communication between the safety PLCs **XPSMF** and non safety related products.

Safety PLCs	Communication on Ethernet network			Communication on fieldbus	
Compact	**Port** (number x type)	**SafeEthernet protocol: safe communication**	**Modbus® TCP/IP protocol: non safe communication**	**Modbus® serial (RTU) protocol**	**PROFIBUS DP protocol**
XPSMF31222	4 x RJ45	yes	yes	no	no
XPSMF3022	4 x RJ45	yes	yes	yes (slave) / 1 x SUB-D (9-pin)	no
XPSMF3502	4 x RJ45	yes	yes	no	no
XPSMF3522	4 x RJ45	yes	yes	yes (slave) / 1 x SUB-D (9-pin)	no
XPSMF3542	4 x RJ45	yes	yes	no	yes (slave) / 1 x SUB-D (9-pin)
XPSMF4000	2 x RJ45	yes	no	no	no
XPSMF4002	2 x RJ45	yes	yes	no	no
XPSMF4020	2 x RJ45	yes	no	yes (slave) / 1 x RJ45	no
XPSMF4022	2 x RJ45	yes	yes	yes (slave) / 1 x RJ45	no
XPSMF4040	2 x RJ45	yes	no	no	yes (slave) / 1 x SUB-D (9-pin)
XPSMF4042	2 x RJ45	yes	yes	no	yes (slave) / 1 x SUB-D (9-pin)
Modular					
XPSMFCPU22 (central processing unit)	4 x RJ45	yes	yes	yes (slave) / 1 x SUB-D (9-pin)	no

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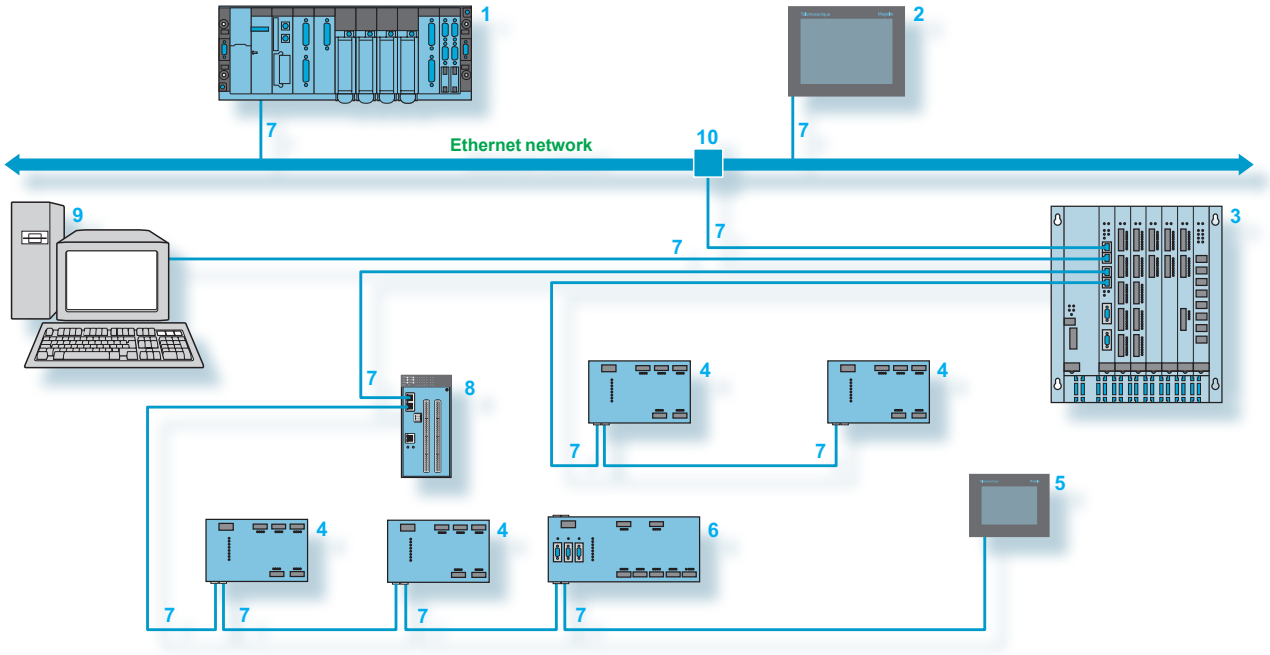
Connection on Ethernet network



1 Premium™ processor **TSX P57 ●634M/●623M** or module **TSX ETY 4103** on Premium™ automation platform: Modbus® TCP/IP client (master).
2 Graphic supervision terminal **XBTGT5230**: Modbus® TCP/IP client (master).
3 Modular safety PLC **XPSMF60**: Modbus® TCP/IP server (slave).
4 Safety remote I/O modules **XPSMF1/2/3**.
5 Graphic supervision terminal **XBTGT2130**: Modbus® TCP/IP client (master).
6 Compact safety PLCs **XPSMF31/30/35**: Modbus® TCP/IP server (slave).
7 Shielded twisted pair cables **490 NTW 000 ●●**, lengths 6.6 to 262 ft (2 to 80 m).
8 Compact safety PLCs **XPSMF40**: Modbus® TCP/IP server (slave).
9 Programming PC.
10 Ethernet connector.

Characteristics

Protocol		**SafeEthernet**	
Compatibility with compact and modular safety PLCs		**XPSMF4000, XPSMF4002, XPSMF4020, XPSMF4022, XPSMF4040, XPSMF4042**	**XPSMF31222, XPSMF3022, XPSMF3502, XPSMF3522, XPSMF3542, XPSMFCPU22 (central processing unit of modular PLC XPSMF60)**
Transmission	Speed (Baud rate)	100 Mbps Half duplex, 10 Mbps Full duplex, Autonegotiation	
	Communication ports	Integrated 2 RJ45 switched Ethernet communications ports	Integrated 4 RJ45 switched Ethernet communications ports
	Medium	Dual twisted pair cable, category 5D or better	
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® TCP/IP messaging (reading/writing of data words) Modbus® identification requests	
	TCP port	Standard 502	
	Max. number of TCP/IP connections	1 to 20	

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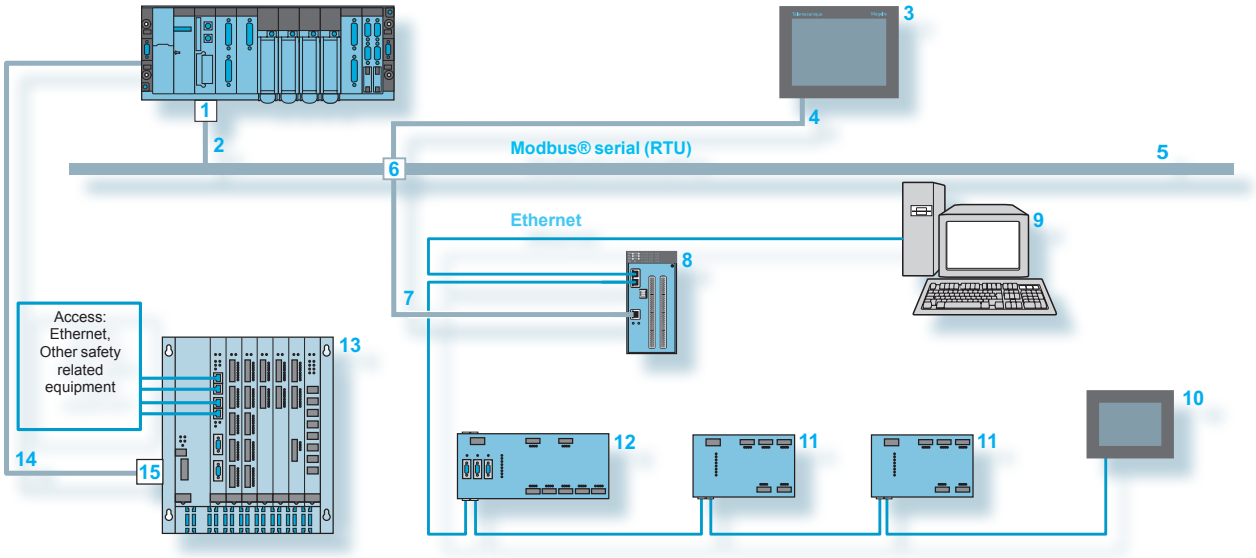
Connection on Modbus® serial (RTU)



1 Premium™ module **TSX SCY 21601**: access to Modbus® serial, on a Premium™ automation platform: Modbus® serial (RTU) master.
2 Cable **TSX SCY CM6030**.
3 Graphic supervision terminal **XBTGT5230**: Modbus® serial (RTU) master.
4 Cable **XBTZ938** + adaptor **XBTZG909**.
5 Cables **VW3 A83 ●6R●●** for Modbus® serial, lengths 1.0 to 9.8 ft (0.3 to 3 m).
6 Modbus® serial splitter box **LU9 GC3** for equipment connection.
7 Cables **TSX CSA ●00** for Modbus® serial, lengths 328 to 1640 ft (100 to 500 m).
8 Compact safety PLCs **XPSMF4020/MF4022**: Modbus® serial (RTU) slaves, Modbus® TCP/IP server.
9 Programming PC.
10 Graphic supervision terminal **XBTGT2130**: Modbus® serial (RTU) client.
11 Safety remote I/O modules **XPSMF1/2/3**.
12 Compact safety PLCs **XPSMF3022/3522:** Modbus® serial (RTU) slaves, Modbus® TCP/IP server.
13 Modular safety PLC **XPSMF60**, Modbus® serial (RTU) slaves, Modbus® TCP/IP server.
14 Direct connection cables **XPSMCSCY** for safety PLCs to Premium™ module **TSX SCY 21601**, length 1 ft (0.3 m).
15 Connector **XPSMFADAPT** (RJ45/SUB-D 9-pin male) for connector FB2 or FB3, depending on PLC.

Characteristics

Bus type			**Modbus® serial (RTU)**		
Compatibility with compact and modular safety PLCs			**XPSMF3022, XPSMF3522**	**XPSMF4020, XPSMF4022**	**XPSMFCPU22 (CPU of modular PLC XPSMF60)**
Serial link port		Number and type	1 x SUB-D 9-pin female (FB3)	1 x RJ45 (Modbus®)	1 x SUB-D 9-pin female (FB2)
		Master/Slave	Slave		
Addressing			122 slave addresses. 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		

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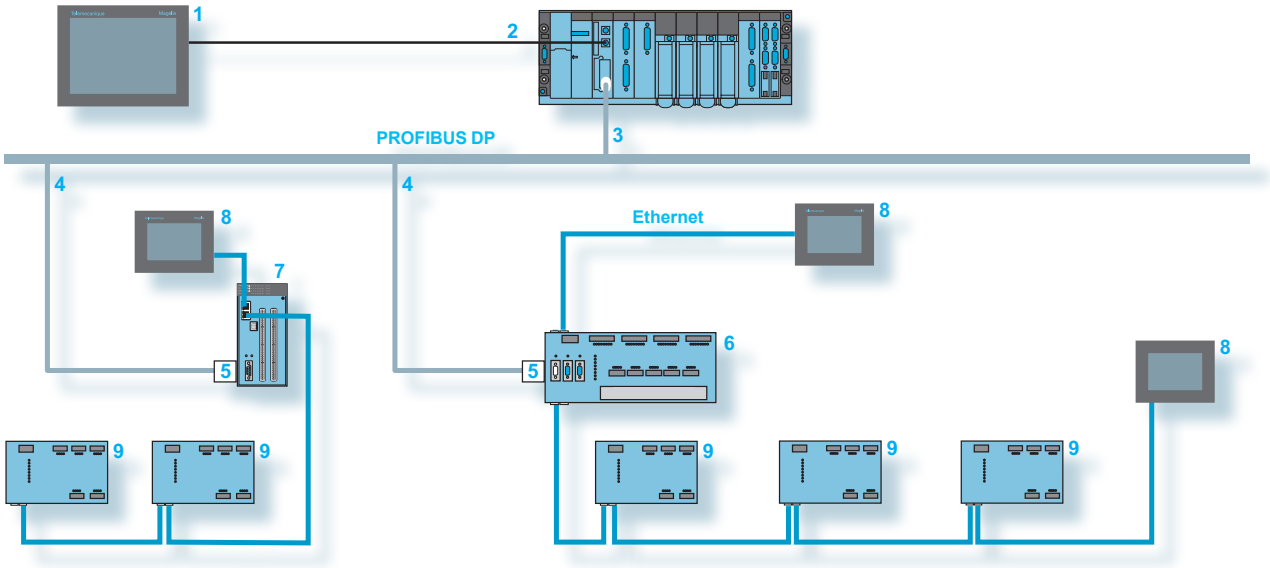
Connection on PROFIBUS DP



1 Graphic terminal connected to TER/AUX port of Premium automation platform: PROFIBUS DP master.
2 Connecting cable **XBTZ968** (RS 485) + adaptor **XBTZG909**.
3 PROFIBUS module **TSX PBY 100** on Premium™ processor: PROFIBUS DP master.
4 Connecting cable **TSX PBS CA ●00**, lengths 328 and 1312 ft (100 and 400 m).
5 Connector **490 NAD 911 03** (SUB-D 9-pin male) on the FB3 connector of safety PLC **XPSMF3542** or on the "PROFIBUS" connector of safety PLC **XPSMF4040/MF4042**.
6 Compact safety PLC **XPSMF3542**: PROFIBUS DP slaves, Modbus® TCP/IP server.
7 Compact safety PLCs **XPSMF4040/MF4042**: PROFIBUS DP slaves, Modbus® TCP/IP server.
8 Graphic supervision terminal **XBTGT2130**: Modbus® TCP/IP client.
9 Safety remote I/O modules **XPSMF1/2/3**.

Characteristics

Bus type		**PROFIBUS DP**	
Compatibility with compact safety PLCs		**XPSMF3542**	**XPSMF4040, XPSMF4042**
Serial port	Number and type	1 x SUB-D 9-pin female (FB3)	1 x SUB-D 9-pin female (PROFIBUS)
	Master/Slave	Slave, V0	
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 (3937...328 ft / 1200...100 m)	

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Safety automation system solutions

Programming software XPSMFWIN for Preventa™ compact and modular safety PLCs XPSMF

Presentation

Conforming to standard IEC 61131-3, programming software **XPSMFWIN** is designed for programming all safety PLCs **XPSMF** and safety remote I/O modules. This safety software is part of the Safety Suite V2 software pack.

To create a program the user can use predefined function blocks, such as the elementary logic functions and certified function blocks, by dragging the blocks into the software programming area.
The "drag and drop" operation of the Windows ® programming environment enables quick and simple creation of configurations.

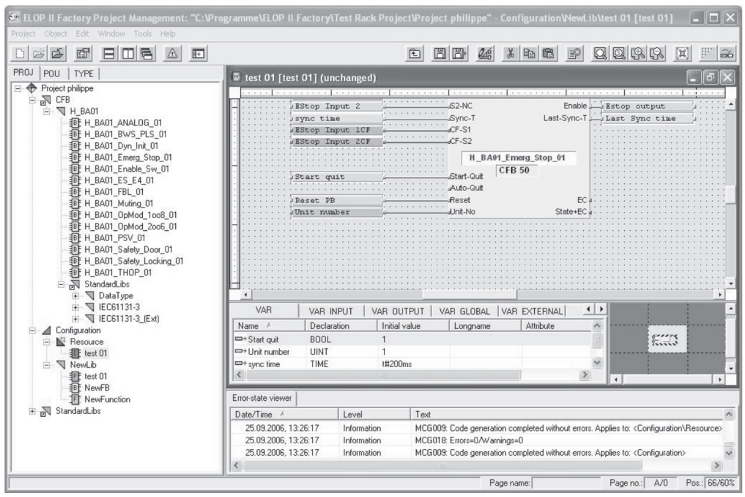
Using the **XPSMFWIN** software, it is possible to program complete systems consisting of several safety PLCs and safety remote I/O modules.
The conditions detailed in the software manual must be adhered to and a complete report accompanying the certificate should be established.

Reference

■ Reference **SSV1XPSMFWIN** contains the full version of the programming software XPSMFWIN software for the XPSMF Safety PLCs. The XPSMFWIN is part of our Safety Suite and is not available separately.

Description	Operating system	Composition	Language	Reference	Weight oz (kg)
Configuration software XPSMFWIN for programming compact XPSMF40●●, XPSMF3● and modular XPSMF60 safety PLCs	Windows ® 2000, Windows ® XP	CD-ROM + user manual	English, German, French	**SSV1XPSMFWIN** *Available with Safety Suite V2 software pack for safety systems*	18.342 (0.520)

Installation



Software XPSMFWIN: project management

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

A USB dongle is available. It must be connected to the PC before the software is installed.
Drivers must also be installed on the computer to recognise the dongle. These drivers are included with software **XPSMFWIN** and are automatically installed during installation.
To install software **XPSMFWIN**:
□ Connect the dongle.
□ Insert the **SSV1XPSMFWIN** software CD-ROM into the computer.
□ Launch installation.
□ Select the preferred language from the configuration menu.
□ Follow the guided installation procedure for the software.
□ Restart the computer.
□ Launch the software by clicking on the Safety Suite icon on the desktop.

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 colors minimum, 8 Mb XGA, 1280 x 1024 True color recommended).
■ Hard disk (1 Gigabyte minimum).
■ Operating system:
□ Windows ® 2000 Professional with Service Pack 1 or higher.
□ Windows ® XP with Service pack 1.

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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.
Connection is made automatically between the master and slaves when assigning the slaves to the corresponding masters. Transmission speeds of up to 100 Mbps in Half duplex mode and 10 Mbps in Full duplex mode can be achieved and using Autonegotiation ensures the correct baud rates for the connection.
Each safety PLC can manage up to 64 safety connections. These 64 connections can consist of safety remote I/Os and other safety PLCs.
Communication between two safety PLCs is established via a Peer-Peer link. This Peer-Peer communication enables data between two or more safety PLCs to be communicated safely.
The connectivity of all the equipment enables centralised or decentralised networks to be established. It also enables safety PLCs and safety remote I/O modules to be connected anywhere on the network with only the assigning of an IP address, to each module, in the software.

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 certified function blocks.
■ Hardware management
This window enables all hardware specific data, inputs and outputs and signal transfer between safety controllers to be defined, as well as the various safety PLCs being used or safety remote I/O modules.

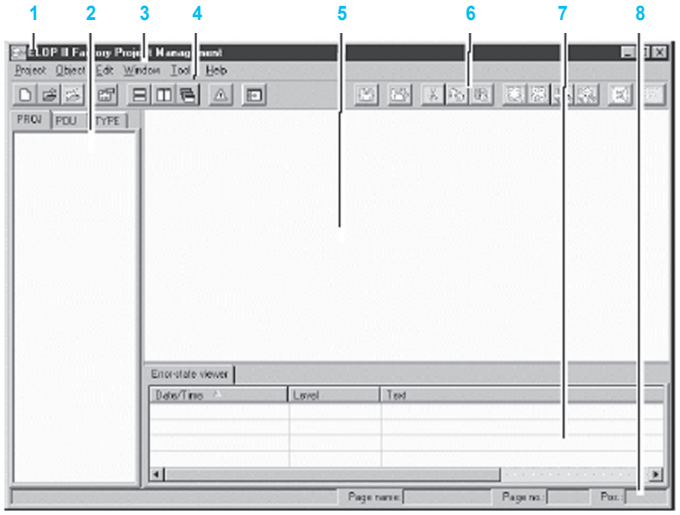
Items included in the XPSMFWIN interface

■ 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.

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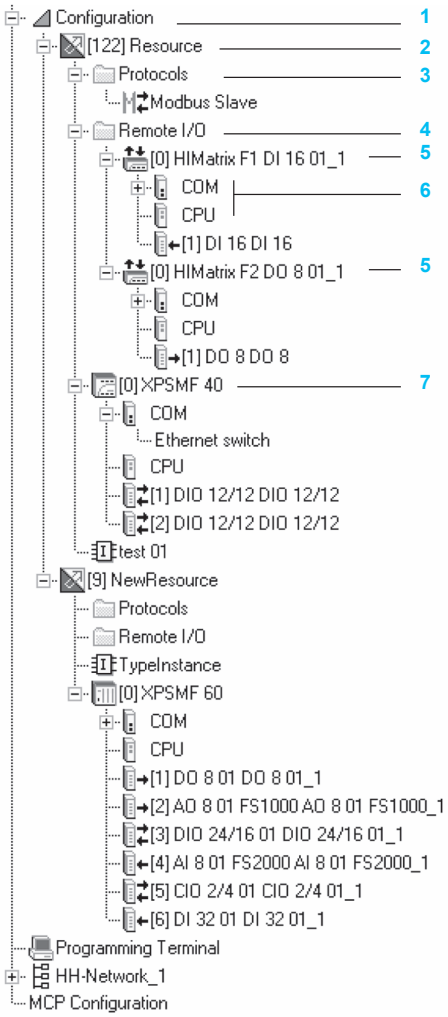
Safety automation system solutions

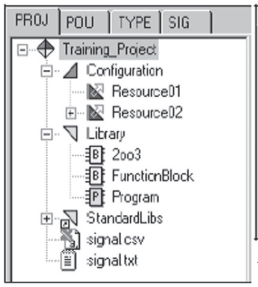
Programming software XPSMFWIN
for Preventa™ compact and modular
safety PLCs XPSMF



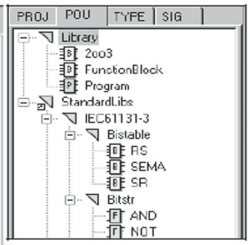
Structure window

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.

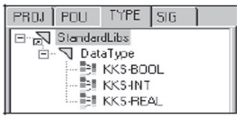
The structure window displays the hierarchical structure of the project. Selecting one of three views provides the user with different levels of detail.



Complete project



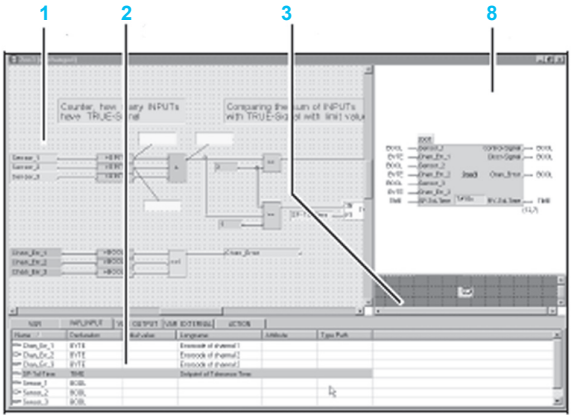
All POUs
(Program Organisation Units)



All data types

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 consists of the following panes:



1 Drawing field.
2 Variable declaration editor.
3 Overview window.
4 Interface declaration editor.

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Safety automation system solutions

Programming software XPSMFWIN for Preventa™ compact and modular safety PLCs XPSMF

Programming

Software **XPSMFWIN** enables programming of the entire range of Preventa™ safety PLCs **XPSMF**.
The powerful and easy to use methodology of this software enables users to quickly and simply familiarize 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.

Up to 64 remote inputs/outputs can be assigned to each safety PLC.
Once all the safety PLCs and remote I/Os have been selected, the signals can be simply connected to the relevant safety 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 can be downloaded via the Ethernet RJ45 communication port on any of the safety PLCs.

Program execution

The program will automatically be stored in all the 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, together with 12 other certified functions.

Modbus® TCP/IP, Modbus® serial (RTU) and PROFIBUS DP protocols are included in software **XPSMFWIN**. They can be used for non safety related data transfer.

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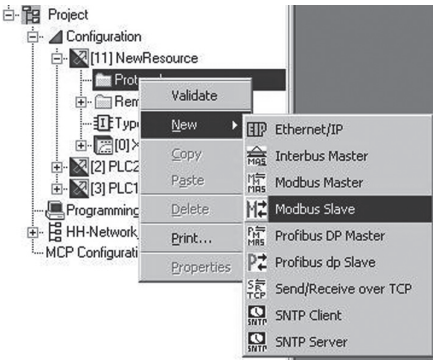
Non safety related communication protocols

Modbus® TCP/IP server (slave)

The **XPSMF** range of safety PLCs (**XPSMFCPU22**, **XPSMF40●2**, **XPSMF35●2**, **XPSMF3022** and **XPSMF31222**) allow the communication of non safety related data on an Ethernet network via a Modbus® TCP/IP link.

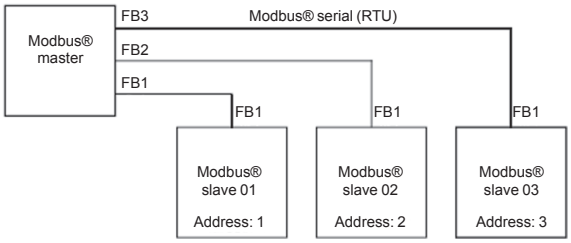


On the Ethernet network, several masters (clients) can read data provided by several slaves (servers).

Creation of Modbus® TCP/IP servers is quick and simple: Select Protocols / New / Modbus® Slave.

Modbus® serial (RTU)

The **XPSMF** range of safety PLCs (**XPSMFCPU22**, **XPSMF402●**, **XPSMF352●** and **XPSMF3022**) allow the communication of non safety related data on a Modbus® serial (RTU) link.
On the Modbus® serial network, a master can read the data provided by several slaves on a network segment.



Creation of Modbus® (RTU) servers is quick and simple: Select Protocols / New / Modbus® Slave.
Select the serial option in the properties window to activate, then select the signals to send and receive from your standard automation system equipment.

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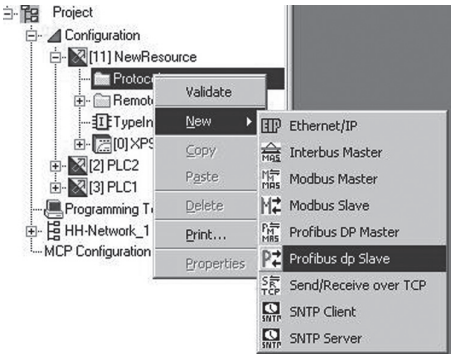
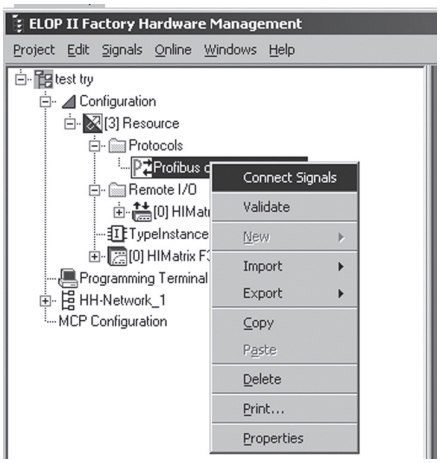
Non safety related communication protocols

PROFIBUS DP

To create a PROFIBUS DP slave on a resource (PLC), a project must be created. Safety PLCs **XPSMF404●** and **XPSMF3542** are PROFIBUS DP V0 slaves.
Within hardware management, assignment of PROFIBUS DP slaves is simple:
Select Protocols / New / PROFIBUS DP slave from the protocol tag of a resource.





The PROFIBUS DP Slave menu contains the following fields:
□ Connect signals tab: for connecting the inputs and outputs to and from the safety PLC, and predefined signals for diagnostics.
□ Import and Export tool: used for importing and exporting the signal list to/from a .CSV format file (format that can be imported into a standard automation PLC).
□ Properties tab: enabling setting of the station address, interface, baud rate and data refresh rate.

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Safety automation system solutions

Preventa™ safety PLCs
Compact and modular, XPSMF
Safety remote input, output and input/output modules
XPSMF1/2/3

Presentation

Remote input, output and input/output modules:
- Location: within the vicinity of machines to be monitored.
- Extension of the I/O capacity of compact and modular safety PLCs.
- Designed for use in safety related parts of control systems up to category 4 conforming to EN 954-1, up to performance level "e" conforming to EN/ISO 13849-1, and up to SIL 3 conforming to EN/IEC 61508.

*Products referenced **XPSMF1DI1601** and **XPSMF2●●●●●●** are marked **HIMatrix® F1DI** and **HIMatrix® F2DI** (manufactured by Hima, sold by Schneider Electric).*

User memory		Application	–		
		Data	–		
Response time			Depending on size of application		
Maximum power consumption			0.8 A	0.5 A	9 A
Supply			External ⎓ 24 V supply (with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)		
Inputs	**Digital**	Number of channels	16, not electrically isolated	–	–
		Current at state 0	1.5 mA max., 1 mA at 5 V	–	–
		Current at state 1	≥ 2 mA at ⎓ 15 V	–	–
	Analog	Number of channels	–	–	–
		Range: voltage/current	–	–	–
	Counting	Number of channels	–	–	–
		Current	–	–	–
Outputs	**Digital**	Number of channels	–	4, not electrically isolated	16, not electrically isolated
		Output current	–	5 A max.	1 A max. at 140 °F (60 °C), 2 A max. at 104 °F (40 °C)
	Analog	Number of channels	–	–	–
		Range: voltage/current	–	–	–
	Relay	Number	–	–	–
		Switching voltage	–	–	–
	Line control	Number	4, not electrically isolated	–	–
		Current/Voltage	60 mA/20 V	–	–
Input/output connections			Removable screw terminal blocks *(1)*		
Safety communication on Ethernet network using SafeEthernet protocol			Yes, access to network via integrated 2 RJ45 switched Ethernet communications ports		
Safety remote I/O module type			**XPSMF1DI1601**	**XPSMF2DO401**	**XPSMF2DO1601**
See page			2/78	2/85	

*(1) Removable screw terminal blocks are provided with safety remote I/O modules **XPSMF1/2/3**.*

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*Products referenced **XPSMF2●●●●●●●** and **XPSMF3●●●●●●●** are marked **HIMatrix® F2DO** and **HIMatrix® F3...** (manufactured by Hima, sold by Schneider Electric).*

–					
–					
Depending on size of application					
0.6 A	0.6 A	8 A	14 A	8 A	0.8 A
External ⎓ 24 V supply (with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)					
–	–	8, not electrically isolated	16, not electrically isolated	20, not electrically isolated	–
–	–	1.5 mA max. 1.25 mA at ⎓ 5 V	1.5 mA max. 1 mA at ⎓ 5 V	1.5 mA max. 1.25 mA at ⎓ 5 V	–
–	–	> 2 mA at ⎓ 15 V	> 2 mA at ⎓ 15 V	⩾ 2 mA at ⎓ 15 V	–
–	–	–	–	–	8 single-pole
–	–	–	–	–	⎓ 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 *(2)*	–
–	–	DO+: channels 1 to 3 and 5 to 7: 0.5 A at 140 °F (60 °C) channels 4 and 8: 1 A at 140 °F (60 °C), 2 A at 104 °F (40 °C) DO-: channels 1 and 2: 1 A at 140 °F (60 °C)	2 A max. at 104 °F (40 °C), 1 A max. at 140 °F (60 °C), 10 mA min.	Channels 1 to 3 and 5 to 7: 0.5 A at 140 °F (60 °C) Channels 4 and 8: 1 A at 140 °F (60 °C), 2 A at 122 °F (50 °C)	–
–	–	–	–	–	4 non safety related outputs
–	–	–	–	–	Usable range: 0…20 mA Nominal range: 4…20 mA
8	16	–	–	–	–
⩾ 5 V, ⩽ ⎓ 250 V/ ∿ 250 V	⩾ 5 V, ⩽ ⎓ 30 V/ ∿ 60 V	–	–	–	–
–	–	2, not electrically isolated		–	–
–	–	60 mA/20 V	60 mA/20 V	–	–
Removable screw terminal blocks *(3)*					
Yes, access to network via integrated 2 RJ45 switched Ethernet communications ports					
XPSMF2DO801	**XPSMF2DO1602**	**XPSMF3DIO8801**	**XPSMF3DIO16801**	**XPSMF3DIO20802**	**XPSMF3AIO8401**
2/85		2/97			

(1) With 500 Ω jumper
(2) Configurable for Line control.
*(3) Removable screw terminal blocks are provided with safety remote I/O modules **XPSMF1/2/3**.*

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Safety automation system solutions

Preventa™ safety PLCs
Compact and modular
Safety remote input modules XPSMF1

XPSMF1DI1601

*This product, referenced **XPSMF1DI1601**, is marked **HIMatrix® F1DI** (manufactured by Hima, sold by Schneider Electric).*

Presentation

XPSMF1DI1601 is a compact safety remote input module which is designed to extend the input capacity of safety PLCs **XPSMF,** either compact or modular, to which it is associated.
The communication with either the compact or modular safety PLCs is managed via one of its' integrated 2 RJ45 switched Ethernet communications ports.
The safety remote input module **XPSMF1DI1601** does not have a user program: it receives its instructions from its' parent safety PLC.

Safety remote input module XPSMF1DI1601

Remote digital inputs		
N°	**Safety detection**	**Safety dialog**
16	Limit switches, Guard switches, with reset and with actuator, Light curtains type 2 and type 4, Safety mats and sensing edges…	Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations…

Remote line control outputs	
N°	
4	Short-circuit and line break monitoring

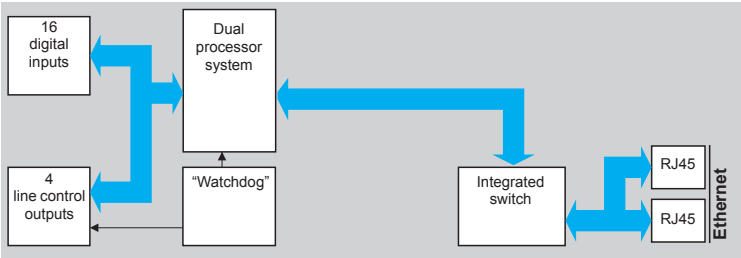
Line control

Line control is a means of short-circuit and line break monitoring.
Using line control outputs enables SIL 3 (EN/IEC 61508) and category 4 (EN 954-1) safety to be achieved. The line control outputs send a high signal with a very short low signal, thus enabling a wiring anomaly (short-circuit, line break) to be seen at the inputs of the safety modules.
Example: The line control outputs 1 to 4 are connected to the digital inputs 1 to 16.

Safety PLCs

In order to meet safety requirements, the safety remote input module **XPSMF1DI1601** incorporates two essential functions (**Redundancy** and **Self-monitoring)** complying to category 4 conforming to EN 954-1 and performance level "e" conforming to EN/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between this safety remote input module and the safety PLCs (**Special Switch**).
■ **Redundancy**: the dual processor integrated in the safety remote input module **XPSMF1DI1601** analyzes and compares the data received from the safety inputs and outputs. The incoming and outgoing data (programmed values and received values) are received in parallel by the two processors and compared in real-time.
■ **Self-monitoring ("Watchdog")**: the safety remote input module **XPSMF1DI1601** continuously monitors the data processing cycle and the execution of tasks, and intervenes if the cycle time 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 data provided by the inputs of the safety module on the Ethernet network, while avoiding signal collisions and excessive amounts of data on the network.

Functional diagram



Safety communication on Ethernet network

The safety input module **XPSMF1DI1601** incorporates two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs **XPSMF**.

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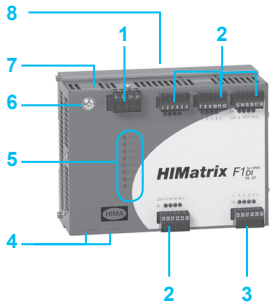

Description

Safety remote input module XPSMF1DI1601

On the front cover of the metal enclosure:

1. One terminal block *(1)* for c 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 digital line control outputs, with four digital output status LEDs.
4. Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
5. Eight process status LEDs.
6. One ground connection screw.
7. On the top: one “Reset” button.
8. On the rear face: one spring operated mounting device for mounting on 35 mm 5 rail.

Status LED details

Safety remote input module XPSMF1DI1601

LED	Color	Status	Meaning
Inputs 1…16	Orange	On	Inputs active.
Outputs 1…4	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-energized state.
		Off	The CPU is in “ERROR” state (see ERROR).
ERROR	Red	On	Software error or hardware anomaly 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 while 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.

*(1) Removable screw terminals are provided with safety input module **XPSMF1DI1601**.*

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2

Characteristics

Safety remote input module type			XPSMF1DI1601
Supply voltage		V	⎓ 24 (external supply with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)
Voltage limits		V	- 15…+ 20%
Ambient air temperature	For operation	°F (°C)	+ 32… + 140 (0…+ 60)
	For storage	°F (°C)	- 40…+ 185 (- 40…+ 85)
Degree of protection			IP 20
Response time		ms	Depending on size of application
Current power 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 (on 24 V), protected against short-circuits
Line control 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 2/26 for wire sizes of the various connector types.

Communication

Ethernet network: safety communication using SafeEthernet protocol			
Transmission	Communication ports		Integrated 2 RJ45 switched Ethernet communications ports
	Baud rate	Mbps	100 Half duplex, 10 Full duplex, Autonegotiation
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable, category 5D or better (Ethernet)

References

XPSMF1DI1601

*This product, referenced **XPSMF1DI1601**, is marked **HIMatrix® F1DI** (manufactured by Hima, sold by Schneider Electric).*

Safety remote input module (⎓ 24 V supply)

For use with	Digital inputs	Line control outputs	Ports	Reference	Weight oz (kg)
Safety PLCs, modular XPSMF60 or compact XPSMF40 and XPSMF31/30/35	16	4	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF1DI1601**	24.692 (0.700)

Connecting cables

Description	For	Reference	Weight oz (kg)
Ethernet network connecting cables	Connection between safety remote input modules and modular or compact safety PLCs XPSMF RJ45 connector fitted at each end	See 2/29	–

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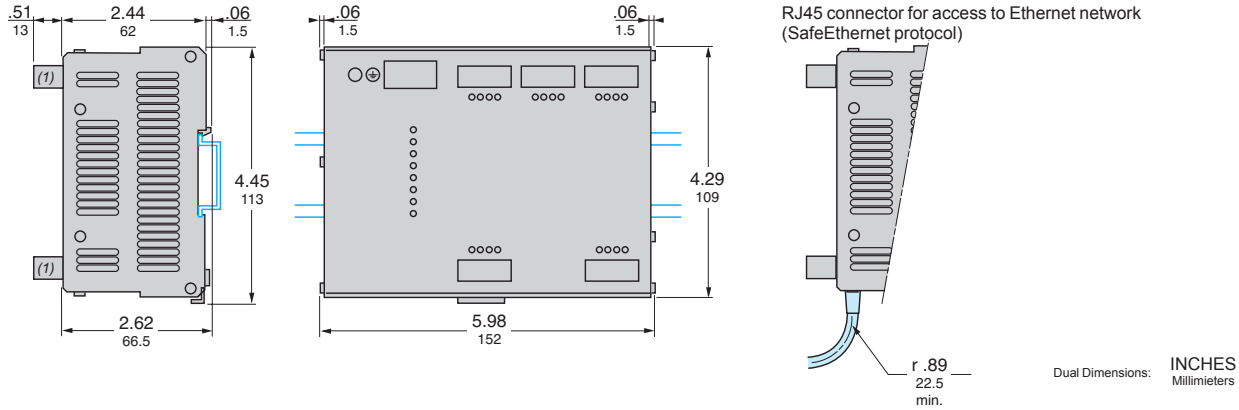
Dimensions

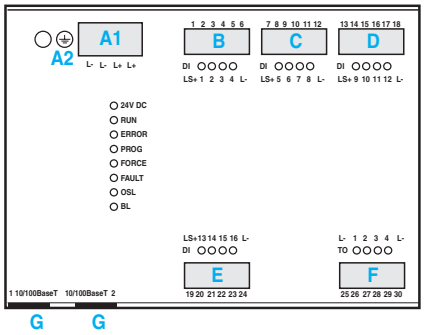
XPSMF1DI1601



*(1) Removable screw terminals are provided with safety input module **XPSMF1DI1601**.*

Connections

XPSMF1DI1601



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	**Ground**	–	⏚	Ground
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	**Line control 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	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

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Safety automation system solutions

Preventa™ safety PLCs
Compact and modular
Safety remote output modules XPSMF2

XPSMF2DO401

XPSMF2DO1601

XPSMF2DO801

XPSMF2DO801

*Products referenced **XPSMF2●●●●●●** are marked **HIMatrix® F2 DO...** (manufactured by Hima, sold by Schneider Electric).*

Presentation

XPSMF2DO●●●● are compact safety remote output modules which are designed to extend the output capacity of safety PLCs **XPSMF**, either compact or modular, to which they are associated.
The communication with either the compact or modular safety PLCs is managed via one of its' integrated 2 RJ45 switched Ethernet communications ports.
Safety modules **XPSMF2DO●●●●** do not have a user program: they receive their instructions from its' parent safety PLC.

Safety remote output modules XPSMF2DO●●●●

Safety output modules	Remote outputs		
	N°	Type	
XPSMF2DO401	**4**	Digital power outputs	**Safety actuators:** Contactors-motors, Control relays, Variable speed drives…
XPSMF2DO1601	**16**	Digital outputs	
XPSMF2DO801	**8**	Relay outputs	**Safety dialog:** Beacons and indicator banks, rotating mirror beacons, sirens…
XPSMF2DO1602	**16**	Relay outputs	

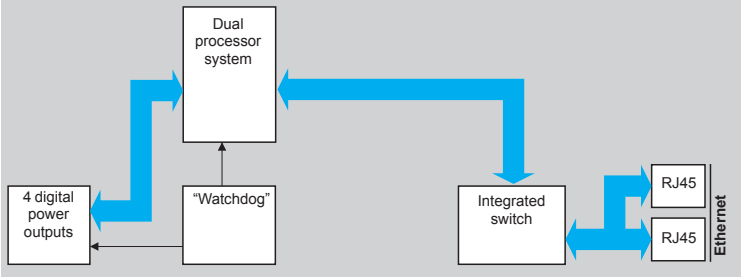
Safety PLCs

In order to meet safety requirements, the safety remote output modules **XPSMF2DO●●●●** incorporate two essential functions (**Redundancy** and **Self-monitoring)** complying to category 4 conforming to EN 954-1 and performance level "e" conforming to EN/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between these safety remote output modules and the safety PLCs (**Special Switch**).

■ **Redundancy**: the dual processor integrated in the safety remote output modules **XPSMF2** analyzes and compares the data received from the safety inputs and outputs. The incoming and outgoing data (programmed values and received values) are received in parallel by the two processors and compared in real-time.
■ **Self-monitoring ("Watchdog")**: the safety remote output modules **XPSMF2** continuously monitor the data processing cycle and the execution of tasks, and intervenes if the cycle time 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 data provided by the outputs of the safety modules on the Ethernet network, while avoiding signal collisions and excessive amounts of data on the network.

Functional diagrams

Remote output module XPSMF2DO401



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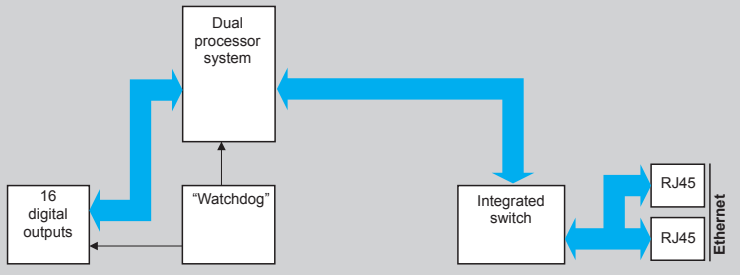
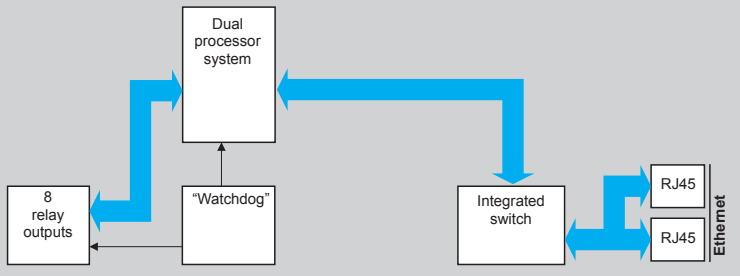
Functional diagrams (continued)

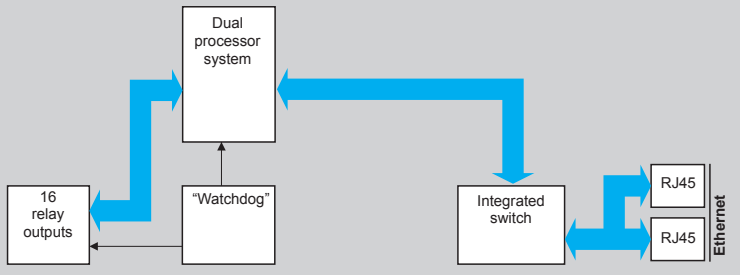
Remote output module XPSMF2DO801



Remote output module XPSMF2DO801



Remote output module XPSMF2DO1602



Safety communication on Ethernet network

The safety remote output modules **XPSMF2DO●●●●** incorporate two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs **XPSMF**.

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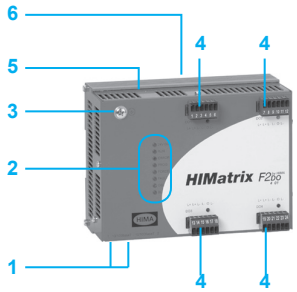
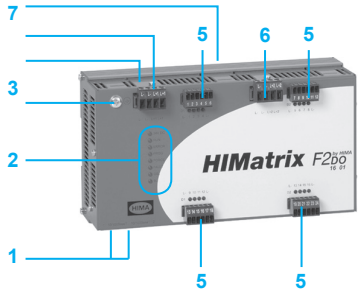


Description

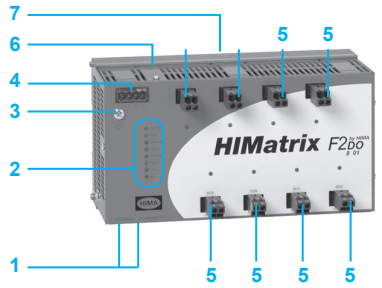
Remote output module XPSMF2DO401

On the front cover of the metal enclosure:
1 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
2 Eight process status LEDs.
3 One ground connection screw.
4 Four terminal blocks *(1)* for connection of digital outputs, with output status LED (one LED per terminal block).
5 **On the top**: one “Reset” button.
6 **On the rear face**: one spring operated mounting device for mounting on 35 mm ⊔ rail.



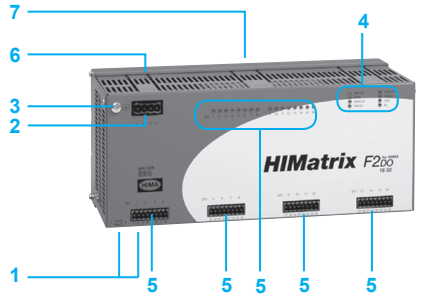
Remote output module XPSMF2DO1601

On the front cover of the metal enclosure:
1 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
2 Eight process status LEDs.
3 One ground connection screw.
4 One terminal block *(1)* for ⎓ 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.
7 **On the top**: one “Reset” button.
8 **On the rear face**: one spring operated mounting device for mounting on 35 mm ⊔ rail.



Remote output module XPSMF2DO801

On the front cover of the metal enclosure:
1 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
2 Eight process status LEDs.
3 One ground connection screw.
4 One terminal block *(1)* for ⎓ 24 V supply.
5 Eight terminal blocks *(1)* for connection of relay outputs, with output status LED (one LED per terminal block).
6 **On the top**: one “Reset” button.
7 **On the rear face**: one spring operated mounting device for mounting on 35 mm ⊔ rail.



Remote output module XPSMF2DO1602

On the front cover of the metal enclosure:
1 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
2 One terminal block *(1)* for ⎓ 24 V supply.
3 One ground connection screw.
4 Eight process status LEDs.
5 Four terminal blocks *(1)* for connection of relay outputs, with relay output status LEDs.
6 **On the top**: one “Reset” button.
7 **On the rear face**: one spring operated mounting device for mounting on 35 mm ⊔ rail.

*(1) Removable screw terminals are provided with the safety output modules **XPSMF2**.*

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Status LED details

Safety remote output modules XPSMF2DO●●●●

LED	Color	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-energized state.
		Off	The CPU is in “ERROR” state (see ERROR).
ERROR	Red	On	Software error or hardware anomaly 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 while 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.

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Characteristics

Safety remote output module type			XPSMF2DO401	XPSMF2DO1601	XPSMF2DO801	XPSMF2DO1602
Supply voltage		**V**	⎓ 24 (external supply with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)			
Voltage limits		**V**	- 15…+ 20%			
Ambient air temperature	For operation	**°F (°C)**	+32… + 140 (0…+ 60)			
	For storage	**°F (°C)**	- 40…+ 185 (- 40…+ 85)			
Degree of protection			IP 20			
Response time		**ms**	Depending on size of application			
Maximum current power 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 2/26 for wire sizes of the various connector types.			
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 140 °F (60 °C) 2 max. at 104 °F (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.	
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 internal 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. (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		Integrated 2 RJ45 switched Ethernet communications ports
	Baud rate	**Mbps**	100 Half duplex, 10 Full duplex, Autonegotiation
Structure			10BASE-T/100BASE-TX
Medium			Dual twisted pair cable, category 5D or better (Ethernet)

Characteristics: page 2/84
References: page 2/85
Dimensions, mounting: page 2/86 and 2/87
Connections: page 2/88 and 2/89
Presentation: page 2/80

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Safety automation system solutions

Preventa™ safety PLCs
Compact and modular
Safety remote output modules XPSMF2

References

XPSMF2DO401

XPSMF2DO1601

XPSMF2DO801

XPSMF2DO1602

*Products referenced **XPSMF2●●●●●●** are marked **HIMatrix® F2 DO...** (manufactured by Hima, sold by Schneider Electric).*

Safety remote output modules (⎓ 24 V supply)

For use with	Outputs		Ports	Reference	Weight oz (kg)
	Digital	Relay			
Safety PLCs, modular XPSMF60 or compact XPSMF40 and XPSMF31/30/35	4	–	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF2DO401**	28.219 (0.800)
	16	–	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF2DO1601**	29.983 (0.850)
	–	8	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF2DO801**	45.856 (1.300)
	–	16	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF2DO1602**	70.548 (2.000)

Connecting cables

Description	For	Reference	Weight oz (kg)
Ethernet network connecting cables	Connection between safety remote output modules and modular or compact safety PLCs XPSMF RJ45 connector fitted at each end	See page 2/29	–

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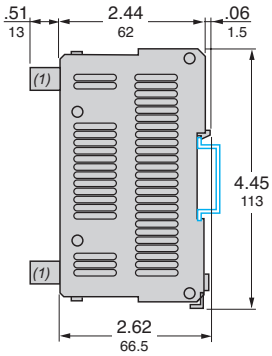
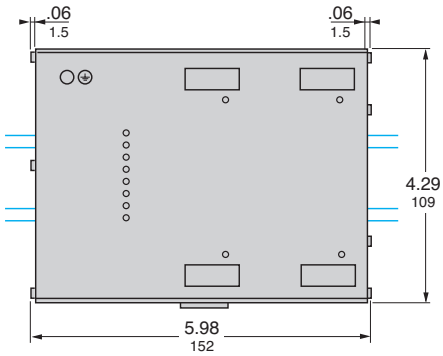
Dimensions

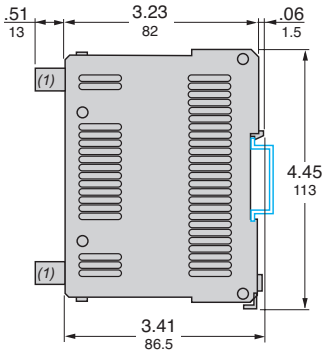
XPSMF2DO401

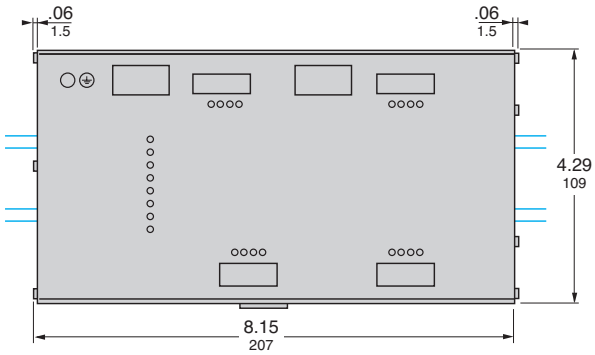




*(1) Removable screw terminals are provided with the safety output modules **XPSMF2DO401**.*

XPSMF2DO1601





*(1) Removable screw terminals are provided with the safety output modules **XPSMF2DO1601**.*

Dual Dimensions: INCHES / Millimieters

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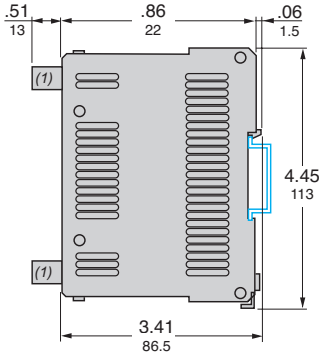
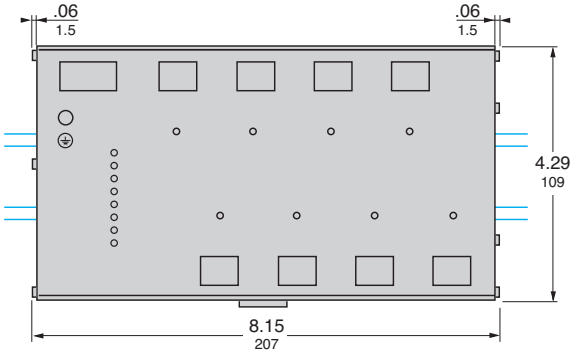
Dimensions

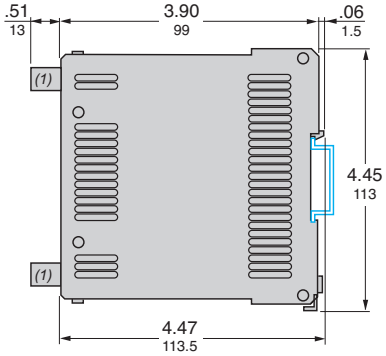
XPSMF2DO801

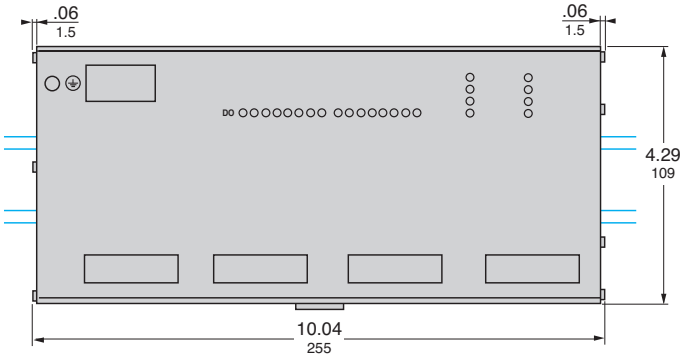




*(1) Removable screw terminals are provided with the safety output modules **XPSMF2DO801**.*

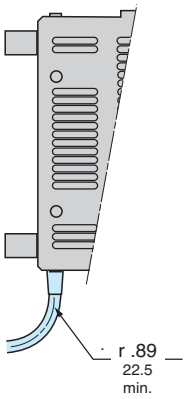
XPSMF2DO1602





*(1) Removable screw terminals are provided with the safety output modules **XPSMF2DO1602**.*

RJ45 connector for access to Ethernet network (SafeEthernet protocol)



Dual Dimensions: INCHES
Millimieters

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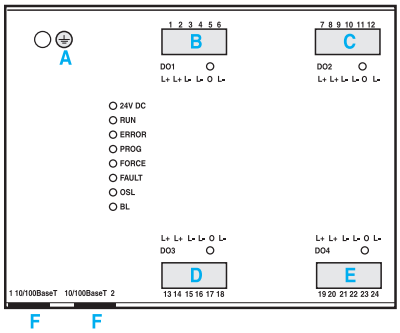
2

Connections

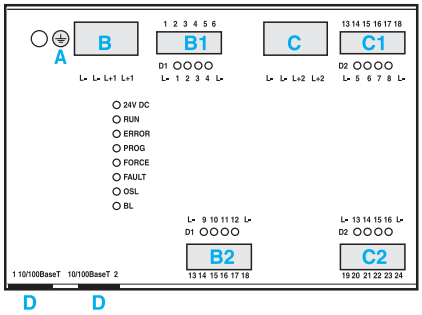
XPSMF2DO401



Item	Connection	Screw N°	Screw	Function
A	**Ground**	–	⏚	Ground
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	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

XPSMF2DO1601



Item	Connection	Screw N°	Screw	Function
A	**Ground**	–	⏚	Ground
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	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

Characteristics: page 2/84
References: page 2/85
Dimensions, mounting: page 2/86 and 2/87
Connections: page 2/88 and 2/89
Presentation: page 2/80

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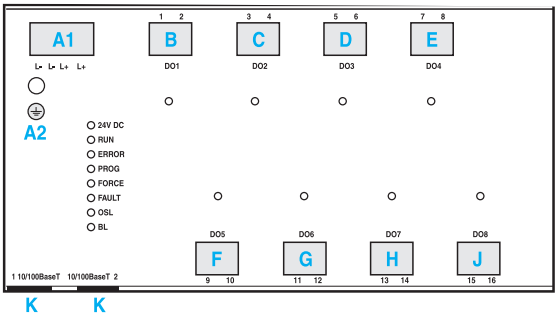
Connections

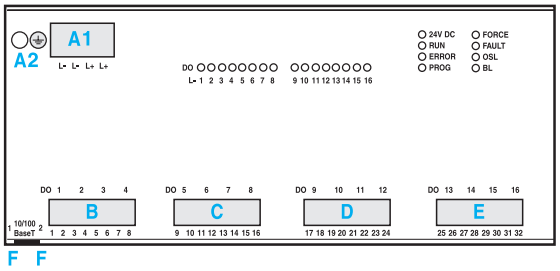
XPSMF2DO801



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	**Ground**	–	⏚	Ground
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	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

XPSMF2DO1602



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	**Ground**	–	⏚	Ground
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	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

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Safety automation system solutions

Preventa™ safety PLCs
Compact and modular
Safety remote mixed I/O modules XPSMF3

XPSMF3DIO8801

XPSMF3DIO16801

XPSMF3DIO20802

XPSMF3AIO8401

*Products referenced **XPSMF3●●●●●●** are marked **HIMatrix® F3...** (manufactured by Hima, sold by Schneider Electric).*

Presentation

XPSMF3DIO/AIO are compact safety remote input/output modules which are designed to extend the I/O capacity of safety PLCs **XPSMF**, either compact or modular, to which they are associated.
The communication with either the compact or modular safety PLCs is managed via one of its' integrated 2 RJ45 switched Ethernet communications ports.
Safety modules **XPSMF3DIO/AIO** do not have a user program: they receive their instructions from its' parent safety PLC.

Safety remote mixed I/O modules XPSMF3DIO/AIO

Mixed I/O safety modules	Remote inputs		Remote outputs	
	N°	Type	N°	Type
XPSMF3DIO8801	**8**	Digital	**8 DO+ / 2 DO-**	Digital
			2	Line control
XPSMF3DIO16801	**16**	Digital	**8 2-pole or 16 single-pole**	Digital
			2	Line control
XPSMF3DIO20802	**20**	Digital	**8**	Digital
XPSMF3AIO8401	**8**	Analog	**4**	Analog (non safety outputs)

Examples of remote inputs of safety modules XPSMF3●IO●●●●●

■ **Digital inputs**

Safety actuators	Safety detection	Safety dialog
Contactors-motors, Control relays, Variable speed drives…	Limit switches, Guard switches, with reset and with actuator, Light curtains type 2 and type 4, Safety mats and sensing edges…	Mushroom head Emergency stops, Enclosures for control and signalling units, Two-hand control stations…

■ **Analog inputs**

Closed circuit scanning of input channels,
Single-pole measuring of 0 to 10 V voltages,
Measuring, using jumper, 0/4 to 20 mA currents (with 500 Ω external resistor).

Examples of remote outputs of safety modules XPSMF3●IO●●●●●

■ **Digital outputs**

Safety actuators	Safety dialog
Contactors-motors, Control relays, Variable speed drives…	Beacons and indicator banks, Rotating mirror beacons, Sirens…

■ **Line control outputs**

Short-circuit and line break monitoring

■ **Analog outputs**

Closed circuit scanning of output channels,
Single-pole measuring of 0 to 10 V voltages,
Measuring, using jumper, 0/4 to 20 mA currents (with 500 Ω external resistor).

Characteristics: page 2/95
References: page 2/97
Dimensions, mounting: page 2/98
Connections: page 2/100
Presentation: page 2/90

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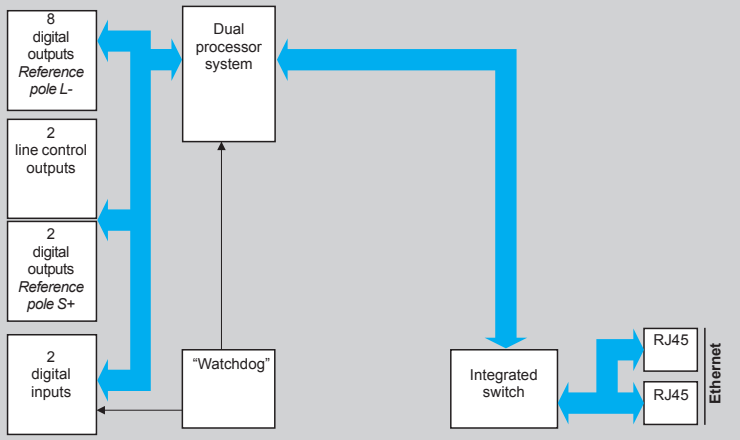
Safety PLCs

In order to meet safety requirements, the safety remote mixed I/O modules **XPSMF3●IO●●●●●** incorporate two essential functions (**Redundancy** and **Self-monitoring)** complying to category 4 conforming to EN 954-1 and performance level "e" conforming to EN/ISO 13849-1 in addition to the SafeEthernet safety communication protocol between these safety remote mixed I/O modules and the safety PLCs (**Special Switch**).

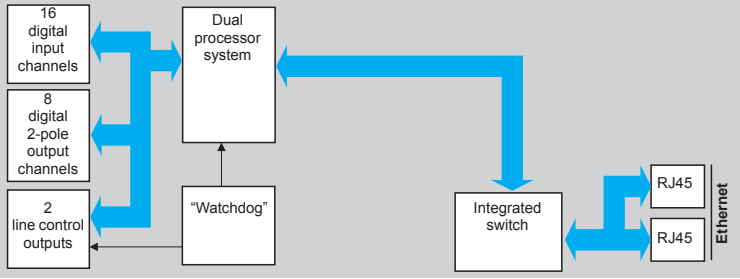
■ **Redundancy**: the dual processor integrated in safety modules **XPSMF3●IO●●●●●** analyzes and compares the data received from the safety inputs and outputs. The incoming and outgoing data (programmed values and received values) are received in parallel by the two processors and compared in real-time.
■ **Self-monitoring ("Watchdog")**: the safety remote mixed I/O modules **XPSMF3●IO●●●●●** continuously monitor the data processing cycle and the execution of tasks, and intervenes if the cycle time 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 data provided by the inputs and outputs of the safety modules on the Ethernet network, while avoiding signal collisions and excessive amounts of data on the network.

Functional diagrams

Remote mixed I/O module XPSMF3DIO8801



Remote mixed I/O module XPSMF3DIO16801



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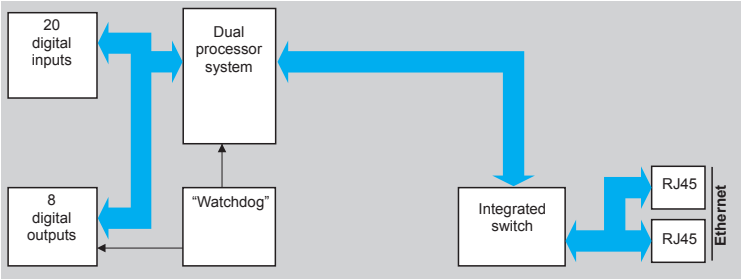
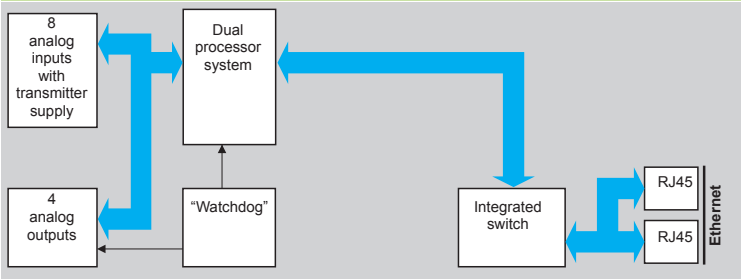
Functional diagrams *(continued)*

Remote mixed I/O module XPSMF3DIO20802



Remote mixed I/O module XPSMF3AIO8401



Line control

Line control is a means of short-circuit and line break monitoring.
Using line control outputs enables SIL 3 (EN/IEC 61508) and category 4 (EN 954-1) safety to be achieved. The line control outputs send a high signal with a very short low signal, thus enabling a wiring anomaly (short-circuit, line break) to be seen at the inputs of the safety modules.

Examples

□ For **XPSMF3DIO8801** and **XPSMF3DIO16801**, the line control outputs 1 and 2 are connected to the digital inputs of the same circuit.

□ For **XPSMF3DIO20802**, the digital outputs 1 to 8 are connected to the digital inputs of the same circuit.

Safety communication on Ethernet network

The safety remote mixed I/O modules **XPSMF3●IO●●●●** incorporate two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs **XPSMF**.

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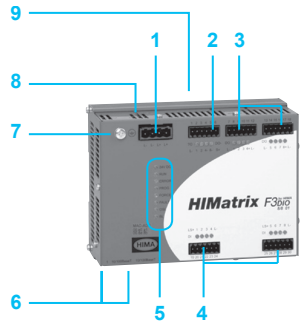
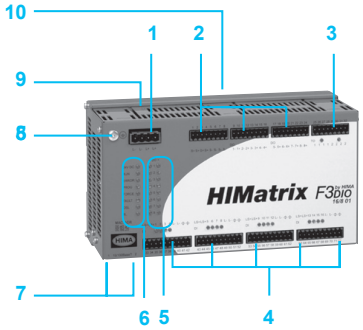


Description

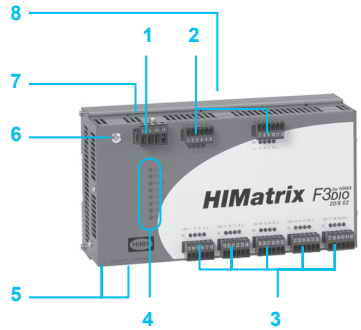
Remote mixed I/O module XPSMF3DIO8801

On the front cover of the metal enclosure:
1 One terminal block *(1)* for ⎓ 24 V supply.
2 One terminal block *(1)* for connection of line control outputs, with four line control 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 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
7 One ground connection screw.
8 One “Reset” button (on the top).
9 **On the rear face:** One spring operated mounting device for mounting on 35 mm ⊥ rail.



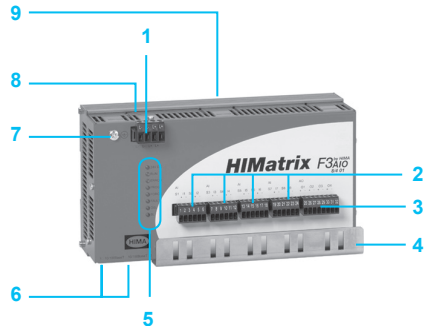
Remote mixed I/O module XPSMF3DIO16801

On the front cover of the metal enclosure:
1 One terminal block *(1)* for ⎓ 24 V supply.
2 Three terminal blocks for connection of digital output channels.
3 One terminal block *(1)* for connection of line control 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 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
8 One ground connection screw.
9 One “Reset” button (on the top).
10 **On the rear face:** One spring operated mounting device for mounting on 35 mm ⊥ rail.



Remote mixed I/O module XPSMF3DIO20802

On the front cover of the metal enclosure:
1 One terminal block *(1)* for ⎓ 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 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
6 One ground connection screw.
7 One “Reset” button (on the top).
8 **On the rear face:** One spring operated mounting device for mounting on 35 mm ⊥ rail.



Remote mixed I/O module XPSMF3AIO8401

On the front cover of the metal enclosure:
1 One terminal block *(1)* for ⎓ 24 V supply.
2 Four terminal blocks *(1)* for connection of analog inputs.
3 One terminal block *(1)* for connection of analog outputs.
4 One metal plate for securing shielded analog input/output connection cables (EMC).
5 Eight process status LEDs.
6 TwTwo RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
7 One ground connection screw.
8 One “Reset” button (on the top).
9 **On the rear face**: one spring operated mounting device for mounting on 35 mm ⊥ rail.

*(1) Removable screw terminals are provided with the safety remote mixed I/O modules **XPSMF3DIO/AIO**.*

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Status LED details

Safety remote mixed I/O modules XPSMF3●IO●●●●●

LED	Color	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-energized state.
		Off	The CPU is in “ERROR” state (see ERROR).
ERROR	Red	On	Software error or hardware anomaly 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 while 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.

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Characteristics

Safety remote mixed I/O module type			XPSMF3DIO8801	XPSMF3DIO16801	XPSMF3DIO20802	XPSMF3AIO8401
Supply voltage		**V**	⎓ 24 (external supply with separate protection conforming toEN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)			
Voltage limits		**V**	- 15…+ 20%			
Ambient air temperature	For operation	**°F (°C)**	+ 32… + 140 (0…+ 60)			
	For storage	**°F (°C)**	- 40…+ 185 (- 40…+ 85)	- 40…+ 185 (- 40… + 85) without battery	- 40…+ 185 (- 40…+ 85)	
Degree of protection			IP 20			
Response time		**ms**	Depending on size of application			
Maximum current power 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 2/26 for wire sizes of the various connector types.			

Digital inputs

Safety remote mixed I/O module type			XPSMF3DIO8801	XPSMF3DIO16801	XPSMF3DIO20802
Number	Inputs not electrically isolated		8	16	20
Voltage	At state 1	**V**	⎓ 15…30		
		mA	> 2 at ⎓ 15 V		⩾ 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 140 °F (60 °C)	5 x 20 V/100 mA at 24 V, protected against short-circuits
LED display			Yes		

Digital outputs

Safety remote mixed I/O module type			XPSMF3DIO8801	XPSMF3DIO16801	XPSMF3DIO20802
Number	Outputs not electrically isolated		8 DO+ (reference pole L-) 2 DO- (reference pole S+)	8 x 2-pole or 16 x single-pole	8
Output voltage		**V**	⎓ 24 ± 2	⎓ 24 ± 3	⎓ 24 ± 2
Output current	Channels 1 to 3 and 5 to 7	**A**	DO+: 0.5 at 140 °F (60 °C)	2 max. at 104 °F (40 °C) 1 max. at 140 °F (60 °C) 10 mA min.	0.5 at 140 °F (60 °C)
	Channels 4 and 8	**A**	DO+: 1 at 140 °F (60 °C), 2 at 104 °F (40 °C)		1 at 140 °F (60 °C), 2 at 50 °C
	Channels 1 and 2	**A**	DO-: 1 at 140 °F (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		

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Characteristics *(continued)*

Line control outputs

Module type			XPSMF3DIO8801	XPSMF3DIO16801
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	

Analog inputs

Safety remote mixed I/O module type			XPSMF3AIO8401
Number	Inputs not electrically isolated		8, single-pole
External jumper		Ω	250 or 500 depending on application
Input values	Nominal value	**V**	⎓ 0…10
		mA	0…20, with 500 Ω jumper
	Service value	**V**	⎓ 0.1…11.5
		mA	0/4…23, with 500 Ω jumper
Input impedance		**MΩ**	2
Maximum distance of equipment			984 ft (300 m)
Internal resistance of signal source		Ω	≤ 500
Overvoltage protection		**V**	+ 15, - 4
Resolution			12-bit
Safety accuracy			± 2%
LED display			No

Analog outputs

Safety remote mixed I/O module type			XPSMF3AIO8401
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			984 ft (300 m)
Resolution			12-bit
Relative error			± 1%
LED display			No

Communication

Ethernet network: safety communication using SafeEthernet protocol

Safety remote mixed I/O module type			XPSMF3DIO8801	XPSMF3DIO16801	XPSMF3DIO20802	XPSMF3AIO8401
Transmission	Communication ports		Integrated 2 RJ45 switched Ethernet communications ports			
	Baud rate	**Mbps**	100 Half duplex, 10 Full duplex, Autonegotiation			
Structure			10BASE-T/100BASE-TX			
Medium			Dual twisted pair cable, category 5D or better (Ethernet)			

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Safety automation system solutions

Preventa™ safety PLCs
Compact and modular
Safety remote mixed I/O modules XPSMF3

XPSMF3DIO8801

XPSMF3DIO16801

XPSMF3DIO20802

XPSMF3AIO8401

*Products referenced **XPSMF3●●●●●●** are marked **HIMatrix® F3...** (manufactured by Hima, sold by Schneider Electric).*

References

Safety remote mixed I/O modules (⎓ 24 V supply)

For use with	Inputs		Outputs			Ports	Reference	Weight oz (kg)
	Digital	Analog	Digital	Line control	Analog			
Safety PLCs, modular XPSMF60 or compact XPSMF40 and XPSMF31/30/35	8	–	8 DO+ 2 DO-	2	–	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF3DIO8801**	35.274 (1.000)
	16	–	8 x 2 or 16 x 1	2	–	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF3DIO16801**	45.856 (1.300)
	20	–	8 *(1)*	–	–	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF3DIO20802**	35.273 (1.000)
	–	8	–	–	4	Integrated 2 RJ45 switched Ethernet communications ports	**XPSMF3AIO8401**	33.510 (0.950)

Connecting cables

Description	For	Reference	Weight oz (kg)
Ethernet network connecting cables	Connection between safety remote mixed I/O modules and modular or compact safety PLCs XPSMF. RJ45 connector fitted at each end	See page 2/29	–

(1) Configurable for line control.

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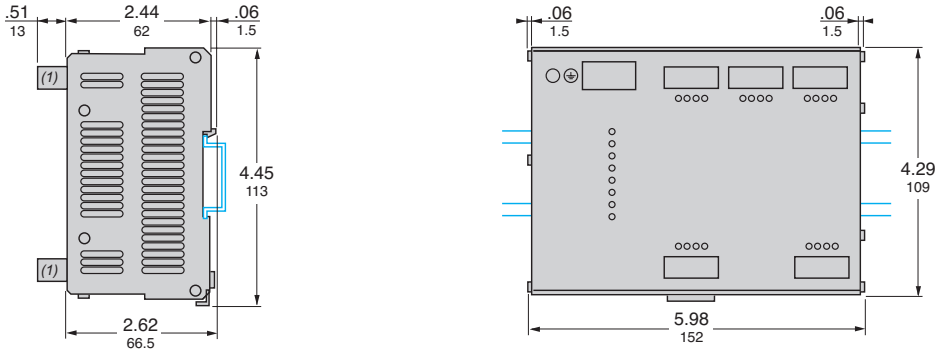
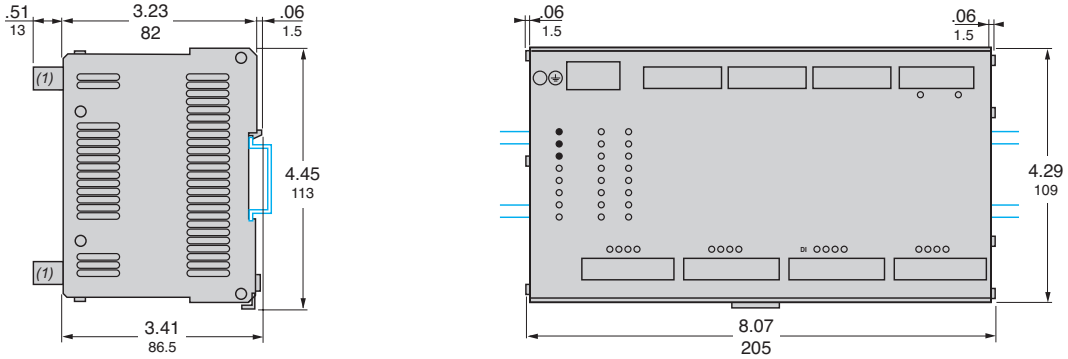
XPSMF3DIO8801



*(1) Removable screw terminals are provided with the safety remote mixed I/O modules **XPSMF3DIO8801**.*

XPSMF3DIO16801



*(1) Removable screw terminals are provided with the safety remote mixed I/O modules **XPSMF3DIO16801**.*

Dual Dimensions: INCHES Millimieters

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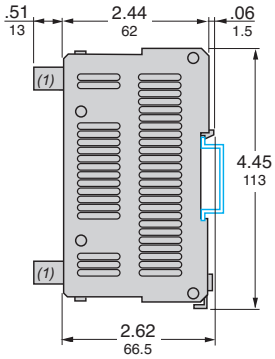
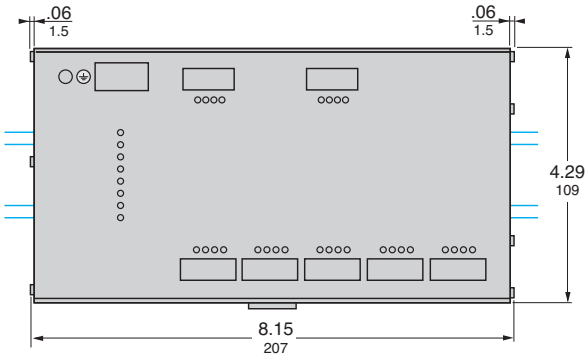
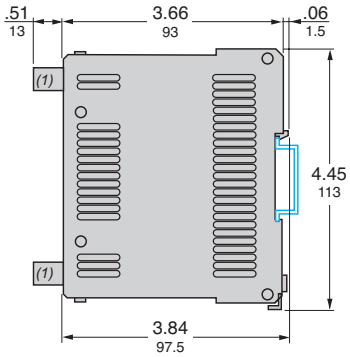
XPSMF3DIO20802

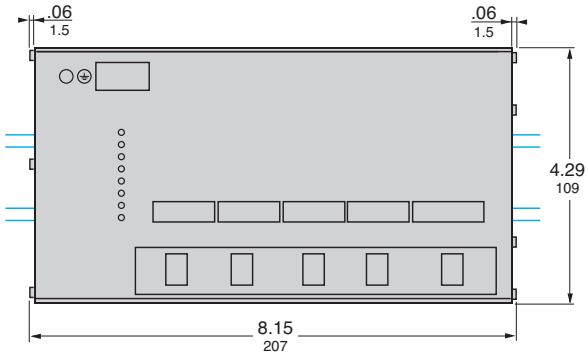




*(1) Removable screw terminals are provided with the safety remote mixed I/O modules **XPSMF3DIO20802**.*

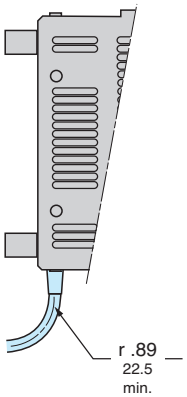
XPSMF3AIO8401





*(1) Removable screw terminals are provided with the safety remote mixed I/O modules **XPSMF3AIO8401**.*

RJ45 connector for access to Ethernet network (SafeEthernet protocol)



Dual Dimensions: INCHES / Millimieters

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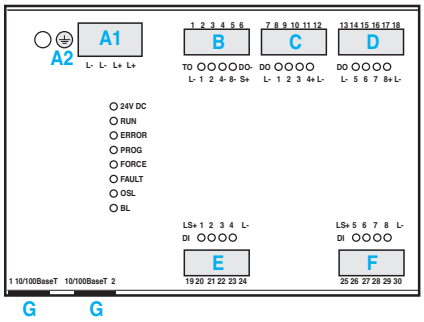
2

XPSMF3DIO8801



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	**Ground**	–	⏚	Ground
B	**Outputs - Line control/ Digital**	1	L-	Reference pole
		2	1	Line control output 1
		3	2	Line control 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		Function
G	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

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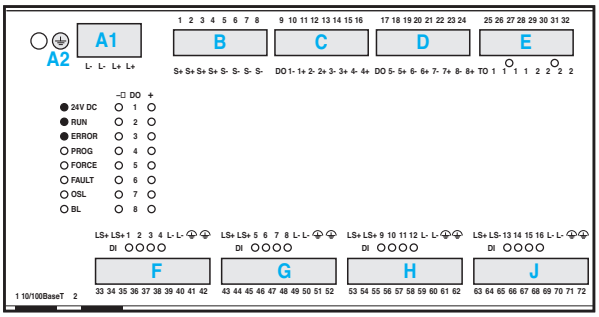
Connections

XPSMF3DIO16801



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	**Ground**	–	⏚	Ground
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 - Line control**	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 ground
		42	PA	Electrically clean ground
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 ground
		52	PA	Electrically clean ground
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 ground
		62	PA	Electrically clean ground
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 ground
		72	PA	Electrically clean ground

Item	Connection		Function
K	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

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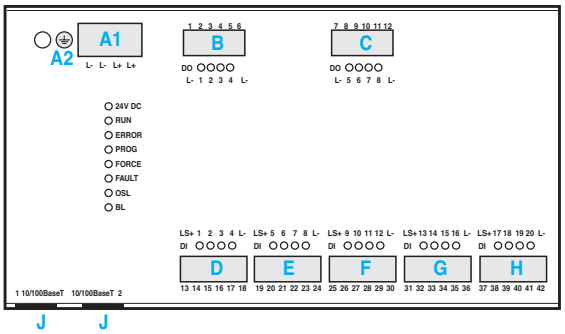
Connections

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	**Ground**		⏚	Ground
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		Function
J	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

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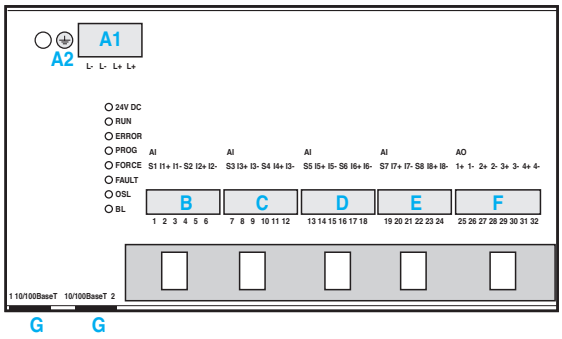
Connections

XPSMF3AIO8401



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	**Ground**		⏚	Ground
B	**Inputs - Analog**	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 - Analog**	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 - Analog**	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 - Analog**	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 - Analog**	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		Function
G	**Programming**	Integrated 2 RJ45 switched Ethernet Communication ports	Either of the two switched Ethernet ports can be used to create a connection between the safety remote I/O and the programming terminal in a point to point or via an Ethernet network for setting the IP address
	Safe Communication (all XPSMF Safety PLCs and Remote I/Os)		Either of the two switched Ethernet ports can be used to create a connection between the safety PLC and other safety related components (e.g other XPSMF safety PLCs or Safety Remote I/O modules) this can be established in a point to point way or via an Ethernet network.

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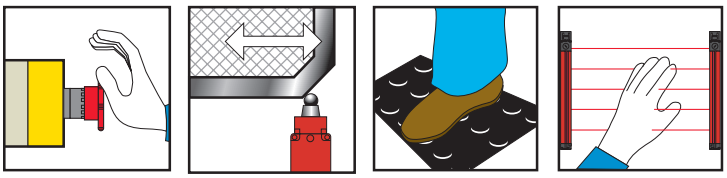
Applications



Modules	**Controllers for monitoring 2 independent safety functions simultaneously.** **User selection of 2 functions from a choice of 15.** **Programmable from front cover of controller.**

Functions		◻ Emergency stop monitoring ◻ Switch monitoring ◻ Enabling switch monitoring ◻ Sensing mat or edges monitoring ◻ Light curtain monitoring, relay output type ◻ etc.
Conformity to standards		EN 954-1 - category 4/ISO 13849-1, EN/IEC 60204-1, DIN V VDE 801 + A1, EN/IEC 60947-1 + A11, EN/IEC 60947-5-1
Product certifications		UL, CSA, BIA
Number of circuits		
	Safety	6 N.O. (3 N.O. per function)
	Additional	3 solid-state outputs for signalling to PLC
Display		12 LEDs
Supply voltage		⎓ 24 V
Communication	CANopen bus	–
	Profibus bus	–
	Modbus® network	–
Module type		**XPSMP**
Page		2/108

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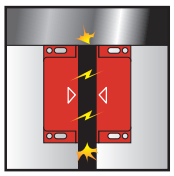
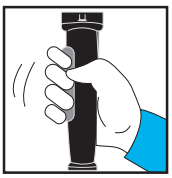
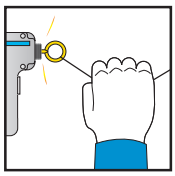
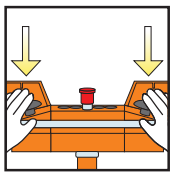
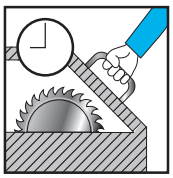

Configurable controllers using software, for several independent safety functions: selection of safety functions using configuration software running on Windows® (16 or 32 inputs and 8 independent safety outputs)

- Emergency stop monitoring
- Limit switch monitoring
- Two-hand control monitoring
- Light curtain monitoring, with or without “muting” function
- Enabling switch monitoring, coded magnetic switch monitoring
- Safety mat monitoring
- Hydraulic press solenoid valve monitoring
- Eccentric press safety stop at top dead center monitoring. Zero speed detection
- Hydraulic press monitoring
- Eccentric press monitoring
- Foot switch monitoring
- Chain shaft breakage monitoring
- Position selector

EN 954-1 - category 4/ISO 13849-1,
IEC 61508 - SIL 3,
EN/IEC 60204-1,
EN 1760-1/ISO 13856-1,
EN/IEC 60947-5-1,
EN/IEC 61496-1,
EN 574/ISO 13851,
EN 954-1/ISO 13849-1

UL, CSA, TÜV

4 N.O. (2 N.O. per function) + 6 solid-state

1 “muting” signalling output

LED display on front cover

⎓ 24 V

Via SUB-D 9-pin male connector, only on XPSMC16ZC and XPSMC32ZC

Via SUB-D 9-pin female connector, only on XPSMC16ZP and XPSMC32ZP

Via RJ45 connector, on all controllers XPSMC●●Z●

XPSMC

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2

Presentation

Operating principle

Preventa™ safety controller modules XPSMP are designed to conform with category 4 of the standard EN 954-1/ISO 13849-1.
They enable two independent safety functions (selected from a choice of 15 pre-defined configurations) to be performed using the same product. Configuration selection is easily made using 3 buttons on the front cover of the module.

These 15 pre-programmed safety functions provide a solution for the majority of safety applications up to level 4 conforming to the standard EN 954-1/ISO 13849-1, for example: monitoring Emergency stops, limit switches, safety mats and sensing edges, enabling switches, coded magnetic switches, type 4 relay output light curtains conforming to EN/IEC 61496-1 (for example, light curtains type XUS L.
Safety controllers XPSMP incorporate 6 safety outputs (3 per function) and 3 solid-state signalling outputs for signalling to the process PLC.

To aid diagnostics, the modules have LEDs on the front cover which provide information on the monitoring circuit status. They also indicate and assist selection of the 2 required configurations.

	Configuration	Synchronization time	Type of start *(1)*		Start test	Notes
			Automatic or unmonitored	Monitored		
Functions disabled	**0**	–	–	–	–	Factory setting
Emergency stop monitoring, 1-channel wiring (category 2)	**1**	–	X	–	–	–
	2	–	–	X	–	–
Emergency stop monitoring, 2-channel wiring, or guard monitoring (category 4)	**3**	Unlimited	X	–	X	–
	4	Unlimited	–	X	X	–
	5	1.5 s	X	–	X	–
	6	1.5 s	–	X	X	–
	7	Unlimited	X	–	–	–
	8	Unlimited	–	X	–	–
Guard monitoring for injection press or blowing machine (category 4)	**9**	1.5 s	–	X	X	Uses both safety outputs *(2)*
Enabling grip switch monitoring (3 position switch) (category 4)	**10**	–	X	–	X	The start button acts as start-up preparation
Sensing mat and edges monitoring (category 3)	**11**	–	X	–	–	Mats with circuit making contacts
	12	–	–	X	–	
Relay output light curtain monitoring (category 4)	**13**	0.5 s	–	X	X	–
Non-contact safety interlock switch monitoring (category 4)	**14**	1.5 s	X	–	–	Magnetic switches with 2 contacts, 1 N.O. and 1 N.C.
	15	1.5 s	–	X	–	

(1) Automatic start: there is no start contact or it is jumpered.
Unmonitored start: the output is activated on closing of the start contact.
Monitored start: the start input is monitored so that there is no start-up in the event of the start contact being jumpered or the start circuit being closed for more than 10 seconds.
Start-up is triggered following activation of the start button (push-release function) on opening of the contact.
(2) Tool zone guard with 3rd switch.
Additional rear guard (optional) with automatic start. The opening of the guard cuts all outputs.

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Characteristics

Module type			XPSMP11123	XPSMP11123P
Conformity to standards			EN/IEC 60204-1, DIN V VDE 801 + A1, EN/IEC 60947-1 + A11, EN/IEC 60947-5-1	
Product certifications			UL, CSA, BIA	
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 4 max.	
Supply		**V**	⎓ 24	
Voltage limits			- 20…+ 20%	
Power consumption		**W**	⩽ 5	
Module inputs fuse protection			Internal, electronic	
Start button monitoring			Yes/No (depending on configuration selected)	
Control unit voltage Between input terminals C1-I1, C2-I2, C3-I3, C4-I4, C5-I5 or C6-I6		**V**	24 (at nominal supply voltage)	
Calculation of wiring resistance RL between input terminals		Ω	100 max. Maximum cable length: 6561 ft (2000 m)	
Synchronization time between inputs		**s**	0.5, 1.5 or unlimited, depending on configuration selected	
Outputs	Voltage reference		Relay hard contacts	
	Number and type of safety circuits		3 N.O. per function (6 N.O. total) (13-14, 23-24, 33-34, 43-44, 53-54, 63-64)	
	Number and type of additional circuits		3 solid-state	
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13		24 V/1.5 A L/R = 50 ms	
	Breaking capacity of solid-state outputs		24 V/20 mA	
	Max. thermal current (Ithe) for each group of 3 outputs		3.3 A for all 3 outputs, or 6 A for 1 output and 2 A for the other 2 outputs, or 2 A for 1 output and 4 A for the other 2 outputs	
	Max. total thermal current	**A**	20	
	Output fuse protection		4 gG or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current	**mA**	10	
	Minimum voltage	**V**	17	
Electrical life			See page 2/172	
Response time on input opening		**ms**	< 30	
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display			12	
Operating temperature		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature		**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC 60529	Terminals		IP 20	
	Enclosure		IP 40	
Connections	Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection, without cable end		Solid or flexible cable: 26-14 AWG (0.14… 2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.2… 2.5 mm²)
	1-wire connection, with cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
			With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)
	2-wire connection, without cable end		Solid or flexible cable: 26-20 AWG (0.14…0.75 mm²)	Solid cable: 24-18 AWG (0.2…1 mm²) Flexible cable: 24-18 AWG (0.2…1.5 mm²)
	2-wire connection, with cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
			Double, with bezel, flexible cable: 22-14 AWG (0.5…1.5 mm²)	

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Safety automation system solutions

Preventa™ safety controllers type XPSMP

With pre-defined functions

2

XPSMP11123

XPSMP11123P

References

Description	Type of terminal block connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight oz (kg)
Modules for 2 independent safety functions	Integrated in module	3 N.O. per function (6 N.O. total)	3 solid-state	⎓ 24 V	**XPSMP11123**	11.287 (0.320)
	Removable from module	3 N.O. per function (6 N.O. total)	3 solid-state	⎓ 24 V	**XPSMP11123P**	11.287 (0.320)

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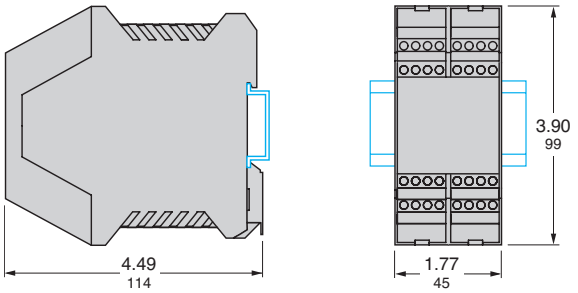
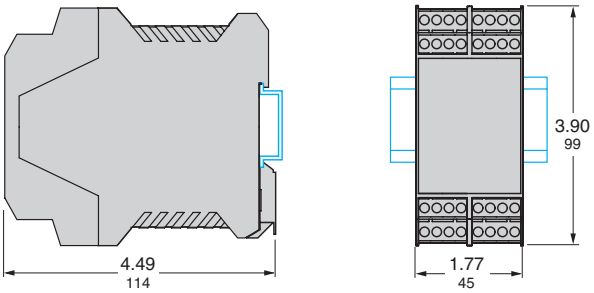
Dimensions

XPSMP●●●●

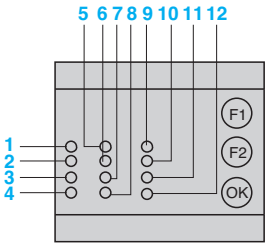


XPSMP●●●●P



Dual Dimensions: INCHES
Millimieters

LED details



1-2-3	Function 1 configuration code.
4	K1/K2 status (function 1, N.O. safety outputs closed).
5-6-7	Function 2 configuration code.
8	K3/K4 status (function 2, N.O. safety outputs closed).
9	Supply voltage A1-A2.
10	Fault.
11	Function 1 configuration.
12	Function 2 configuration.
F1, F2, OK:	Configuration buttons.

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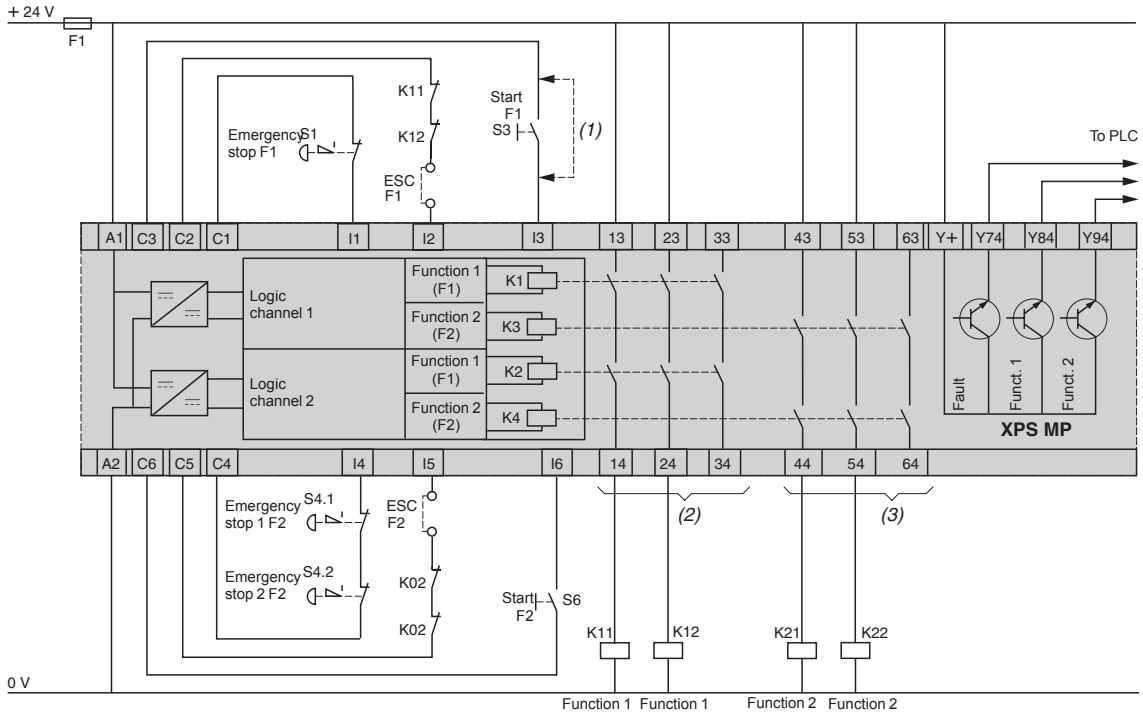
2

XPSMP

Emergency stop monitoring, 1-channel wiring

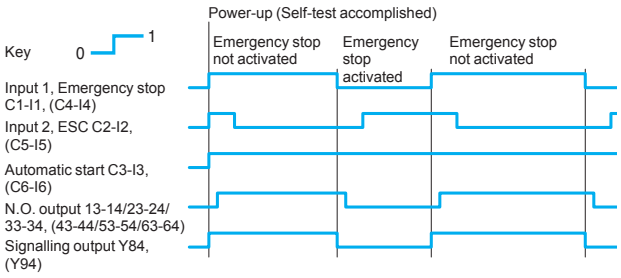
Configuration 1 (1-channel Emergency stop, automatic or unmonitored start) = function 1.
Configuration 2 (1-channel Emergency stop, monitored start) = function 2.



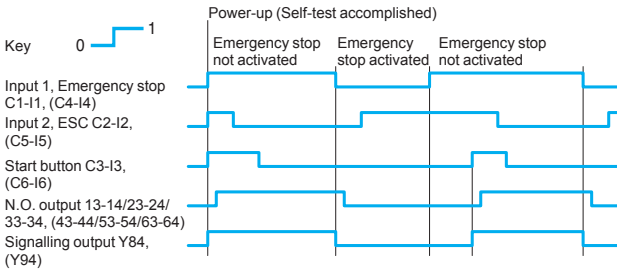
(1) Automatic start.
(2) Function 1 safety outputs.
(3) Function 2 safety outputs.
ESC = External start conditions.

Functional diagrams

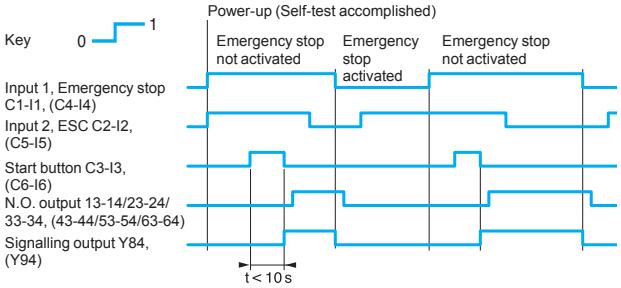
Configuration 1
Automatic start



Configuration 1
Unmonitored start



Configuration 2
Monitored start



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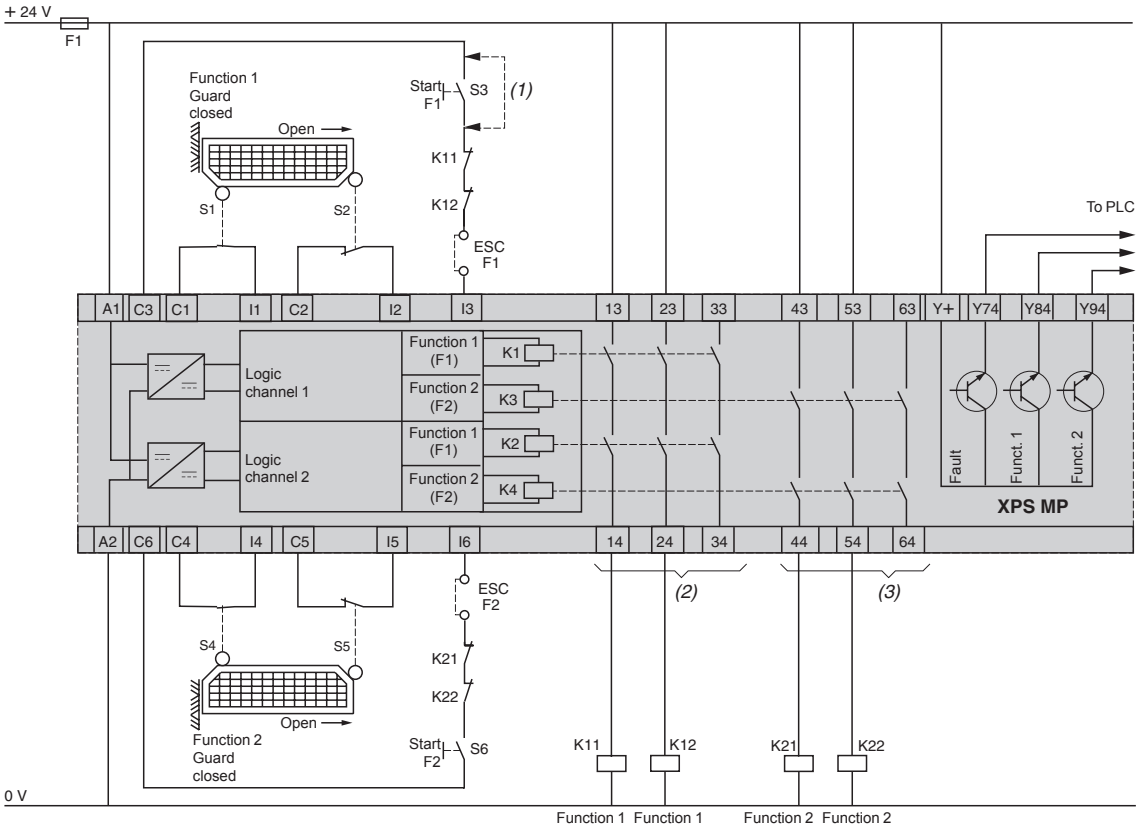
XPSMP

Guard monitoring with start test

Configuration 3 (locking of guard with start test, automatic or unmonitored start) = function 1.
Configuration 4 (locking of guard with start test, monitored start) = function 2.

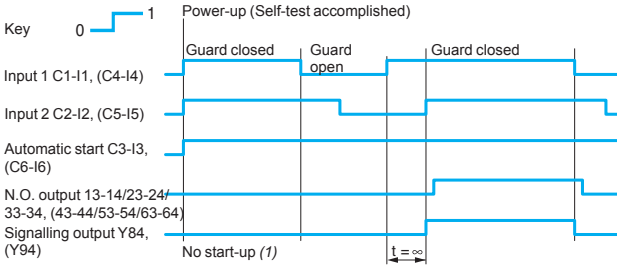


(1) Automatic start.
(2) Function 1 safety outputs.
(3) Function 2 safety outputs.
ESC = External start conditions.

Functional diagrams

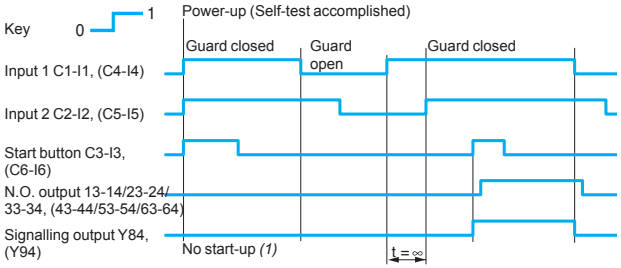
Configuration 3

Automatic start



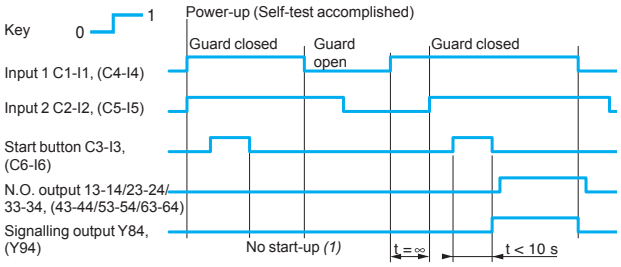
Configuration 3

Unmonitored start



Configuration 4

Monitored start



(1) Prevention of start-up necessary: to check the sensors connected, open and reclose the guard.

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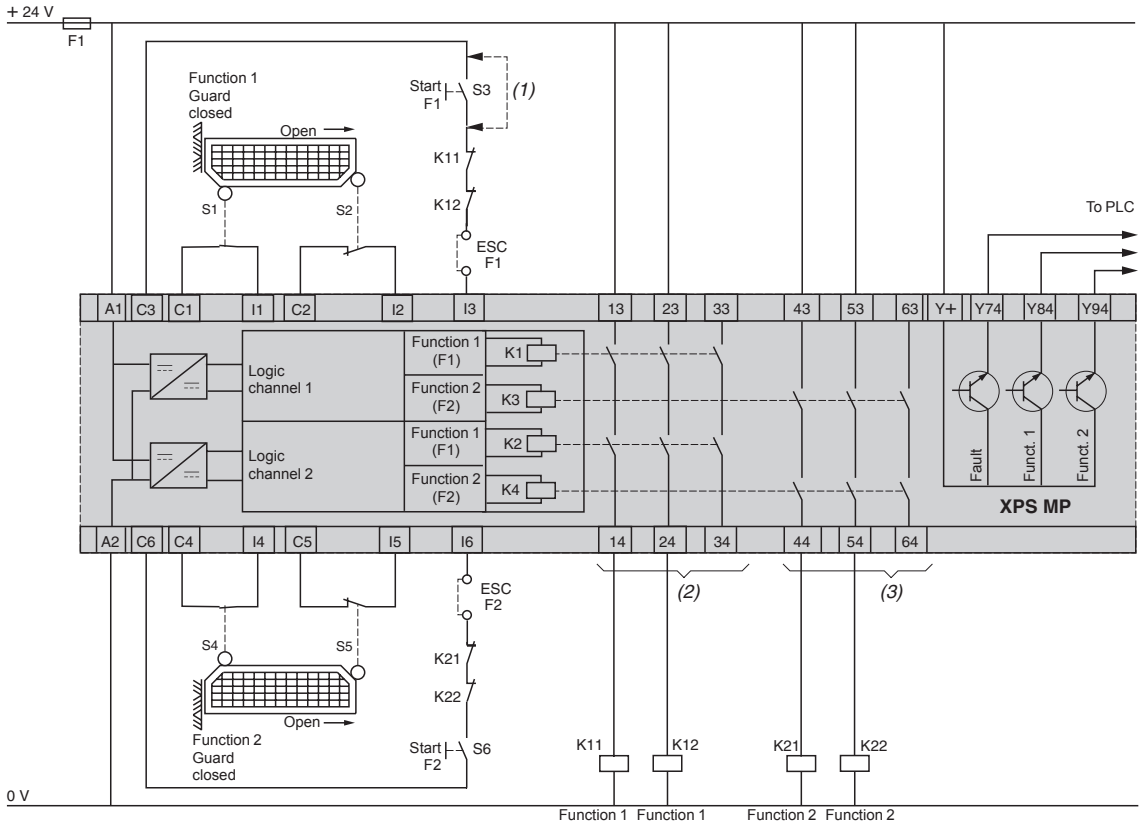
2

XPSMP

Guard monitoring with start test and synchronization time = 1.5 ms

Configuration 5 (locking of guard with start test, automatic or unmonitored start) = function 1.
Configuration 6 (locking of guard with start test, monitored start) = function 2.

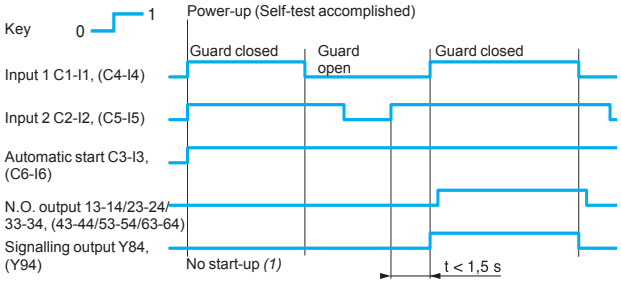


(1) Automatic start.
(2) Function 1 safety outputs.
(3) Function 2 safety outputs.
ESC = External start conditions.

Functional diagrams

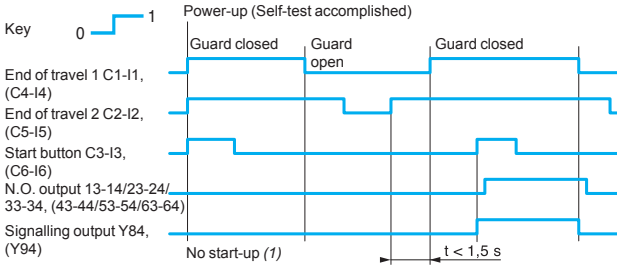
Configuration 5

Automatic start



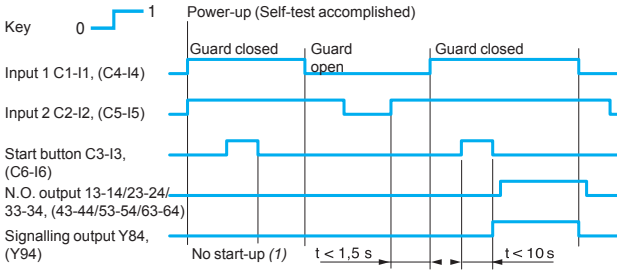
Configuration 5

Unmonitored start



Configuration 6

Monitored start



(1) Prevention of start-up necessary: to check the sensors connected, open and reclose the guard.

Presentation: page 2/106
Characteristics: page 2/107
References: page 2/108
Dimensions: page 2/109
Wiring Diagrams: page 2/110 to 2/117

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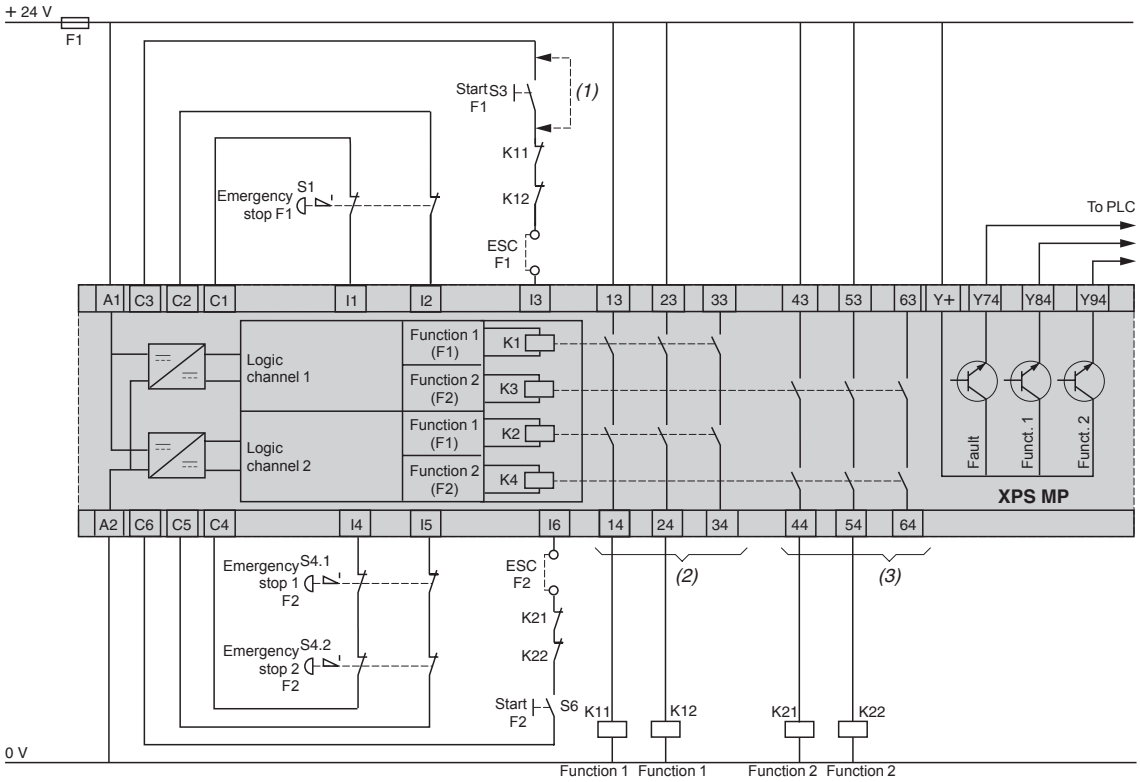
2

XPSMP

Emergency stop monitoring, 2-channel wiring

Configuration 7 (2-channel Emergency stop, automatic or unmonitored start) = function 1.
Configuration 8 (2-channel Emergency stop, monitored start) = function 2.

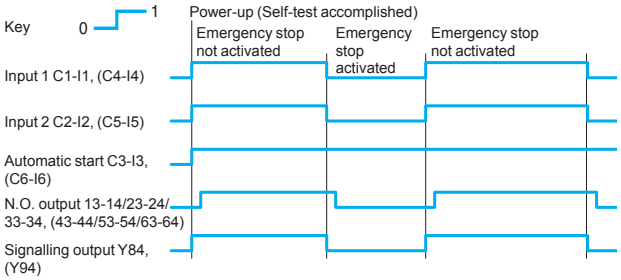


(1) Automatic start.
(2) Function 1 safety outputs.
(3) Function 2 safety outputs.
ESC = External start conditions.

Functional diagrams

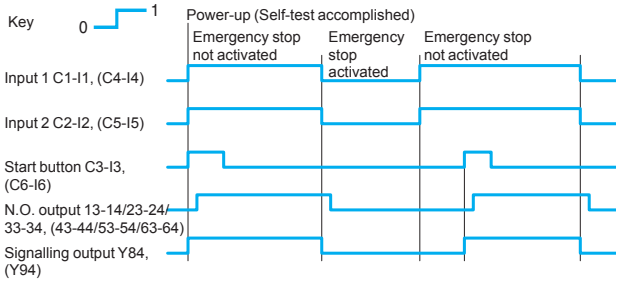
Configuration 7

Automatic start



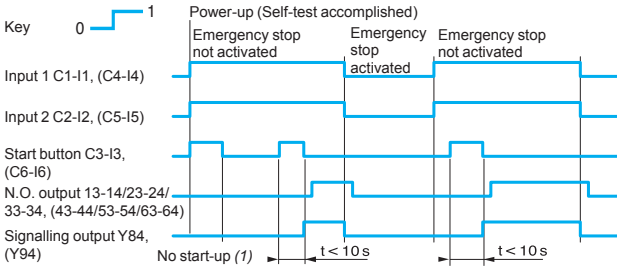
Configuration 7

Unmonitored start



Configuration 8

Monitored start



(1) Start button control: the start button must not be activated on power-up.

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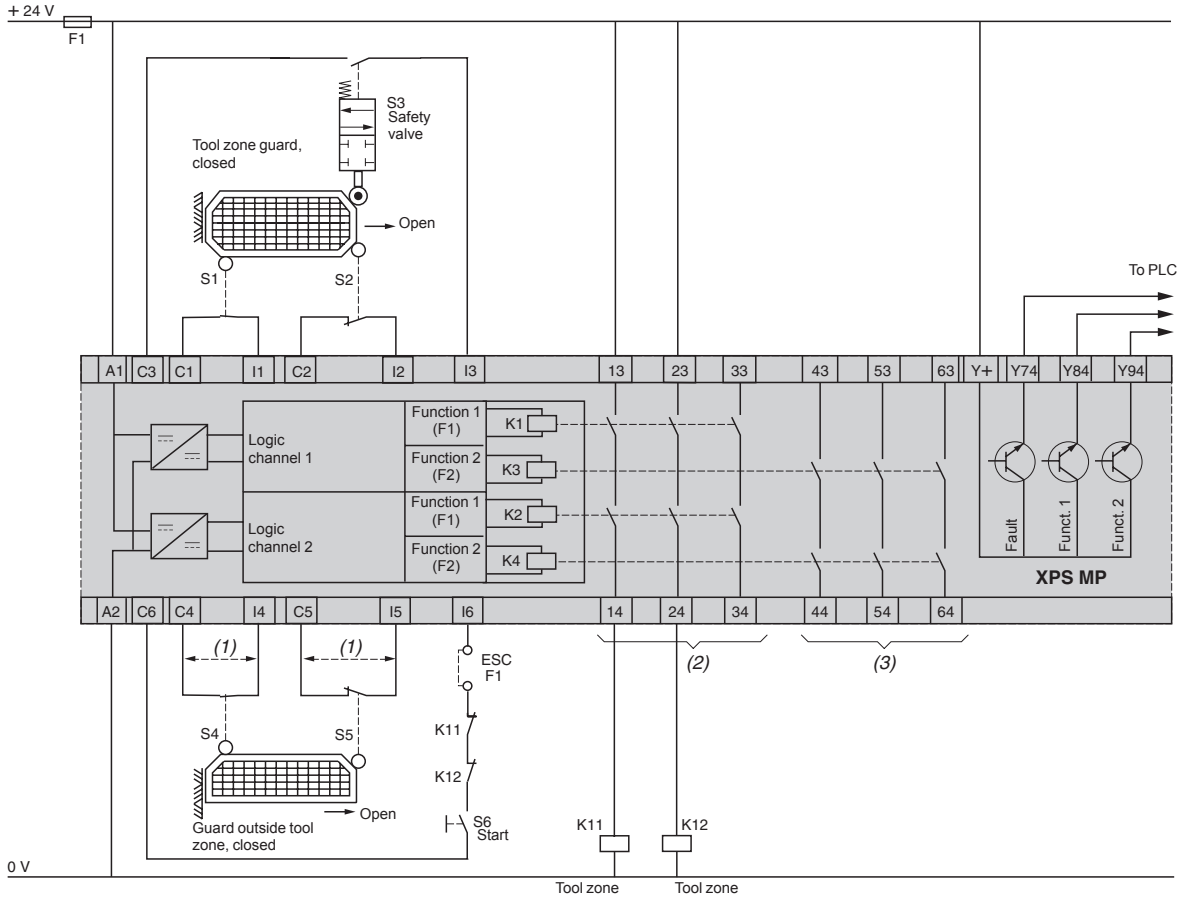
2

XPSMP

Guard monitoring for injection press or blowing machine

Configuration 9 (this configuration uses both functions of the controller. Only function 1 is configured).



(1) If sensors S4 and S5 are not used, terminals C4-I4 and C5-I5 must be linked.

(2) Safety outputs for tool zone.

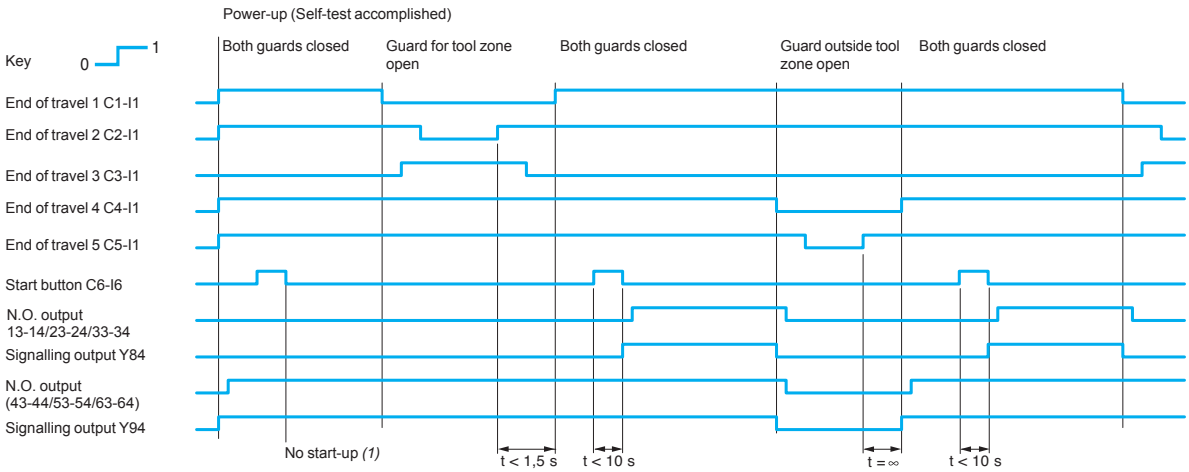
(3) Safety outputs for rear access safety doors.

In configuration mode 9, the N.C. contacts of the relays or contactors controlled via outputs 43-44, 53-54, 63-64 cannot be monitored by the feedback loop (ESC).

ESC = External start conditions.

Functional diagram

Configuration 9



(1) Prevention of start-up necessary: to check the sensors connected, open and reclose the guard.

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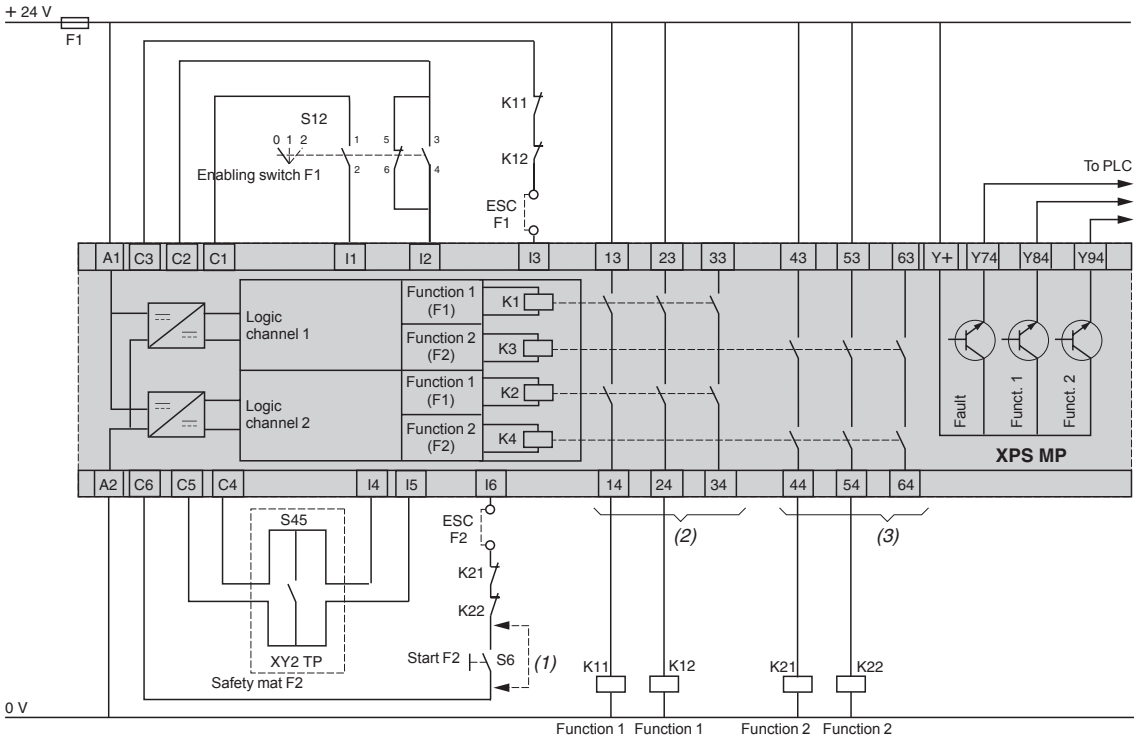
XPSMP

Enabling switch monitoring, safety mat monitoring

Configuration 10 (enabling switch monitoring, with or without start-up preparation) = function 1.
Configuration 11 (safety mat monitoring, automatic or unmonitored start) = function 2.

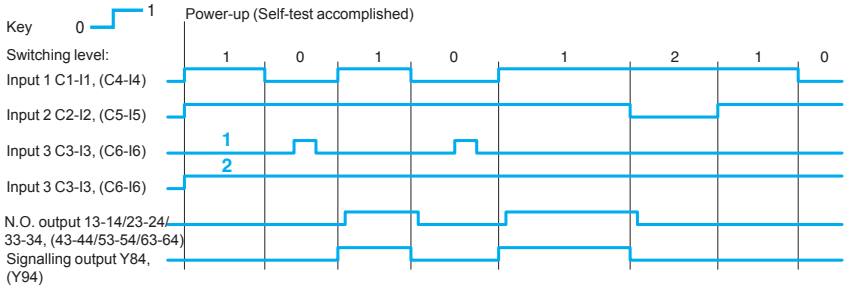


(1) Automatic start.
(2) Function 1 safety outputs.
(3) Function 2 safety outputs.
ESC = External start conditions.

Functional diagrams

Configuration 10

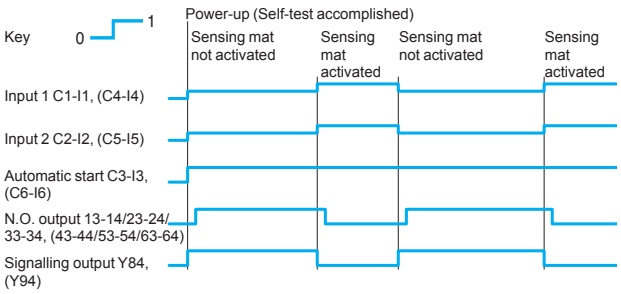
Enabling switch



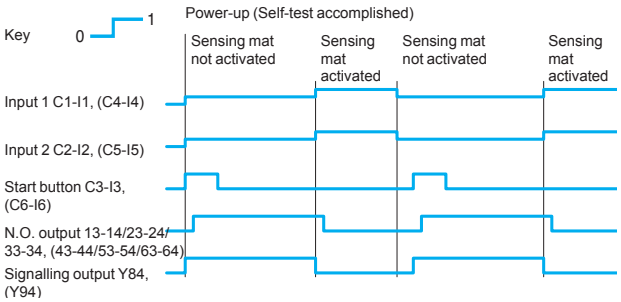
1 With start-up preparation.
2 Without start-up preparation.

Configuration 11

Safety mat with automatic start



Safety mat with unmonitored start



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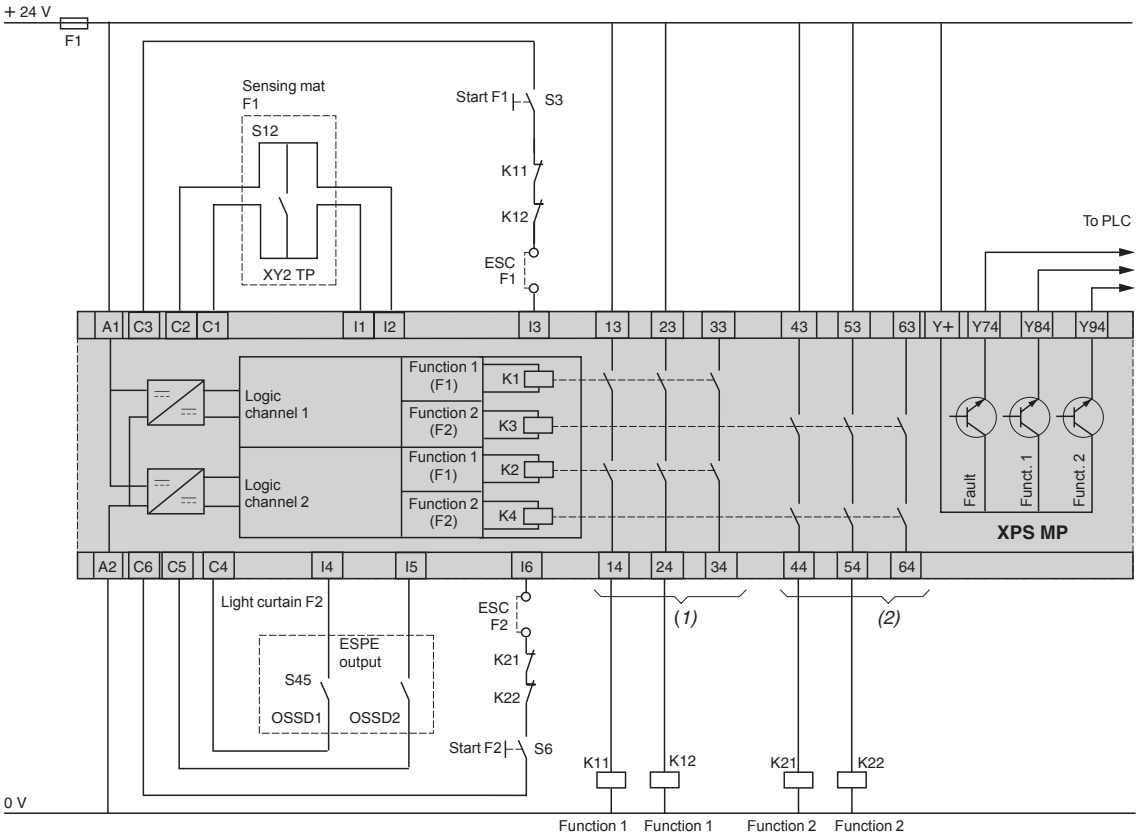
2

XPSMP

Safety mat monitoring, light curtain monitoring

Configuration 12 (sensing mat monitoring, monitored start) = function 1.
Configuration 13 (light curtain monitoring, monitored start; synchronization time = 0.5 s) = function 2.

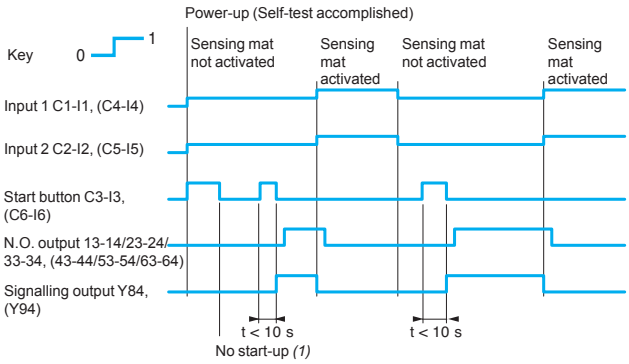


(1) Function 1 safety outputs.
(2) Function 2 safety outputs.
ESC = External start conditions.

Functional diagrams

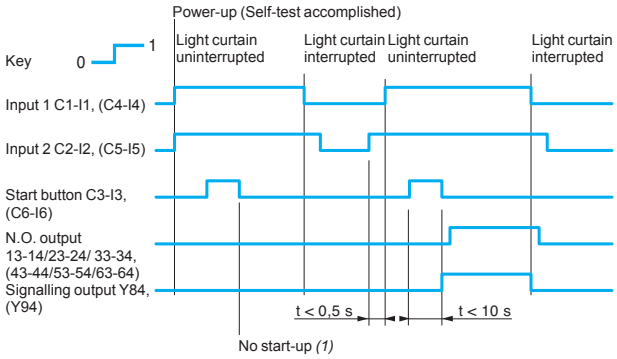
Configuration 12

Sensing mat with monitored start



Configuration 13

Light curtain with monitored start



(1) Start button control: the start button must not be activated on power-up.

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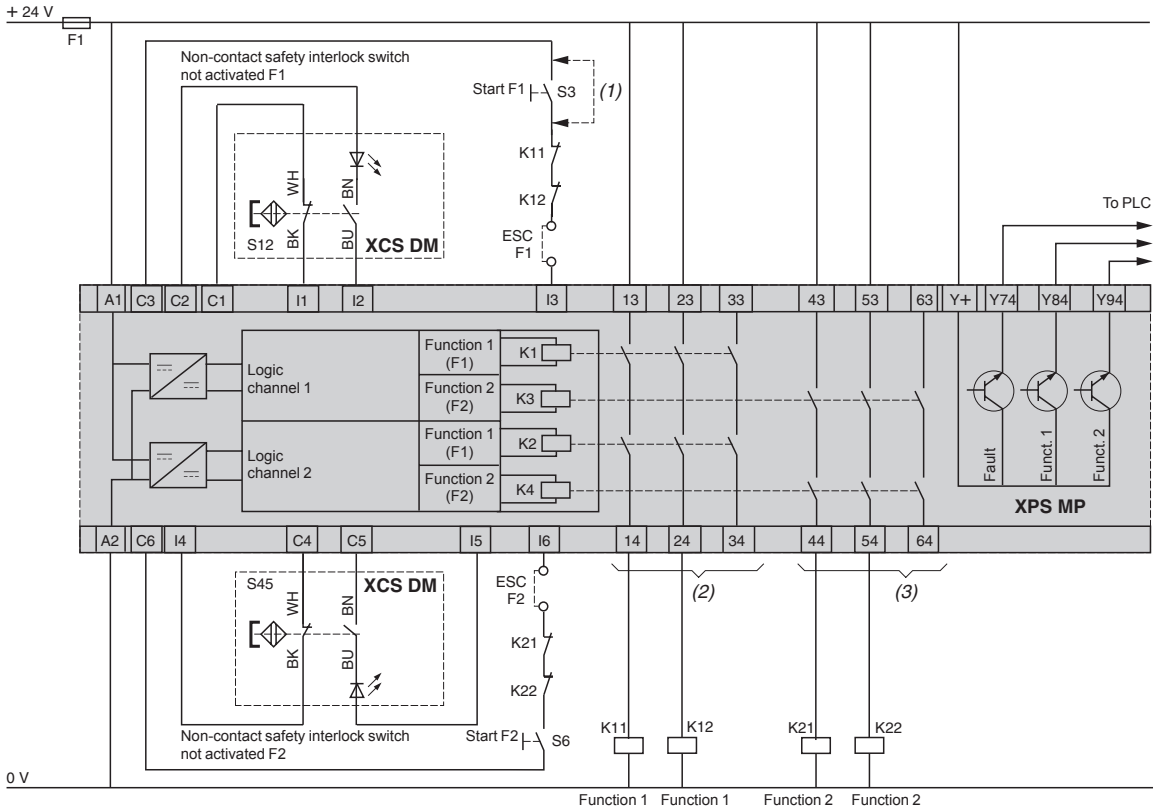
2

XPSMP

Non-contact safety interlock switch monitoring

Configuration 14 (automatic or unmonitored start, synchronization time = 1.5 s) = function 1.
Configuration 15 (monitored start, synchronization time = 1.5 s) = function 2.

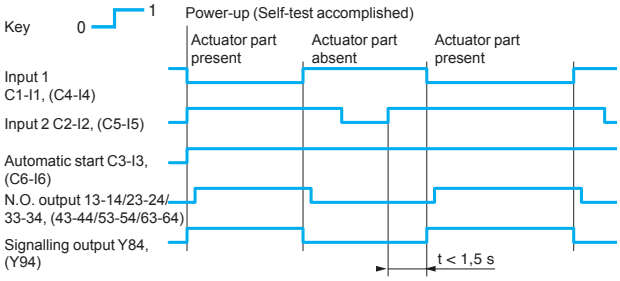


(1) Automatic start.
(2) Function 1 safety outputs.
(3) Function 2 safety outputs.
ESC = External start conditions.

Functional diagrams

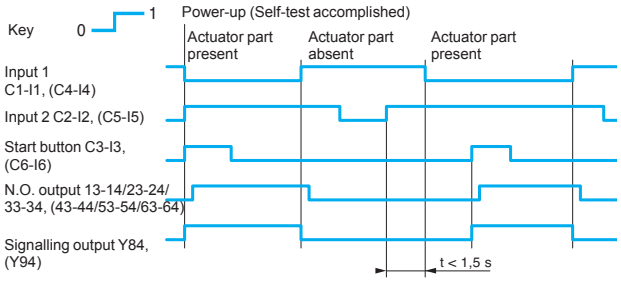
Configuration 14

Automatic start



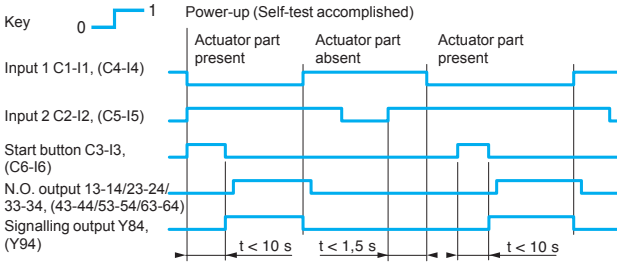
Configuration 14

Unmonitored start



Configuration 15

Monitored start



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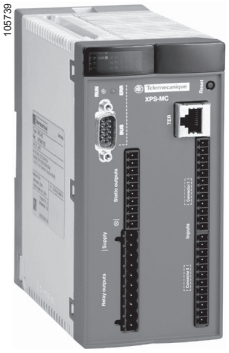
Safety automation system solutions

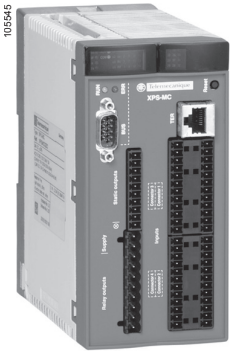
Preventa™ configurable safety controllers type XPSMC

105739



XPSMC16ZC

105545



XPSMC32ZC

Presentation

Configurable safety controllers XPSMC●●Z● are designed to provide a solution for safety applications requiring conformity to category 4 of standard EN 954-1/EN/ ISO 13849-1 and SIL 3 requirements of standard IEC 61508.
The range of configurable safety controllers consists of 6 products, each with different technical characteristics.

Configurable controllers	Safety inputs	Safety outputs *(1)*	Communication via		
			CANopen bus	Profibus bus	Modbus® serial link
XPSMC16Z	16	6 + 2 x 2	–	–	Yes, slave
XPSMC16ZC	16	6 + 2 x 2	Yes, slave	–	Yes, slave
XPSMC16ZP	16	6 + 2 x 2	–	Yes, slave	Yes, slave
XPSMC32Z	32	6 + 2 x 2	–	–	Yes, slave
XPSMC32ZC	32	6 + 2 x 2	Yes, slave	–	Yes, slave
XPSMC32ZP	32	6 + 2 x 2	–	Yes, slave	Yes, slave

Line control

The safety inputs are supplied by the various control outputs *(2)*, in such a manner so as to monitor for short-circuits between the inputs, short-circuits between each input and ground or the presence of residual voltages.
The controller, assisted by the control outputs, continuously tests all the connected inputs. As soon as an error is detected on an input, all the outputs associated with this input are disconnected. Safety outputs associated with other inputs remain active.

Configuration

Safety controllers XPSMC●●Z● are configurable and addressable using software XPSMCWIN running on a PC. Connection accessories required: see page 2/79.

Connections

For connection of safety inputs and outputs, safety controllers XPSMC●●Z● can be fitted with a choice of:
- screw connectors type XPSMCTS●●, or
- spring clip connectors type XPSMCTC●●.

These connectors are to be ordered separately, see page 2/124.

(1) 8 independent safety outputs = 6 solid-state safety outputs + 2 x 2 relay outputs (4 relay outputs with guided contacts).
(2) 8 control outputs are available but they are not safety outputs.

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Safety functions

Configuration of the safety functions is carried out using XPSMCWIN software.

30 certified safety functions are available with this software and they are easily assignable to the safety outputs. The safety functions have multiple combination possibilities and various starting conditions.

The safety functions are:
- certified in accordance with EN 954-1/EN/ISO 13849-1 and IEC 61508,
- configurable in controller XPSMC using XPSMCWIN software.

All 8 safety outputs are suitable for use in safety related parts of control systems conforming to category 4 of EN 954-1/EN/ISO 13849-1 and each output can disconnect one of its safety circuits.

Main safety functions

- Emergency stop monitoring, with or without time delay, 1 or 2-channel wiring
- Two-hand control (type III-C conforming to EN 574/ISO 13851)
- Guard monitoring with 1 or 2 limit switches
- Guard monitoring for injection presses and blowing machines
- Magnetic switch monitoring
- Sensing mat monitoring
- Light curtain (type 4 conforming to EN/IEC 61496, relay or solid-state output) monitoring
- Zero speed detection
- Dynamic monitoring of hydraulic valves on linear presses
- Monitoring safety stop at top dead center on eccentric press
- Safety time delays
- “Muting” function of light curtains
- Enabling switch monitoring, 2 or 3 contact
- Hydraulic press
- Eccentric press
- Foot switch monitoring
- Chain shaft breakage monitoring
- Position selector

Wiring diagrams and functional diagrams

See from page 2/126

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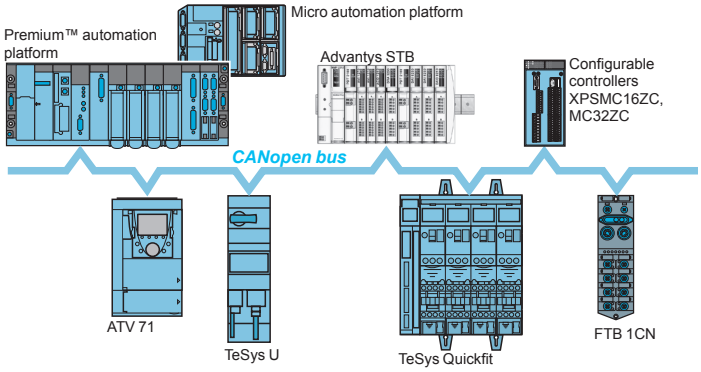
2

Communication

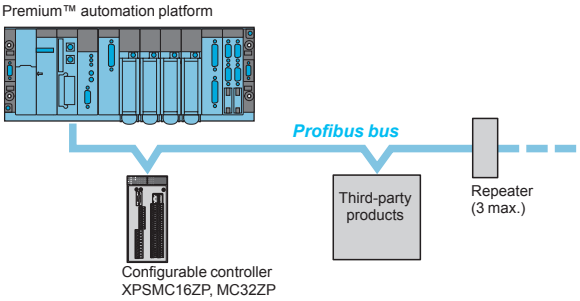
CANopen fieldbus



Configurable safety controllers XPSMC●●ZC incorporate a SUB-D 9-pin male connector for direct connection on CANopen bus.

CANopen bus is an open bus that ensures deterministic and reliable access to the real-time data of automation equipment. The bus uses a shielded dual twisted pair on which a maximum of 127 devices can be connected by chaining. The data rate varies between 10 Kbps and 1Mbps depending on the length of the bus (16,404 to 66 ft / 5,000 to 20 m).

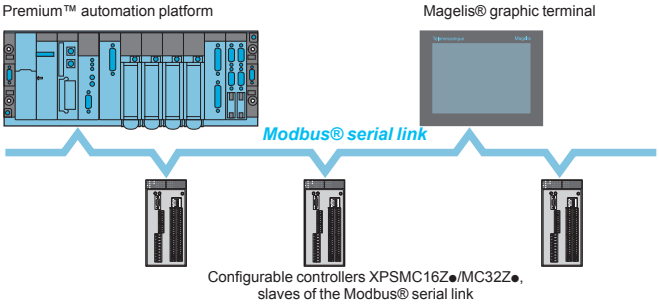
Profibus bus



Configurable safety controllers XPSMC●●ZP incorporate a SUB-D 9-pin female connector for connection on Profibus bus.
Configurable safety controllers XPSMC●●ZP are slaves on the Profibus bus.

Profibus bus is a fieldbus that meets industrial communication requirements. The topology of the Profibus bus is of the linear type with a centralised master/slave type access procedure. The physical link is a single shielded twisted pair.

Modbus® serial link



Configurable safety controllers XPSMC●●Z● MC incorporate a Modbus® communication interface (RJ45 connector) for configuration and diagnostics.
This interface enables connection of the controllers to:
- a PC (configuration),
- a PLC (diagnostics), or
- an operator dialog terminal (diagnostics).

The Modbus® serial link consists of a master station (Premium™ automation platform) and slave stations (configurable controllers XPSMC16/32Z●).
Two exchange mechanisms are possible:
- **Question/response:** the questions from the master are addressed to a given slave. The response is expected by return from the interrogated slave.
- **Distribution:** the master distributes a message to all the stations of the Modbus® serial link. The latter execute the order without transmitting a reply.

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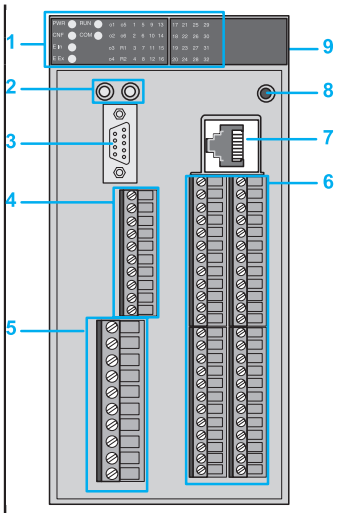
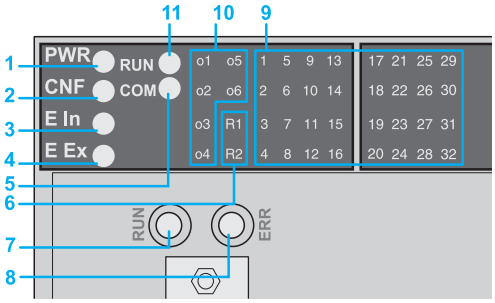


Configurable safety controller XPSMC●●Z●, with screw connectors



Illuminated display

Description

Configurable safety controllers XPSMC●●Z●

Front cover of controllers:

1 LED display and system diagnostics.
2 Two LEDs for CANopen or Profibus *(1)* connection status.
3 SUB-D 9-pin male connector for connection on CANopen bus (**XPSMC16ZC/ MC32ZC**)
or SUB-D 9-pin female connector for connection on Profibus bus (**XPSMC16ZP/ MC32ZP**).
4 Solid-state safety output and "muting" indicator light terminals.
5 Power supply (⎓ 24 V) and relay safety output terminals.
6 Control output terminals for power supply to safety inputs and safety input terminals.
7 RJ45 connector for connection on Modbus® serial link.
8 RESET button (resetting of controller).

Rear face of controllers:
9 Mounting plate for mounting on rail.

(1) Depending on controller model.

LED details

LED	Color	Status	Meaning
1 PWR	Green	On	Supply voltage present.
2 CNF	Yellow	On	In configuration mode.
		Flashing	Not configured, initial power-up.
3 E In	Red	On	Internal error: all safety outputs deactivated.
4 E Ex	Red	On	External error: all safety outputs associated with the defective circuit are deactivated.
5 COM	Green	On	Controller communicating via the TER (RJ45) connection.
6 R1, R2	Green	On	Relay outputs 13/14, 23/24, 33/34 and 43/44 activated.
		Flashing	Fault on these outputs.
7 RUN	Green	Off	Hardware OK for the Profibus bus or the CANopen bus.
		On	Communicating on Profibus bus or on CANopen bus. Normal status.
8 ERR	Red	On	Communication impossible, configuration error, damaged cabling or absence. Bus deactivated
		Off	Communicating on CANopen or Profibus bus. Normal status.
		Flashing (x 1)	Warning limit reach.
		Flashing (x 2)	Control event error on CANopen bus.
		Flashing (x 3)	Synchronization error on CANopen bus.
9 1…16 1…32	Green	On	Input circuit closed.
		Flashing	Error detected on input relating to LED.
10 o1…o6	Green	On	Solid-state output activated.
		Flashing	Short-circuit, anomaly on output.
11 RUN	Green	On	Run mode.
		Flashing	Changing from run mode to stop mode.

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2

Characteristics

Configurable safety controller type				XPSMC16Z and MC32Z, XPSMC16ZC and MC32ZC, XPSMC16ZP and MC32ZP
Conformity to standards				EN/IEC 60204-1, EN 1760-1/ISO 13856-1, EN/IEC 60947-5-1, EN/IEC 61496-1, EN 574/ISO 13851, EN 954-1/EN/ISO 13849-1, IEC 61508
Product certifications				UL, CSA, TÜV
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1/EN/ISO 13849-1 and IEC 61508)				Category 4 max. (EN 954-1/EN/ISO 13849-1), SIL 3 max. (IEC 61508)
Supply voltage			**V**	⎓ 24 ± 20%
Maximum power consumption			**W**	12
Fuse protection			**A**	16 gL max.
Start button monitoring				Configurable
Control circuit voltage				28.8 V/13 mA (between input terminals C1-I1 to C8-I16, resp. I32)
Calculation of wiring resistance RL			Ω	100 max, maximum cable length: 2000 m (Between input terminals)
Synchronization time between inputs			**s**	Depending on configuration selected
Outputs	**Relay**	Voltage reference		Relay hard contacts
		Safety circuit		2 N.O. per function (4 N.O. total) (13-14, 23-24, 33-34, 43-44)
		Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180
		Breaking capacity in DC-13		24 V/1.5 A L/R = 50 ms
		Thermal current (Ithe) for each group of 2 outputs	**A**	6 for 1 output and 2 for the other, **or** 4 for both outputs.
		Current limit	**A**	Ith ≤ 16 (with several relay output circuits simultaneously loaded)
		Output fuse protection	**A**	4 gL or 6 quick blow
		Minimum current	**mA**	10 *(1)*
		Minimum voltage	**V**	17 *(1)*
	Solid-state	Breaking capacity		24 V/2 A
		Safety circuit		6 solid-state (O1, O2, O3, O4, O5, O6)
		Current limit	**A**	Ith ≤ 6.5 (with several solid-state output circuits simultaneously loaded)
Electrical life				See page 2/172
Response time on input opening			**ms**	Response time = 20 or 30, configurable using software XPSMCWIN □ if 20 for controllers XPSMC●●Z●: 30 for a safety mat □ if 30 for controllers XPSMC●●Z●: 45 for a safety mat
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to IEC 60647-5-1, DIN VDE 0110 part 1)
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to IEC 60647-5-1, DIN VDE 0110 part 1)
LED display				30 (XPSMC16Z), 46 (XPSMC32Z) 32 (XPSMC16ZC/MC16ZP, 48 (XPSMC32ZC/MC32ZP)
Temperature	Operating		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
	Storage		**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)
Degree of protection				IP 20 conforming to EN/IEC 60529 (connector and enclosure)

(1) The controller is also capable of switching low power loads (17 V/10 mA minimum) provided that the contact has not been used for switching high power loads (possible contamination or wear of the gold layer on the contact tips).

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Communication

Modbus® serial link			
Compatibility			**XPSMC16Z, XPSMC32Z, XPSMC16ZC, XPSMC32ZC, XPSMC16ZP, XPSMC32ZP**
Serial link ports	Number and type		1 x RJ45
	Status		Slave
Data exchange			14 words
Addressing			1 …247
Baud rate		**bps**	1200, 2400, 4800, 9600 or 19200
Parity			Even, odd, none
Fixed parameters			RTU (Remote Terminal Unit) mode 1 start bit / 8 data bits 1 stop bit stop with “even” or “odd” parity 2 stop bits without parity
Functions supported			01: 8-bit output data / 32-bit input data (0 = OFF, 1 = ON) 02: 32-bit input data / 8-bit output data (0 = OFF, 1 = ON) 03: information and errors
CANopen bus			
Compatibility			**XPSMC16ZC, XPSMC32ZC**
Serial link ports	Number and type		1 x SUB-D 9-pin male
	Status		Slave
Data exchange			14 words By included dual port memory: only data addresses, diagnostics, but no baud rates
Parameters (adjustable using software XPSMCWIN)	Baud rate	**Kbps**	20, 50, 125, 250, 500, 800
		Mbps	1
	Address		1…127
Profibus bus			
Compatibility			**XPSMC16ZP, XPSMC32ZP**
Serial link ports	Number and type		1 x SUB-D 9-pin female
	Status		Slave
Data exchange			14 words By included dual port memory: only data addresses
Parameters	Baud rate	**Mbps**	12
	Address		1…125

Connections

Type			**Separate plug-in screw connector XPSMCTS●● *(1)***	**Separate plug-in spring clip connector XPSMCTS●● *(1)***
Power supply and relay output terminals				
1 conductor	Without cable end		Solid or flexible cable: 24-12 AWG (0.2…2.5 mm²)	
	With cable end		Without bezel, flexible cable: 22-12 AWG (0.25…2.5 mm²)	
			With bezel, flexible cable: 22-12 AWG (0.25…2.5 mm²)	
2 conductors	Without cable end		Solid or flexible cable: 24-16 AWG (0.2…1.5 mm²)	–
	With cable end		Without bezel, flexible cable: 22-16 AWG (0.25…1.5 mm²)	–
			Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	Double, with bezel, flexible cable: 20-18 AWG (0.5…1.0 mm²)
Tightening torque of screw terminals			4.2...5.3 lb-in (0.5...0.6 Nm)	–
Wire stripping length			0.39 in (10 mm)	
Other terminals				
1 conductor	Without cable end		Solid or flexible cable: 28-16 AWG (0.14…1.5 mm²)	
	With cable end		Without bezel, flexible cable: 23-16 AWG (0.25…1.5 mm²)	
			With bezel, flexible cable: 23-20 AWG (0.25…0.5 mm²)	
2 conductors	Without cable end		Solid cable: 28-20 AWG (0.14…0.5 mm²) Flexible cable: 28-19 AWG (0.14…0.75 mm²)	–
	With cable end		Without bezel, flexible cable: 23-22 AWG (0.25…0.34 mm²)	–
			Double, with bezel, flexible cable: 20 AWG (0.5 mm²)	–
Enclosure mounting (conforming to DIN EN 50022)			Metal adaptor for mounting on ⊥ 35 mm metal rail	

(1) To be ordered separately.

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Safety automation system solutions

Preventa™ configurable safety controllers type XPSMC

2

105569

XPSMC16Z

105570

XPSMC32Z

105739

XPSMC16ZC

105545

XPSMC32ZC

105540

XPSMC16ZP

105546

XPSMC32ZP

References

Configurable safety controllers (connector not included)

Number of inputs	Number of outputs: Relay	Number of outputs: Solid-state	Communication (Link and bus)	Reference	Weight oz (kg)
16	**4 (2 x 2)**	**6**	Modbus®	**XPSMC16Z**	28.925 (0.820)
			Modbus®, CANopen	**XPSMC16ZC**	28.925 (0.820)
			Modbus®, Profibus	**XPSMC16ZP**	28.925 (0.820)
32	**4 (2 x 2)**	**6**	Modbus®	**XPSMC32Z**	29.630 (0.840)
			Modbus®, CANopen	**XPSMC32ZC**	29.630 (0.840)
			Modbus®, Profibus	**XPSMC32ZP**	29.630 (0.840)

Plug-in connectors for configurable safety controllers *(1)*

Description	For use with	Reference	Weight oz (kg)
Screw connectors	XPSMC16Z, MC16ZC, MC16ZP	**XPSMCTS16**	2.822 (0.080)
	XPSMC32Z, MC32ZC, MC32ZP	**XPSMCTS32**	3.880 (0.110)
Spring clip connectors	XPSMC16Z, MC16ZC, MC16ZP	**XPSMCTC16**	2.822 (0.080)
	XPSMC32Z, MC32ZC, MC32ZP	**XPSMCTC32**	3.880 (0.110)

Configuration software

Description	Operating system	Details *(2)*	Languages	Reference	Weight oz (kg)
Configuration software for controllers XPSMC●●Z● CD-ROM + user manual	Windows® 2000, Windows® XP	Software available on Safety Suite V2 software pack	EN, FR, DE, IT, ES, PT	**XPSMCWIN**	18.342 (0.520)

(1) To be ordered separately to the controllers.
(2) EDS and GSD files are available on the XPSMCWIN configuration software CD-ROM.

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XPSMCCPC

TSX PCX 1031

490 NT● 000 ●●

TSX CUSB485

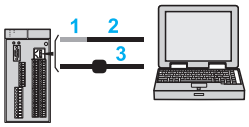
TSX CAN TDM4

ABL 8RPS24100

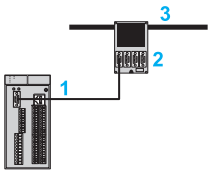
References

Connecting cables *(1)*

Function			Length ft (m)	Reference	Weight oz (kg)
Diagnostics using Magelis® operator dialog terminal type XBT GT			9.8 (3)	**VW3 A8 306 R30**	39.860 (1.130)
Configuration software	1	Adaptor: RJ45 socket/PC connection cables	–	**XPSMCCPC**	0.388 (0.011)
	2	Cable to PC serial port (type SUB-D9)	8.2 (2.5)	**TSX PCX 1031**	5.997 (0.170)
	3	Straight shielded twisted pair cables, EIA/TIA 568 standard (RJ45 connector at each end)	6.6 (2)	**490 NTW 000 02**	–
			16.4 (5)	**490 NTW 000 05**	–
			39.4 (12)	**490 NTW 000 12**	–
		Straight shielded twisted pair cables, UL and CSA 22.1 approved (RJ45 connector at each end)	6.6 (2)	**490 NTW 000 02U**	–
			16.4 (5)	**490 NTW 000 05U**	–
			39.4 (12)	**490 NTW 000 12U**	–
	with	RJ45/PC USB port converter *(2)*	1.3 (0.4)	**TSX CUSB485**	–



Function	Medium	Length ft (m)	Reference	Weight oz (kg)
Modbus® serial link access	Premium™ automation platform TSX SCY 21601	–	**XPSMCSCY**	–
CANopen bus access	1 CANopen connection cables (fitted with: 1 SUB-D 9-pin female connector at each end)	1 (0.3)	**TSX CANCADD03**	–
		3.3 (1)	**TSX CANCADD1**	–
		9.8 (3)	**TSX CANCADD3**	–
		16.4 (5)	**TSX CANCADD5**	–
	2 CANopen tap-off box	–	**TSC CANTDM4**	–
	3 Standard CANopen cables	164 (50)	**TSX CANCA50**	–
		328 (100)	**TSX CANCA100**	–
		984 (300)	**TSX CANCA300**	–
Profibus bus access		328 (100)	**TSX PBS CA100**	–
		1312 (400)	**TSX PBS CA400**	–



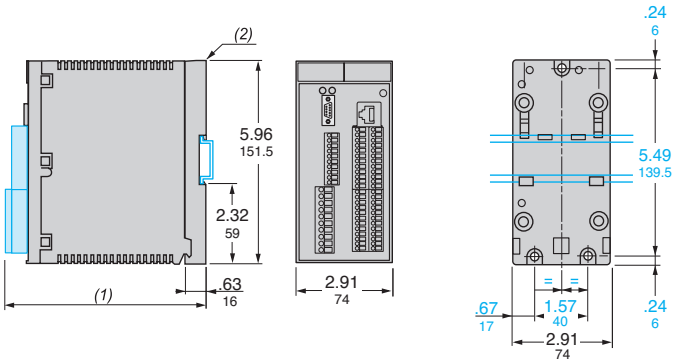
Accessories *(1)*

Regulated switch mode power supply, single-phase	Output voltage: ⎓ 24…28.8 V Nominal current: 10 A Nominal power: 240 W	**ABL 8RPS24100**	35.274 (1.000)

(1) To be ordered separately.
*(2) The converter **TSX CUSB485** is installed using **Driver Pack V2.3**. This "driver" is available on the Safety Suite V2 software pack or downloadable from our site: www.schneider-electric.com*

Dimensions, mounting

XPSMC●●Z●



Dual Dimensions: INCHES / Millimeters

(1) 6.02 in (153 mm) with screw connector XPSMCTS●●. 5.96 in (151.4 mm) with spring clip connector XPSMCTC●●.
(2) Metal adaptor for mounting on metal ⊔ 35 mm rail.

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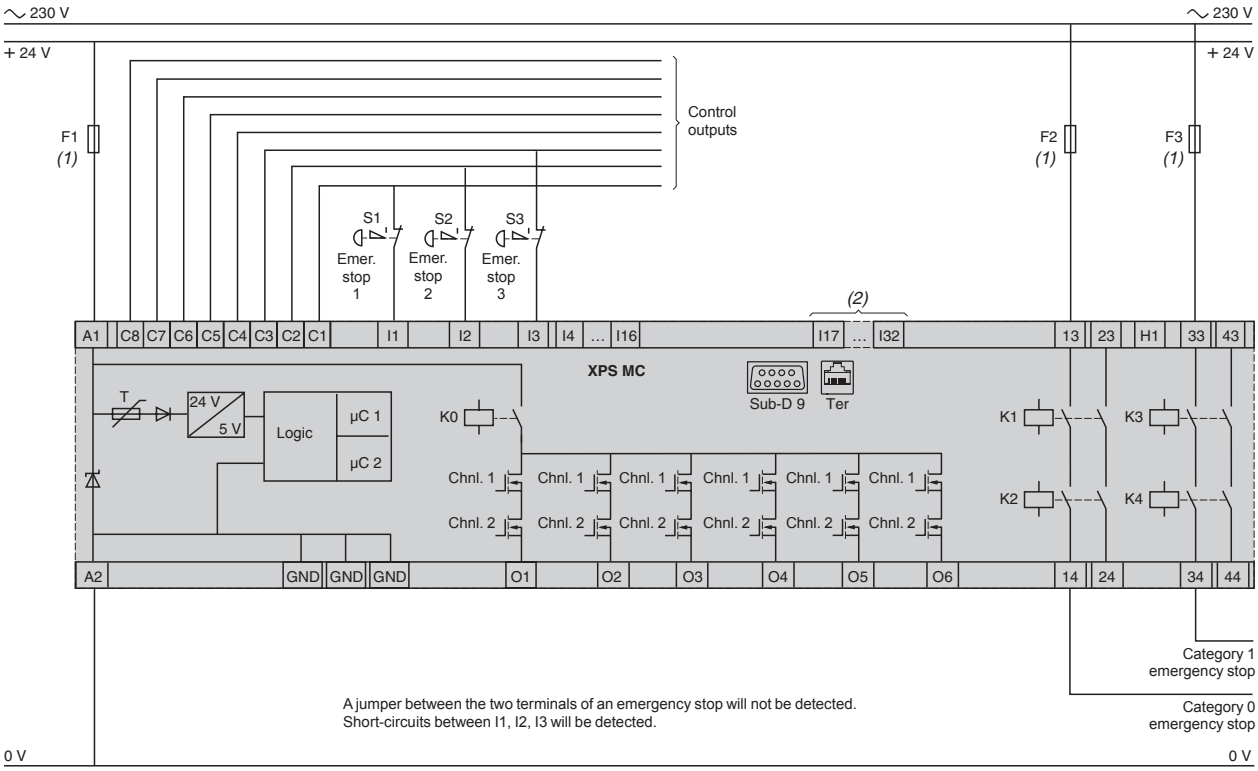
2

Emergency stop monitoring, with or without time delay, 1-channel wiring, with automatic start

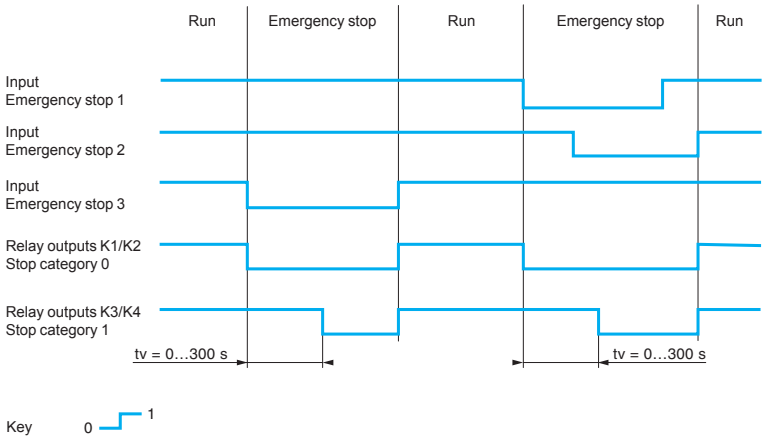
Category 4 achieved with necessary precautions taken to eliminate input circuit anomalies.

Wiring diagram



(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagram



tv = delay time

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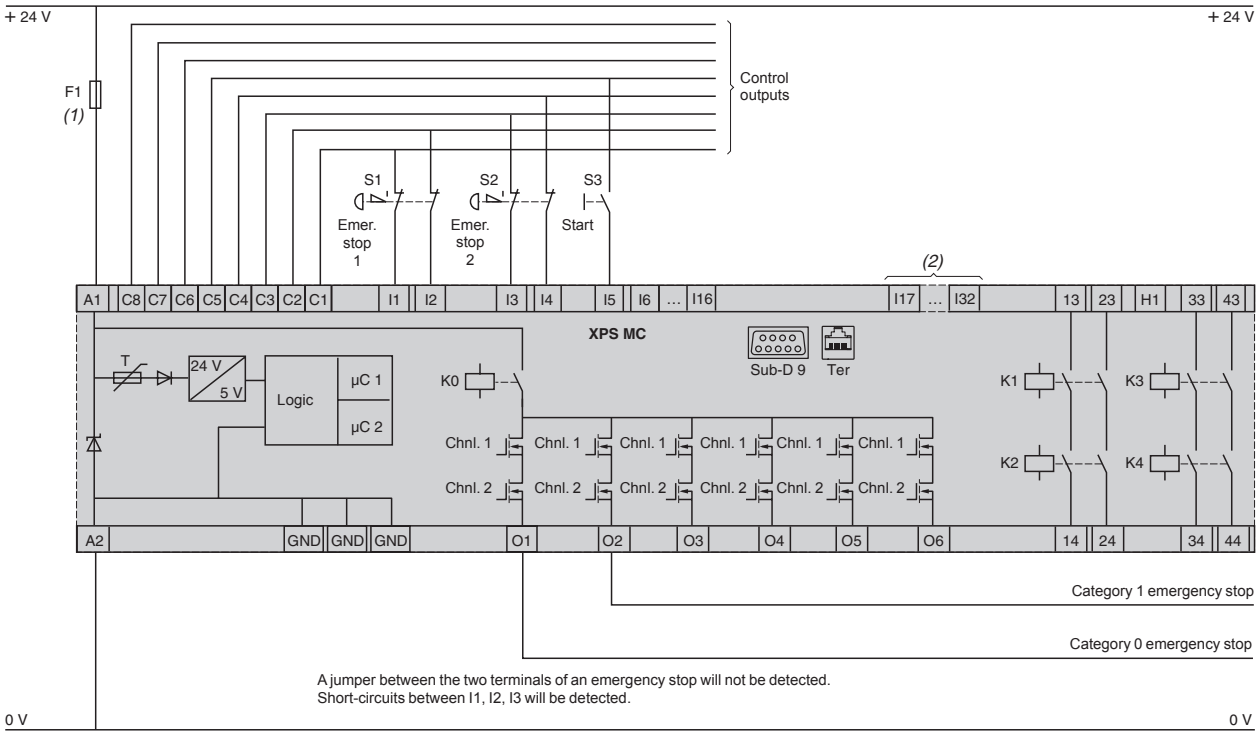
Emergency stop monitoring, with or without time delay, 2-channel wiring, with start button

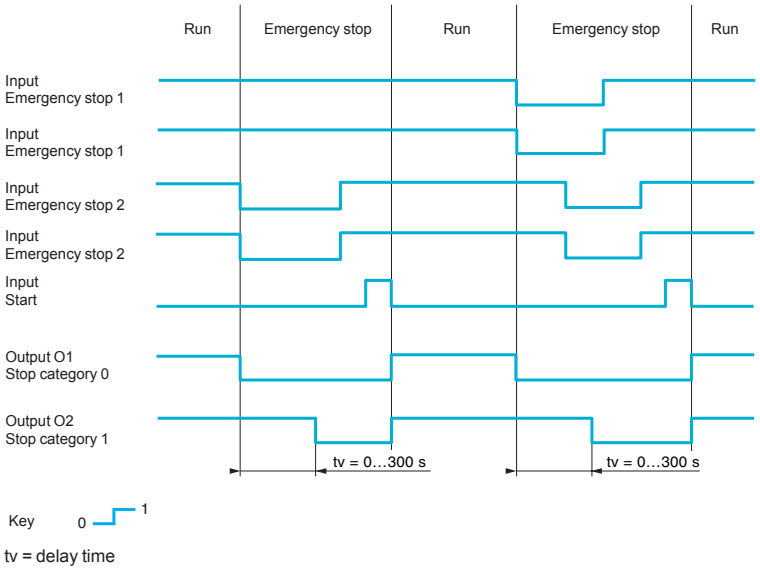
Category 4 conforming to standard EN 954-1.

Wiring diagram



(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagram



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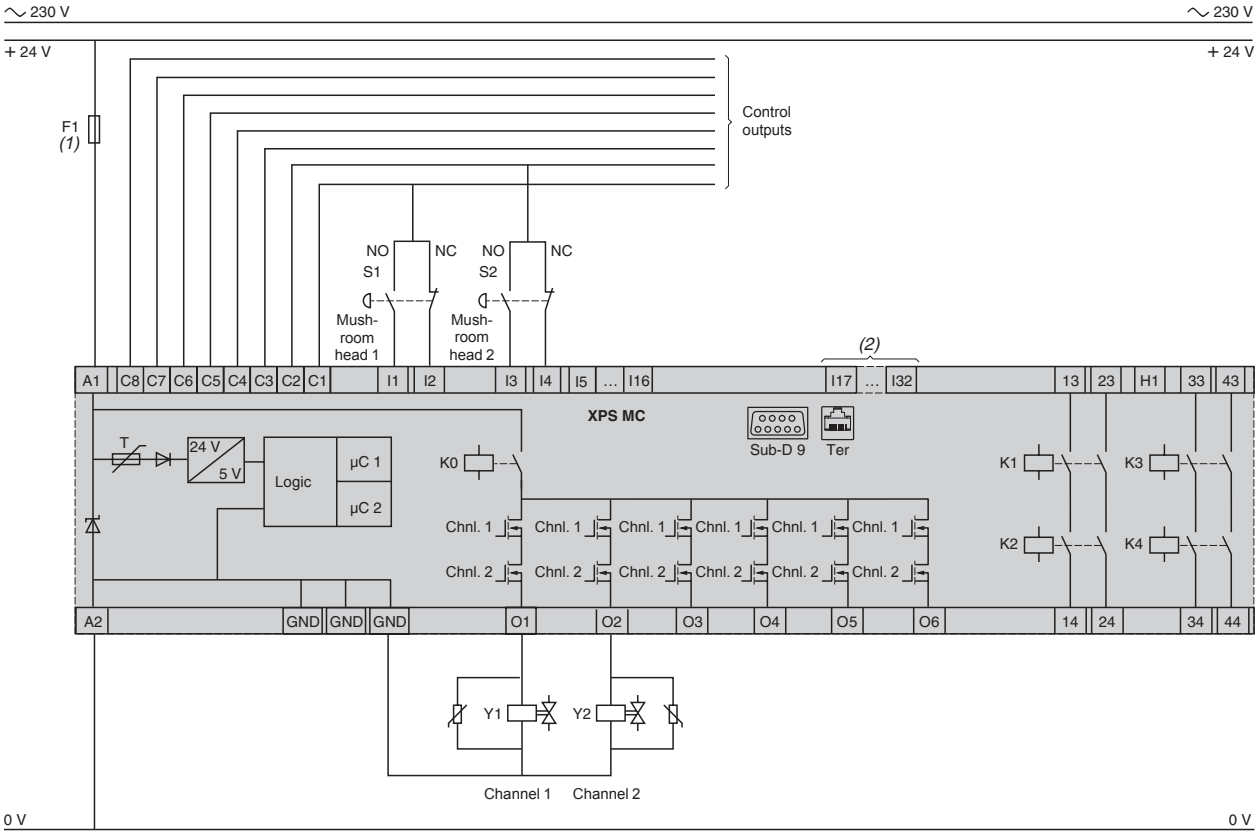
2

Two-hand control (type III-C conforming to EN 574-1)

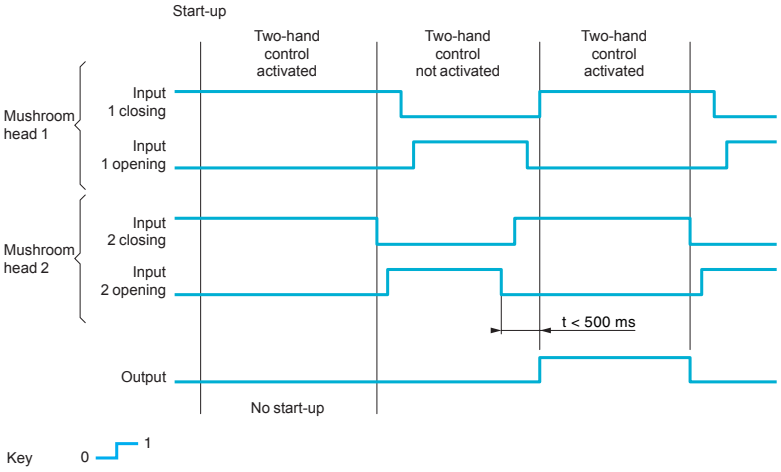
Category 4 conforming to standard EN 954-1.

Wiring diagram



(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagram



tv = delay time

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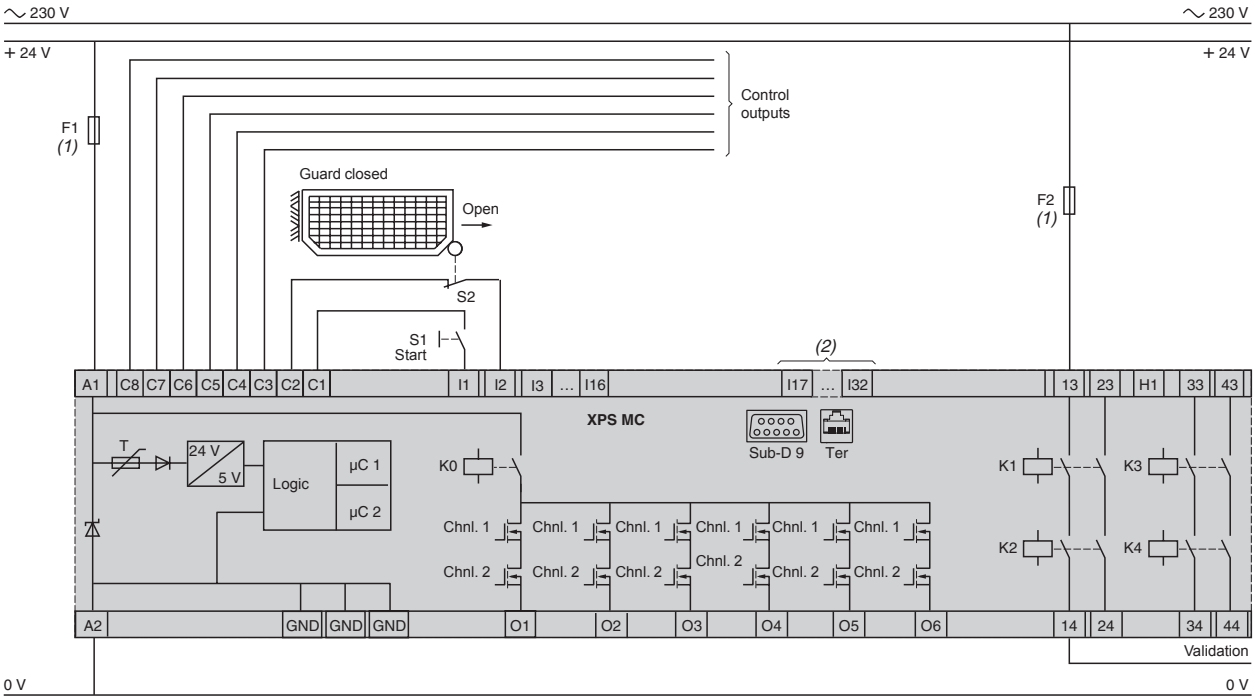
Guard monitoring with 1 safety limit switch

Category 1 conforming to standard EN 954-1.

Wiring diagram

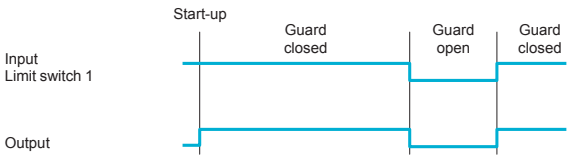


(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

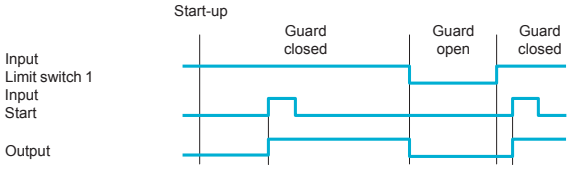
Functional diagrams

Start test = NO

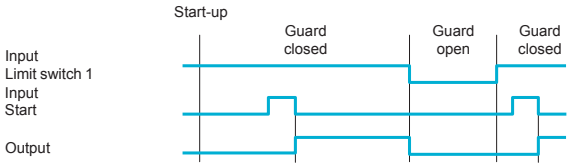
Automatic start



Rising edge monitored start

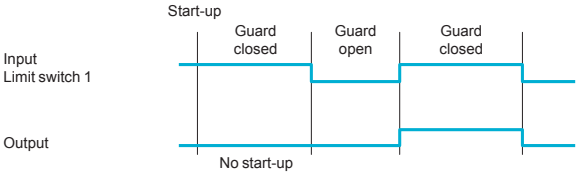


Falling edge monitored start

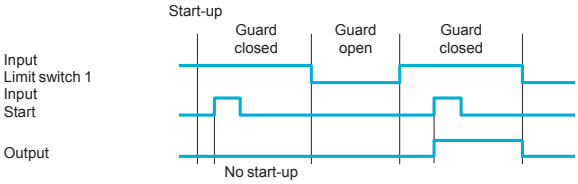


Start test = YES

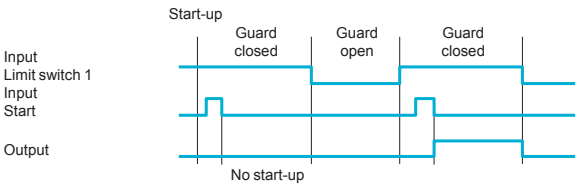
Automatic start



Rising edge monitored start



Falling edge monitored start



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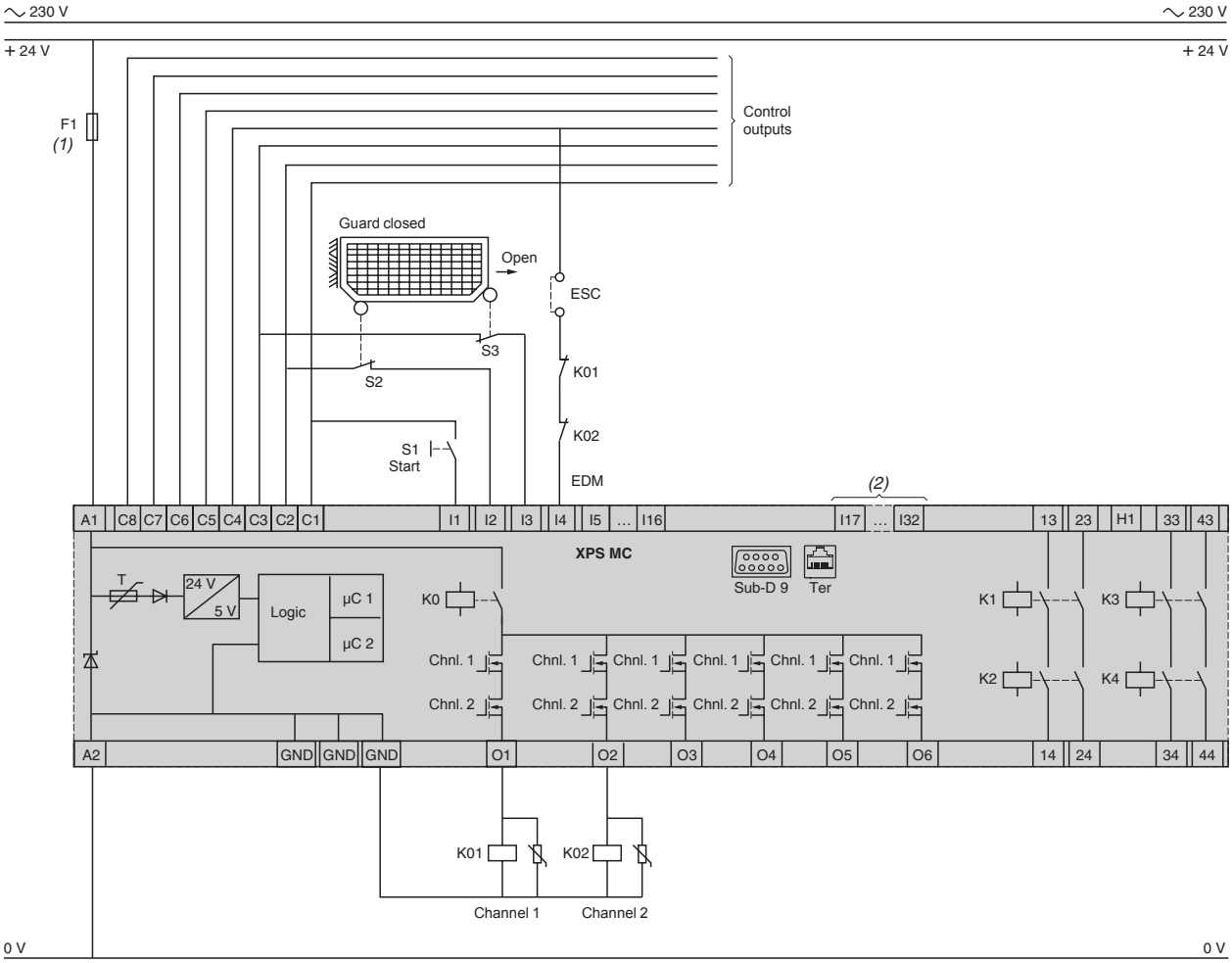
2

Guard monitoring with 2 safety limit switches

Category 4 conforming to standard EN 954-1.

Wiring diagram



ESC = external start conditions
EDM = external devices monitoring

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

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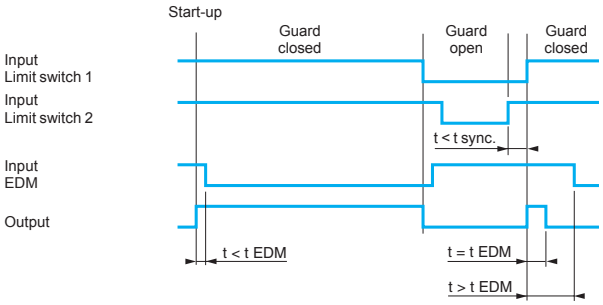
Guard monitoring with 2 safety limit switches (continued)

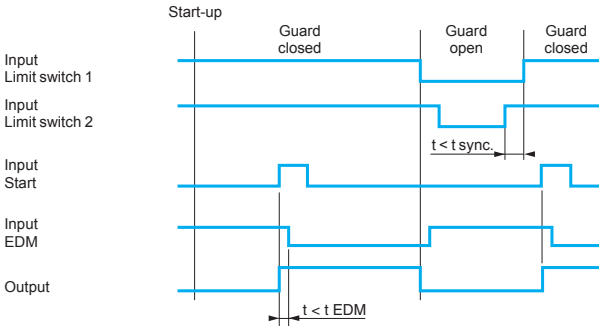
Functional diagrams

Start test = NO

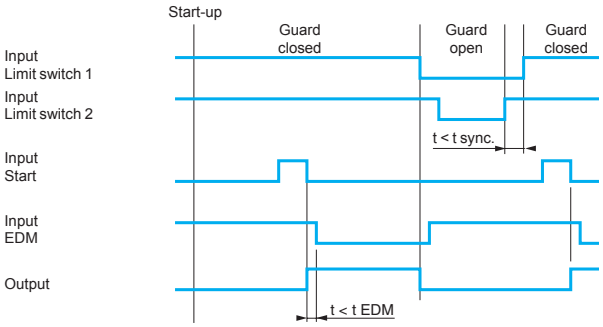
Automatic start



Rising edge monitored start

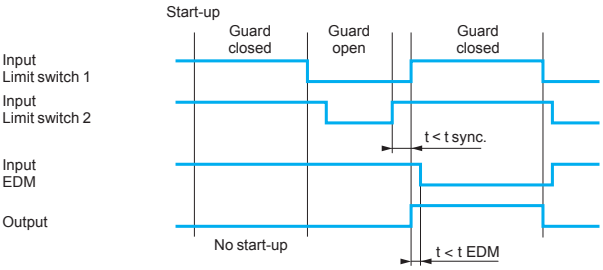


Falling edge monitored start

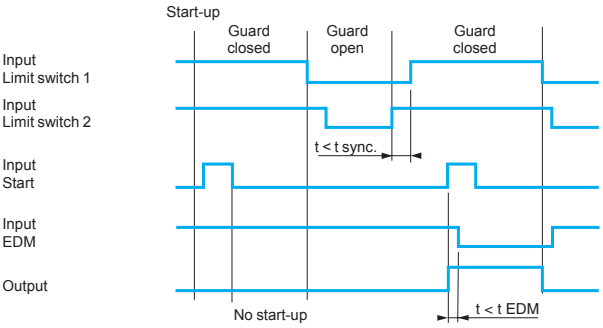


Start test = YES

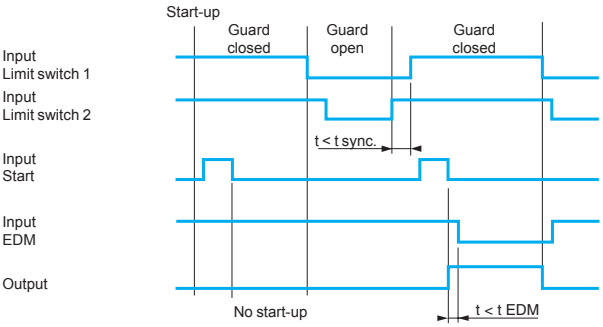
Automatic start



Rising edge monitored start



Falling edge monitored start



Key 0 1

EDM = external devices monitoring
t EDM = maximum monitoring time of external devices
t sync. = synchronization time

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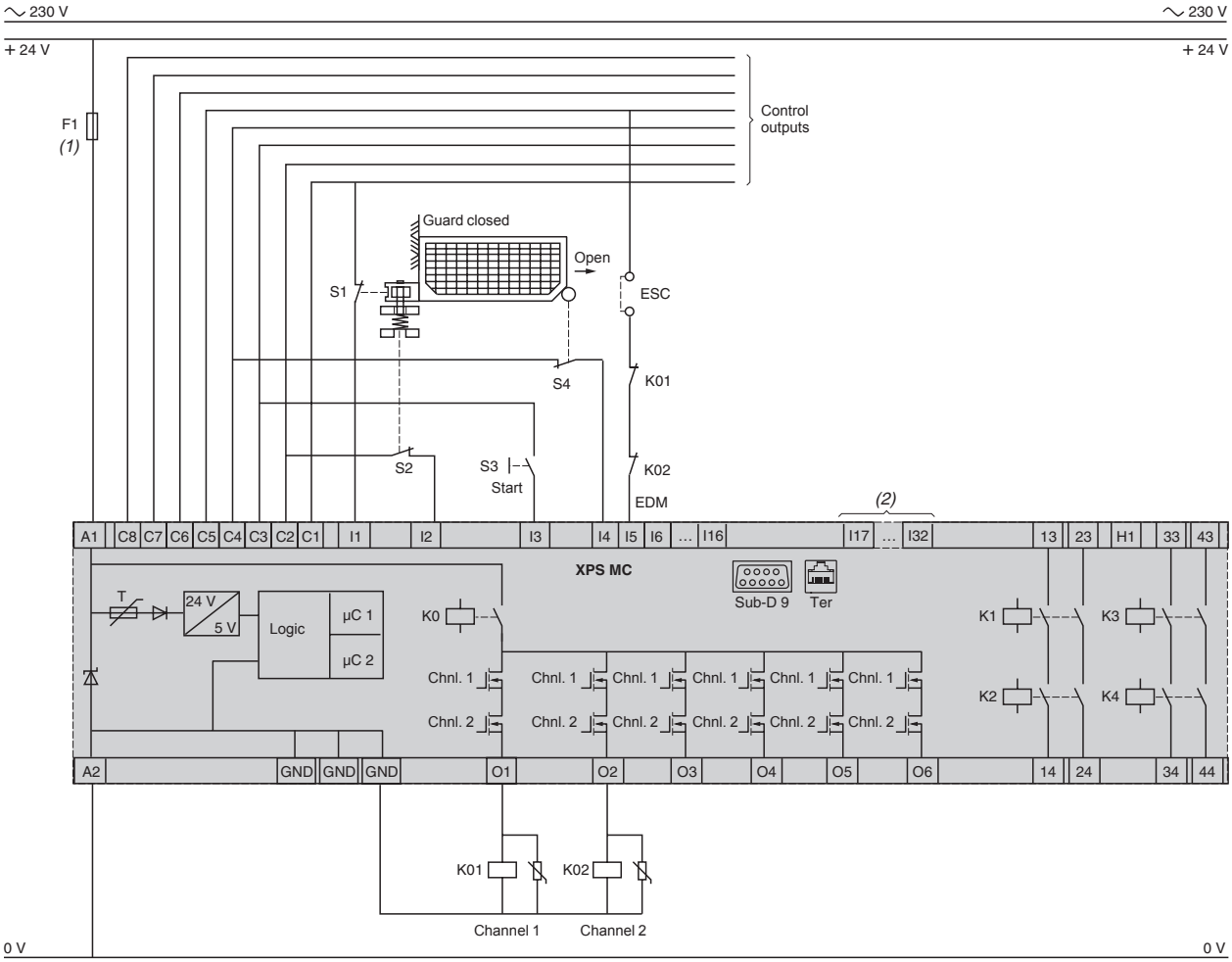
2

Guard monitoring with 2 safety limit switches, with guard locking

Category 4 conforming to standard EN 954-1.

Wiring diagram



ESC = external start conditions
EDM = external devices monitoring

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

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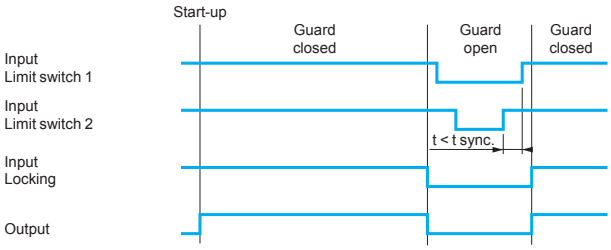
Guard monitoring with 2 safety limit switches, with guard locking (continued)

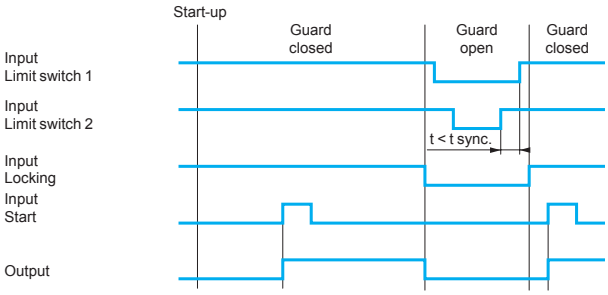
Functional diagrams

Start test = NO

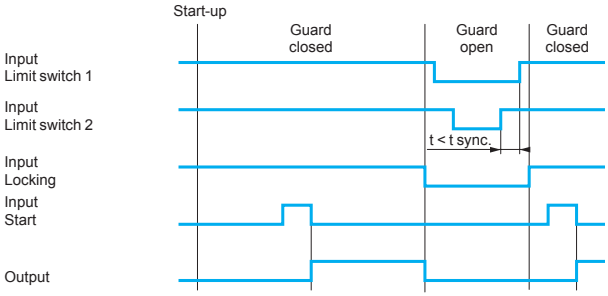
Automatic start



Rising edge monitored start

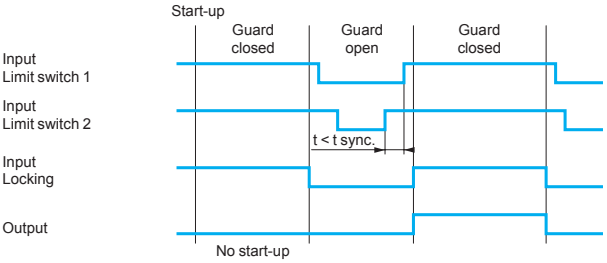


Falling edge monitored start

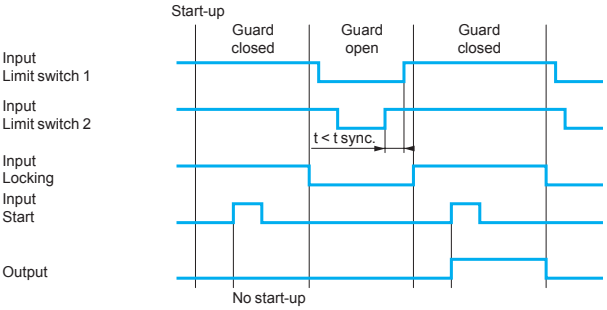


Start test = YES

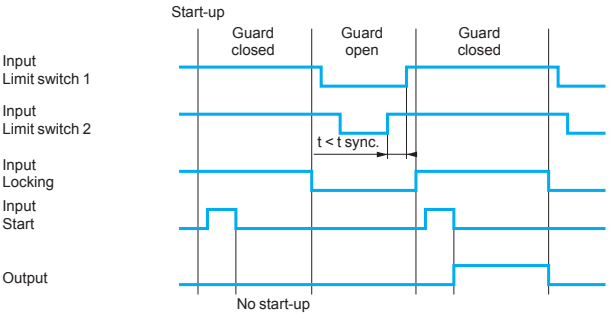
Automatic start



Rising edge monitored start



Falling edge monitored start



Key 0 1

t sync. = synchronization time

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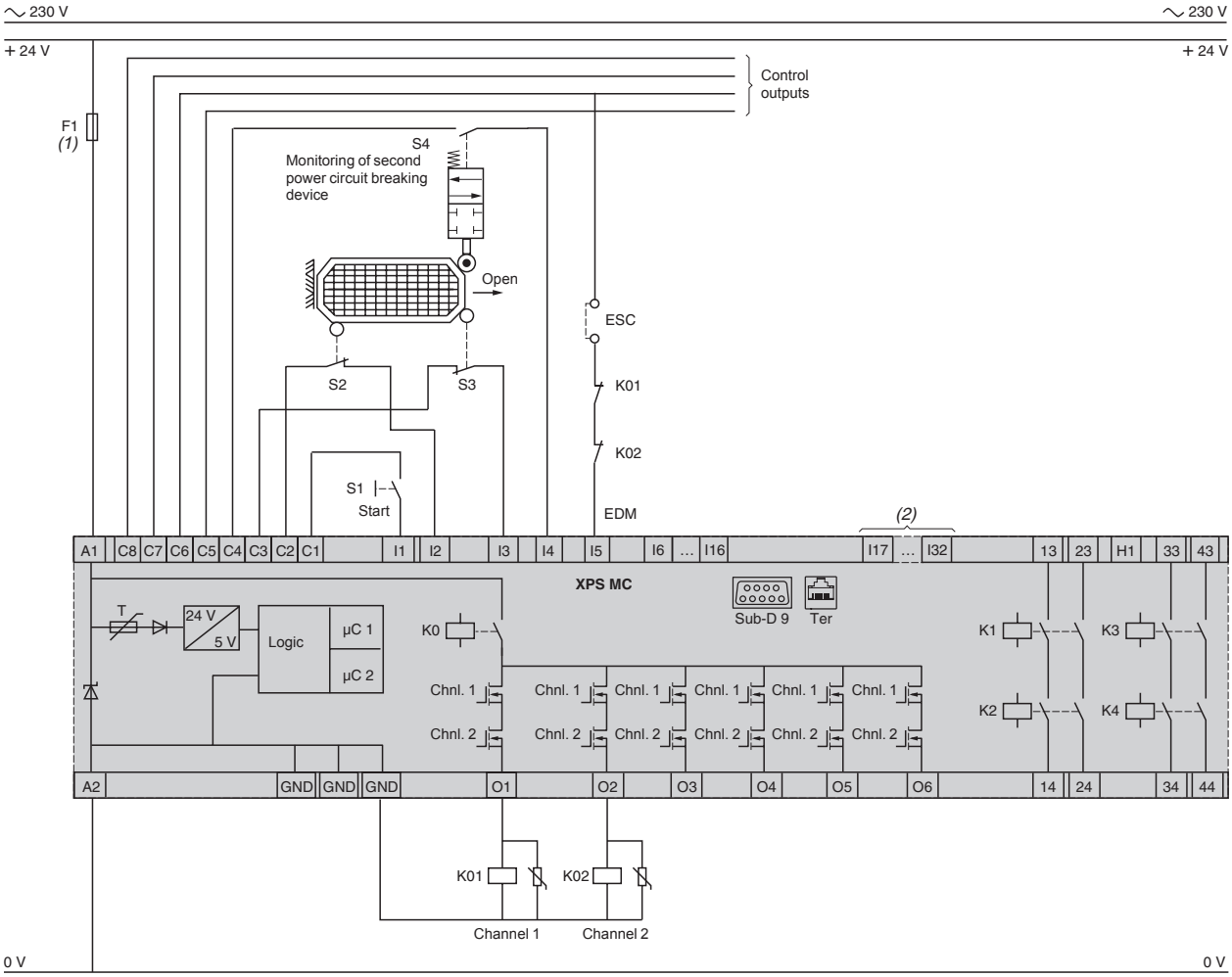
2

Guard monitoring for injection presses and blowing machines

Category 4 conforming to standard EN 954-1.

Wiring diagram



ESC = external start conditions
EDM = external devices monitoring

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

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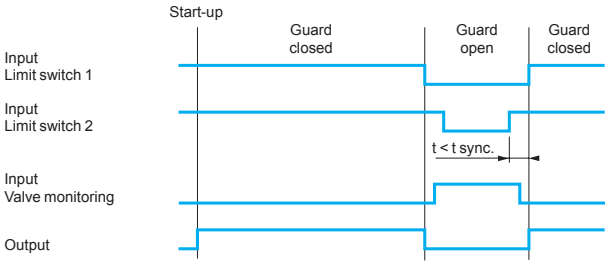
Guard monitoring for injection presses and blowing machines (continued)

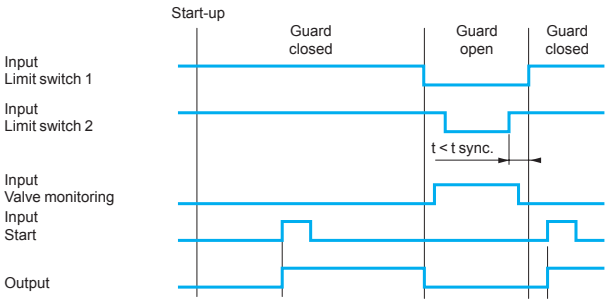
Functional diagrams

Start test = NO

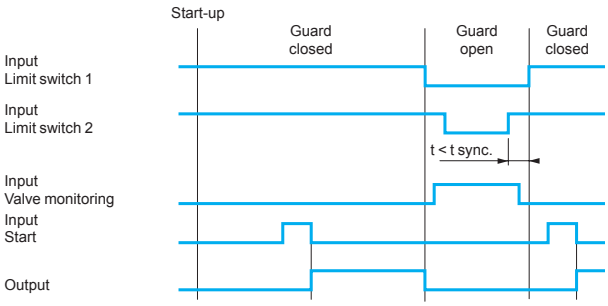
Automatic start



Rising edge monitored start

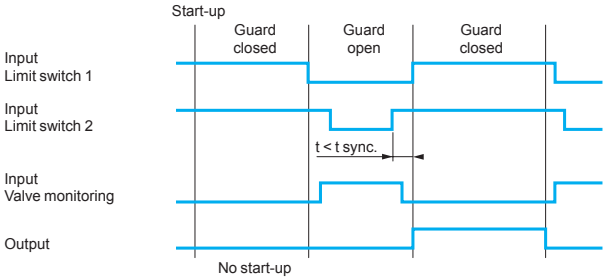


Falling edge monitored start

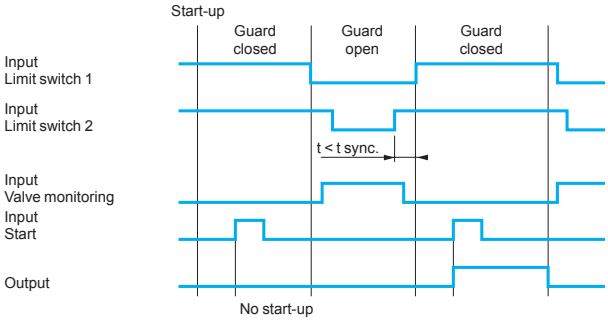


Start test = YES

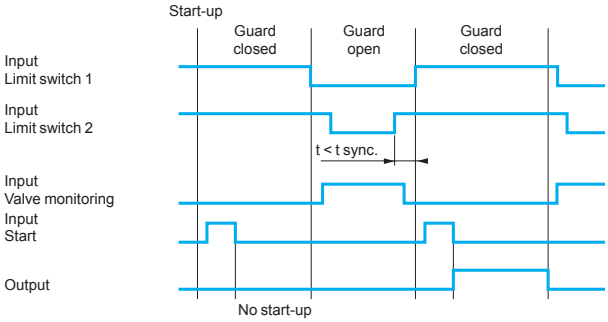
Automatic start



Rising edge monitored start



Falling edge monitored start



Key 0 1

t sync. = synchronization time

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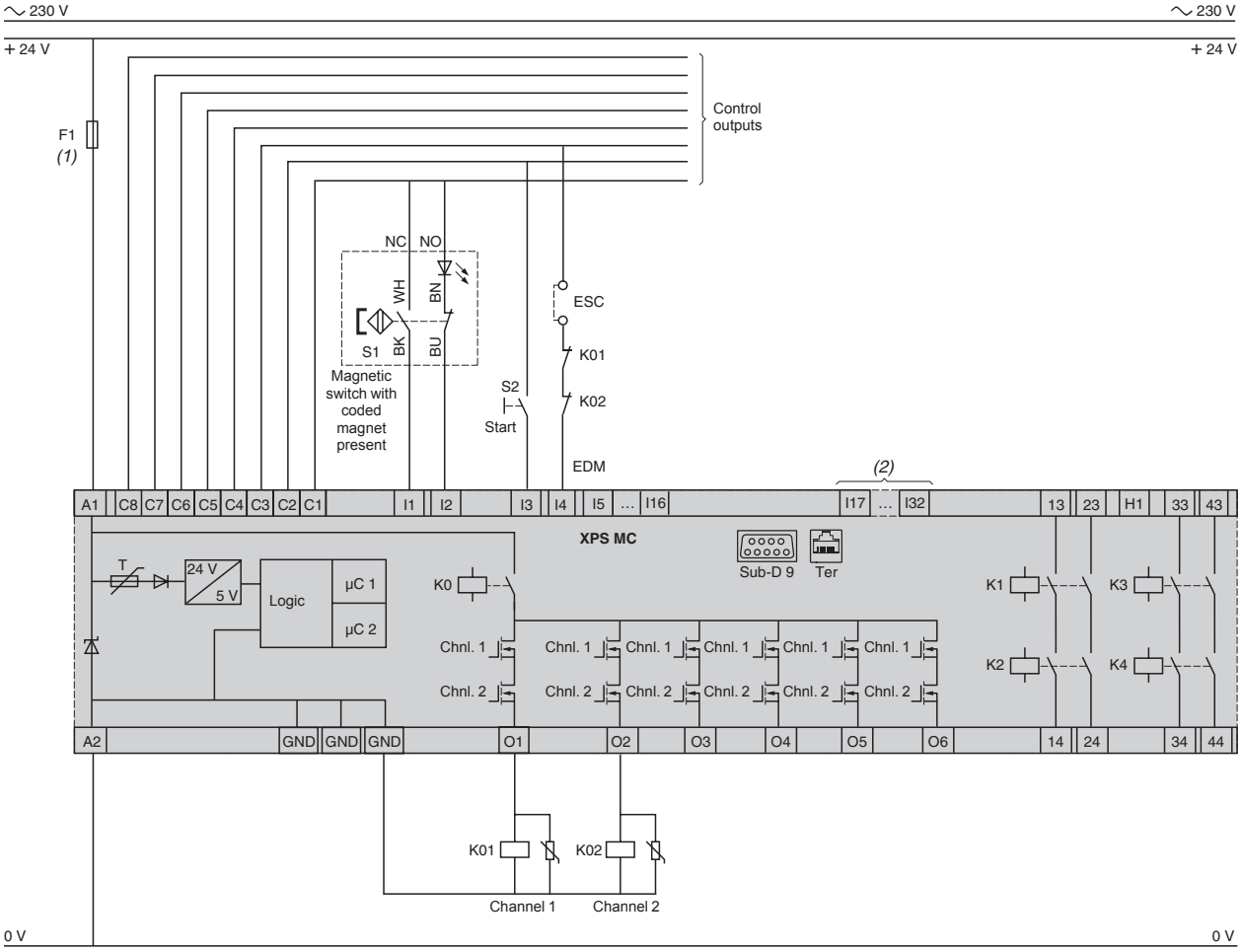
2

Non-contact safety interlock (magnetic switch) monitoring

Wiring diagram



ESC = external start conditions
EDM = external devices monitoring

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

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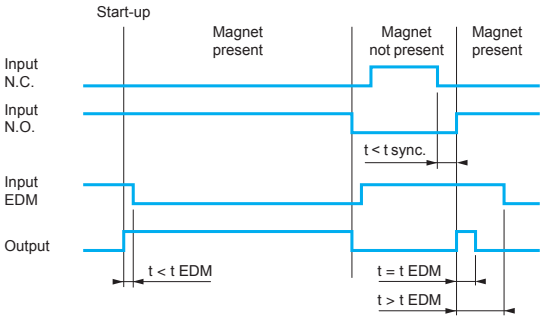
Non-contact safety interlock (magnetic switch) monitoring (continued)

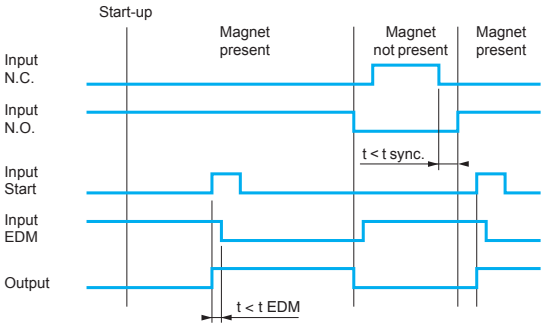
Functional diagrams

Start test = NO

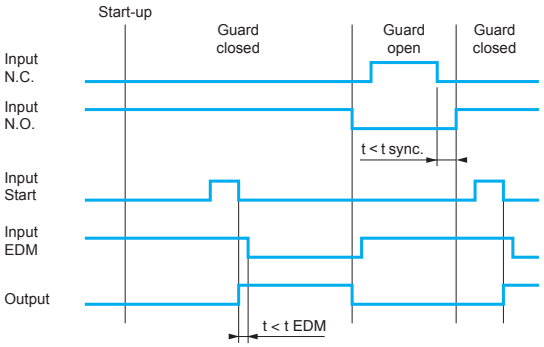
Automatic start



Rising edge monitored start

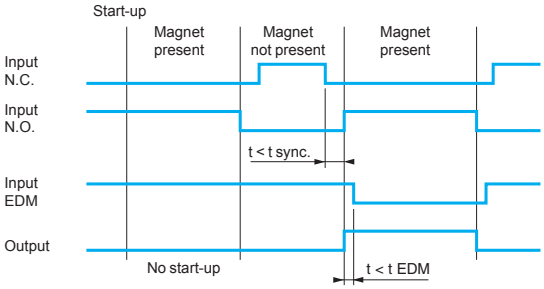


Falling edge monitored start

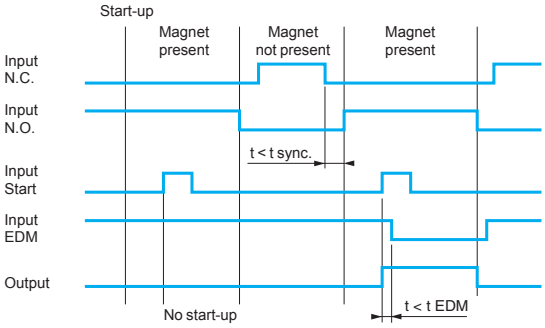


Start test = YES

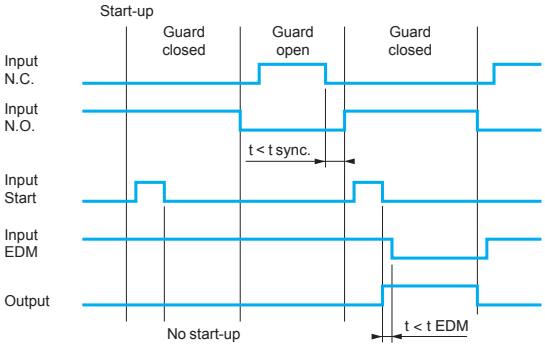
Automatic start



Rising edge monitored start



Falling edge monitored start



Key 0 1

EDM = external devices monitoring
t EDM = maximum monitoring time of external devices
t sync. = synchronization time

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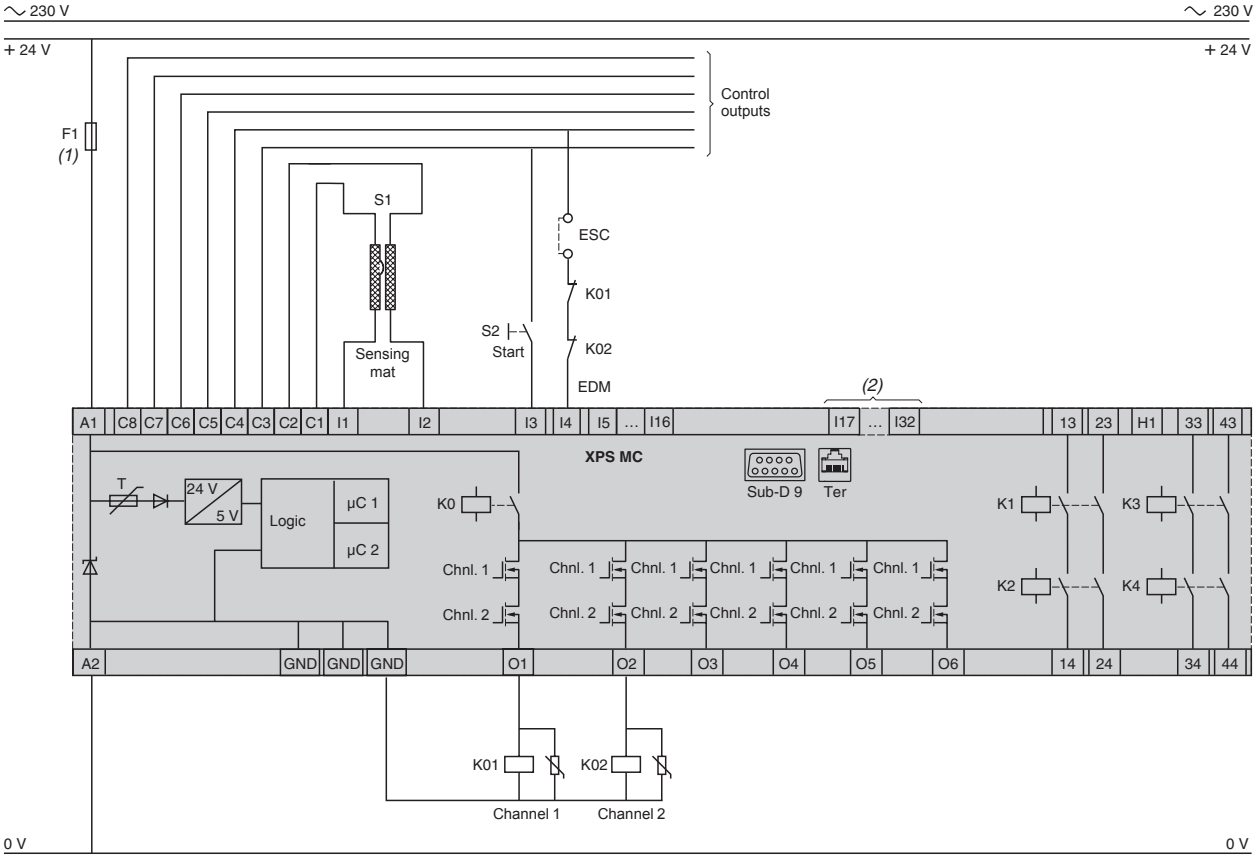
2

Sensing mat monitoring

- Category 3 conforming to standard EN 954-1.
- Control outputs connected to a sensing mat cannot be used for other items.

Wiring diagram



ESC = external start conditions
EDM = external devices monitoring

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

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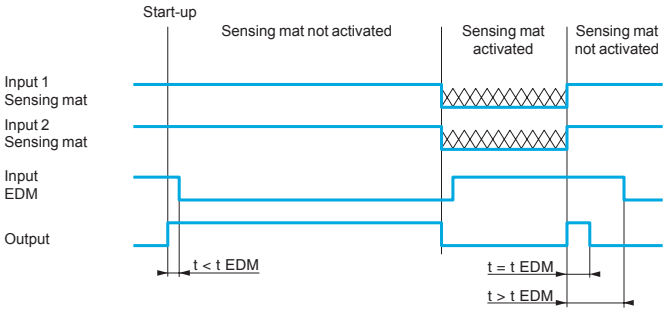
Sensing mat monitoring (continued)

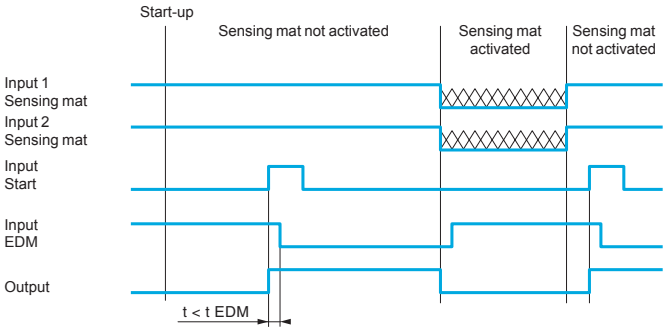
Functional diagrams

Start-up test

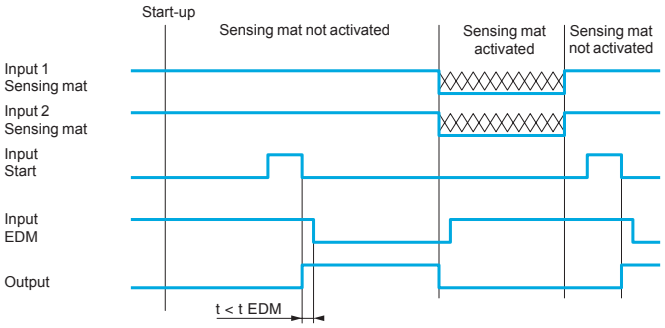
Automatic start



Rising edge monitored start



Falling edge monitored start



Key 0 1

EDM = external devices monitoring
t EDM = maximum monitoring time of external devices

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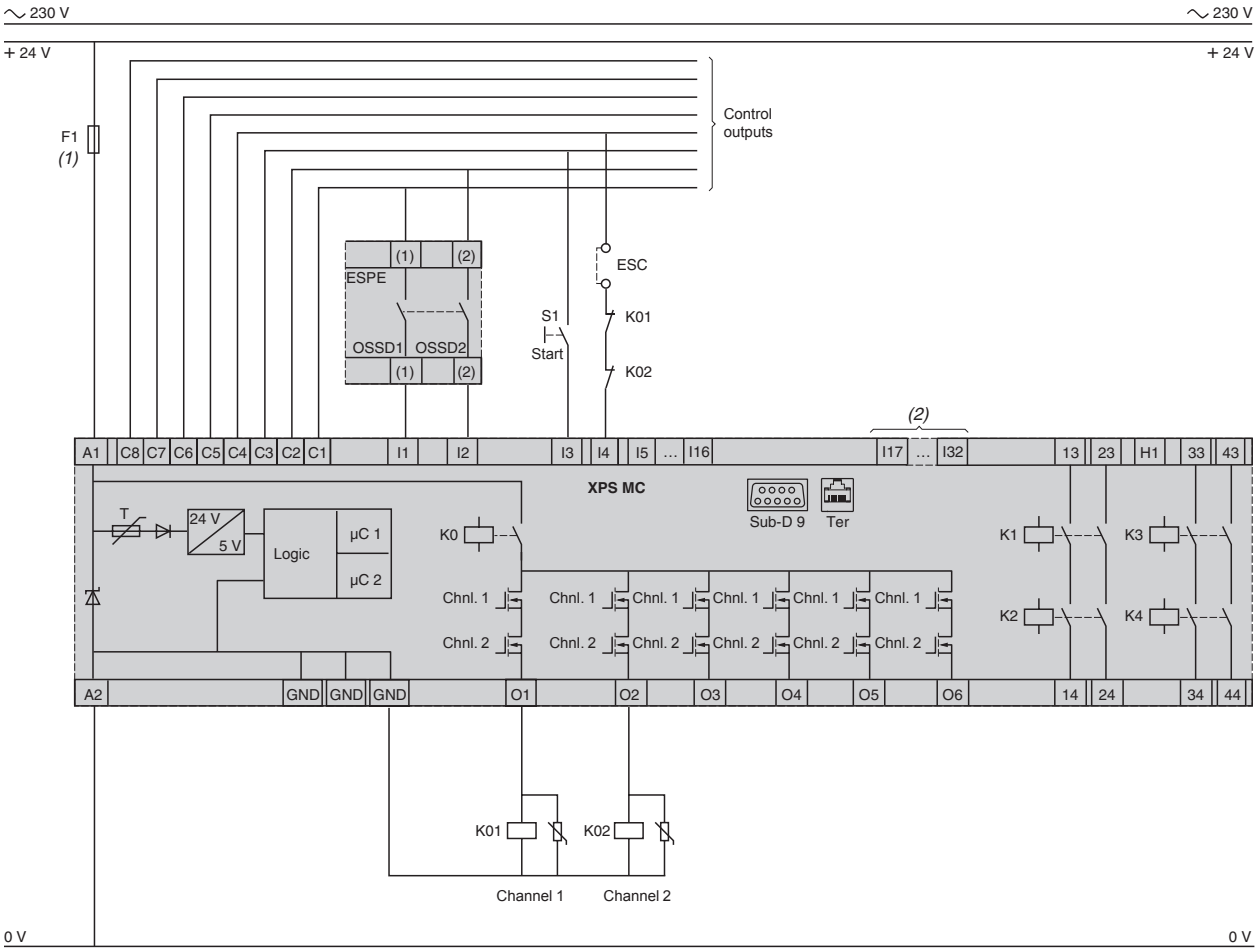
2

Light curtain monitoring, relay output type

Category 4 conforming to standard EN 954-1.

Wiring diagram



ESC = external start conditions
ESPE = electro-sensitive protection equipment
OSSD1/OSSD2 = output signal switching device

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

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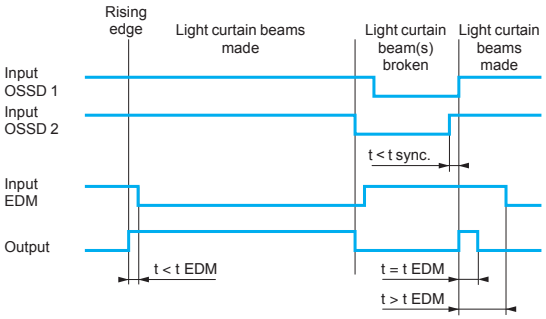
Light curtain monitoring, relay output type (continued)

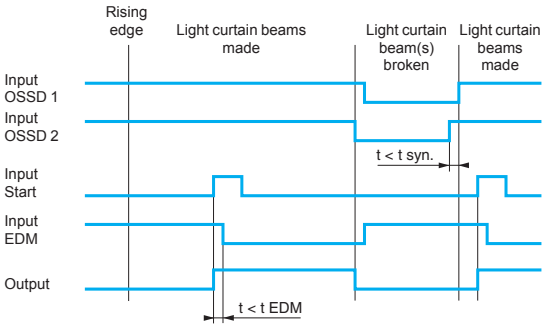
Functional diagrams

Start test = NO

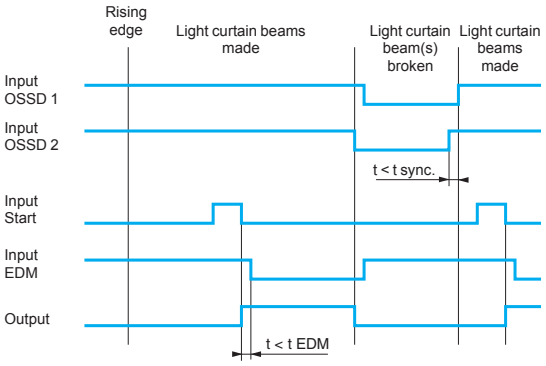
Automatic start



Rising edge monitored start

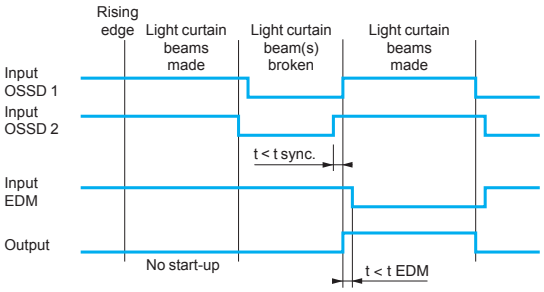


Falling edge monitored start

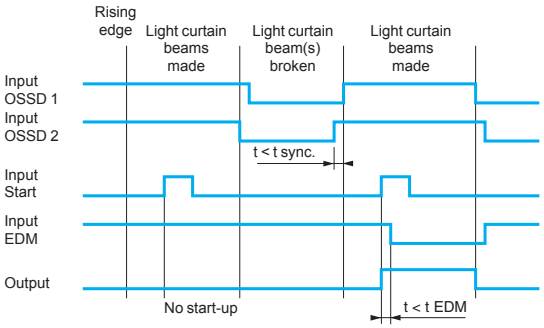


Start test = YES

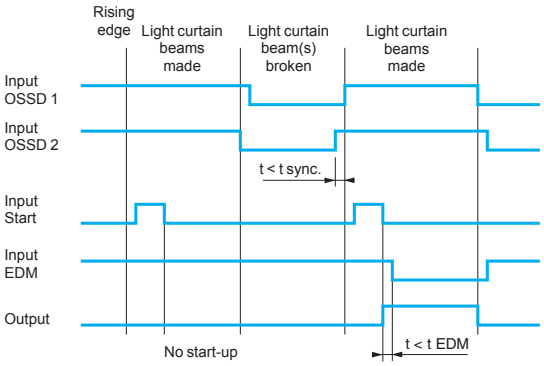
Automatic start



Rising edge monitored start



Falling edge monitored start



Key 0 ⎍ 1

EDM = external devices monitoring
t EDM = maximum monitoring time of external devices
t sync. = synchronization time

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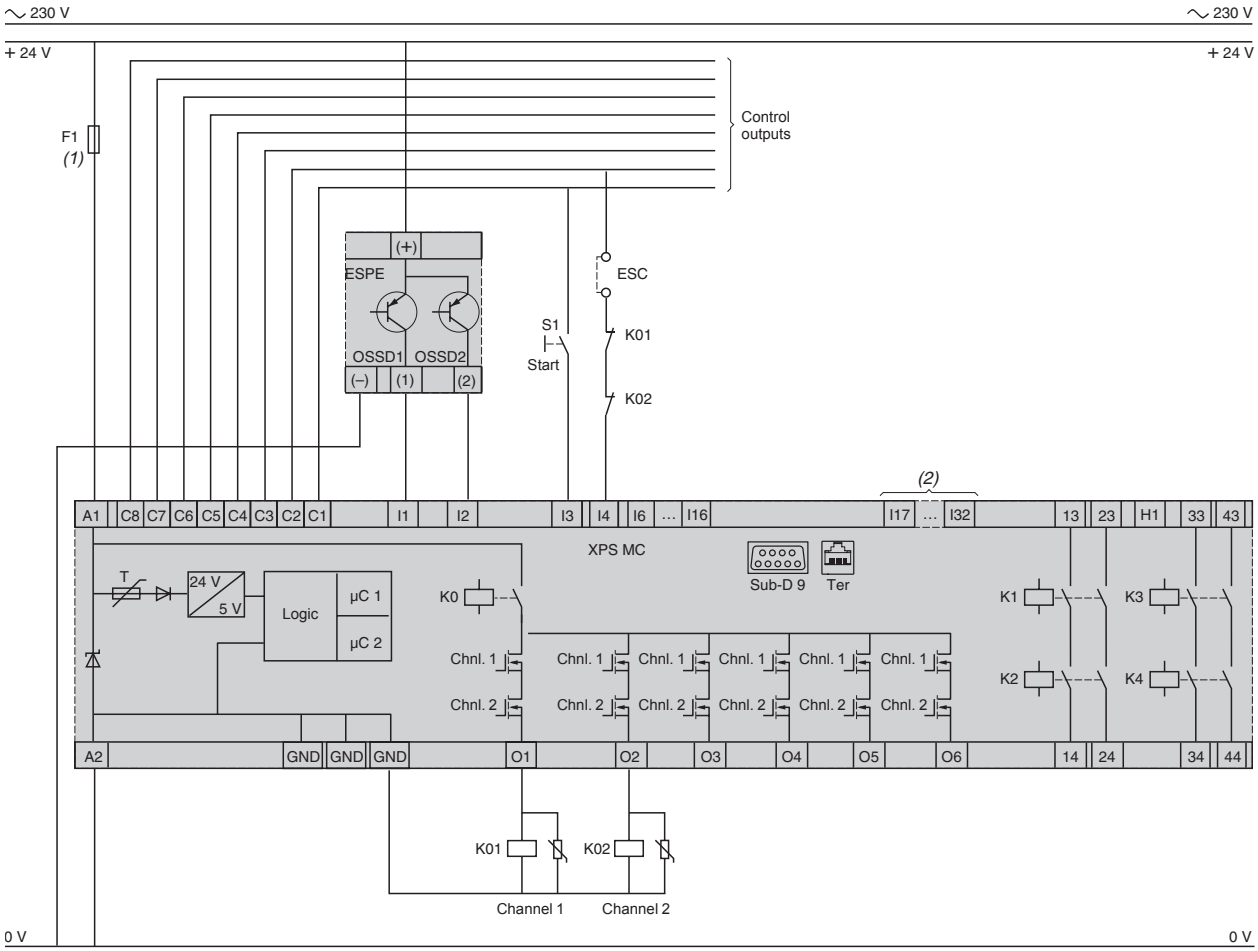
2

Light curtain monitoring, solid-state output type

Category 4 conforming to standard EN 954-1.

Wiring diagram



ESC = external start conditions
ESPE = electro-sensitive protection equipment
OSSD1/OSSD2 = output signal switching device

(1) Technical characteristics for maximum rating of fuses, see page2/122.
(2) Only applicable to XPSMC32Z●.

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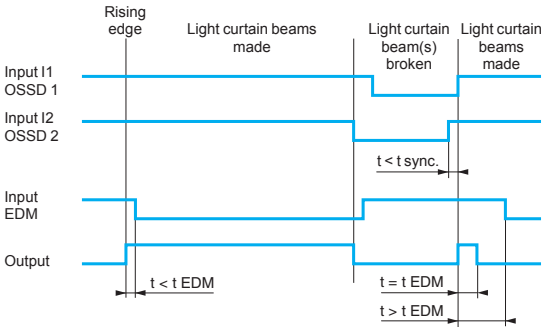
Light curtain monitoring, solid-state output type (continued)

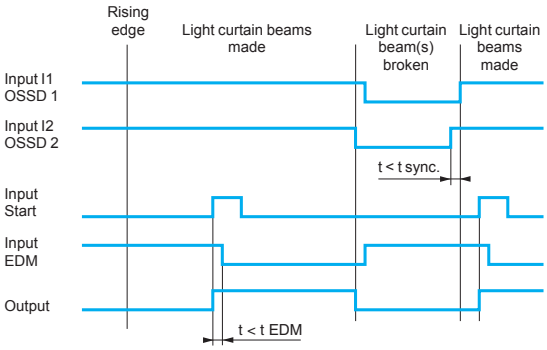
Functional diagrams

Start test = NO

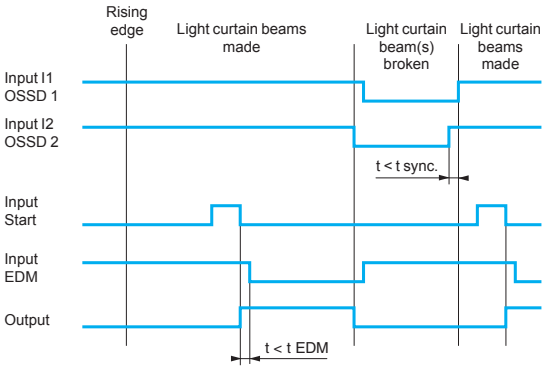
Automatic start



Rising edge monitored start

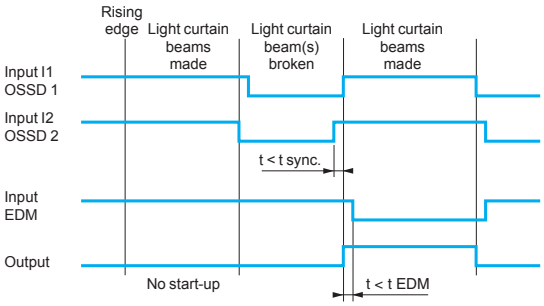


Falling edge monitored start

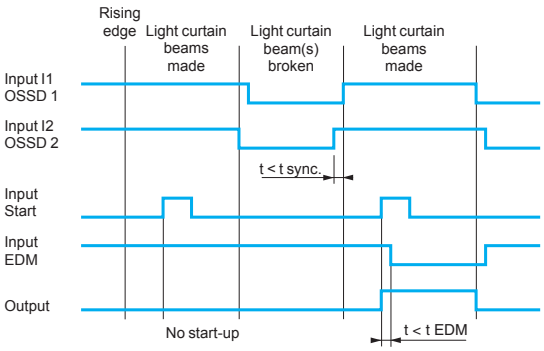


Start test = YES

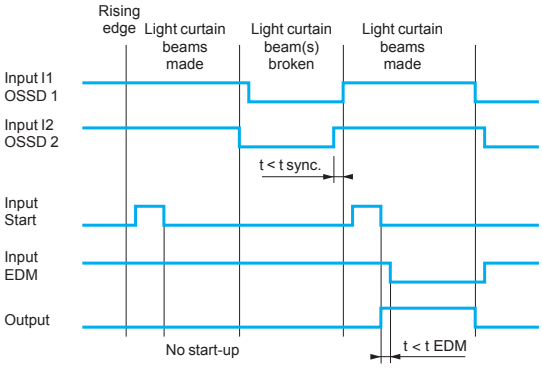
Automatic start



Rising edge monitored start



Falling edge monitored start



Key 0 ⎍ 1

EDM = external devices monitoring
t EDM = maximum monitoring time of external devices
t sync. = synchronization time

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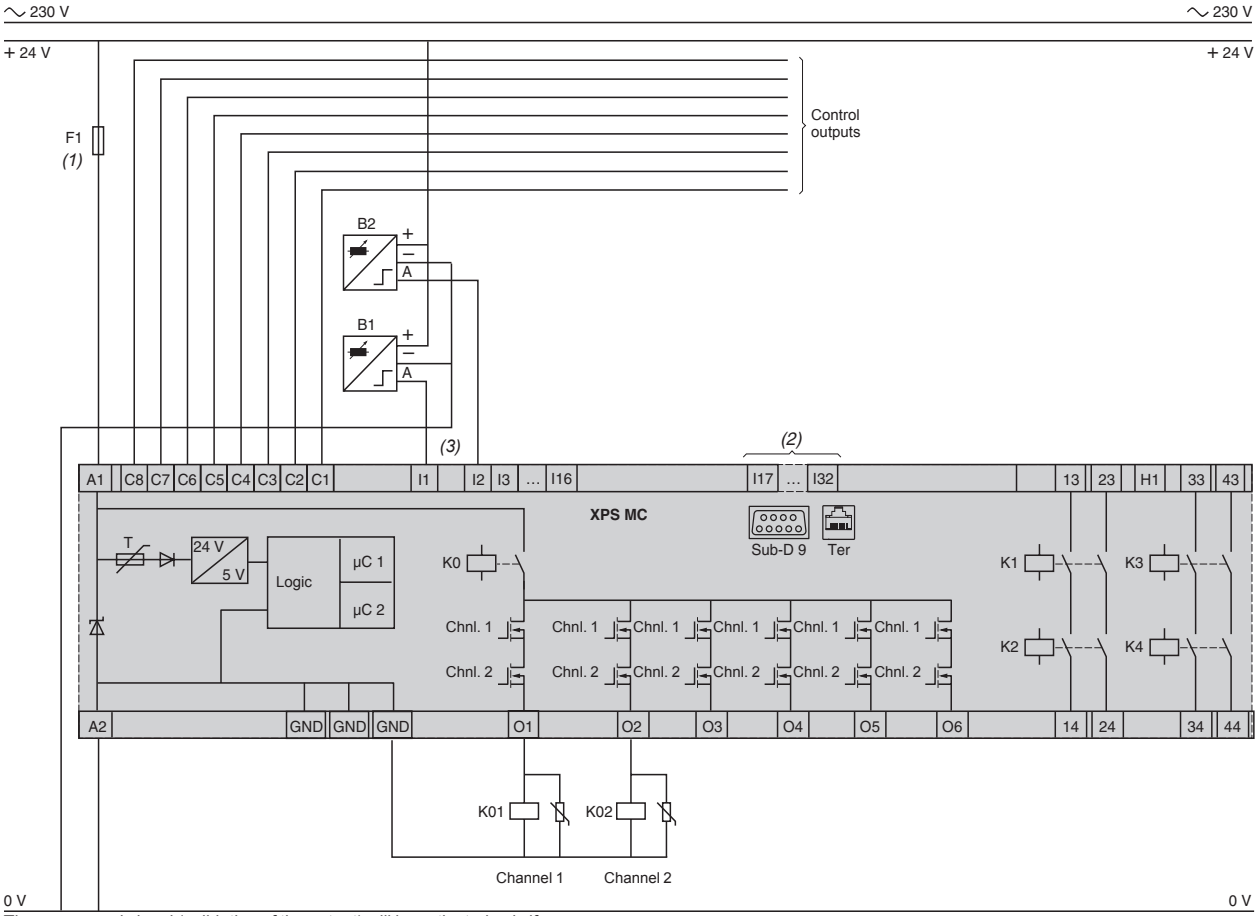
2

Zero speed detection

Category 4 conforming to standard EN 954-1.

Wiring diagram

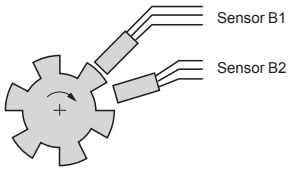


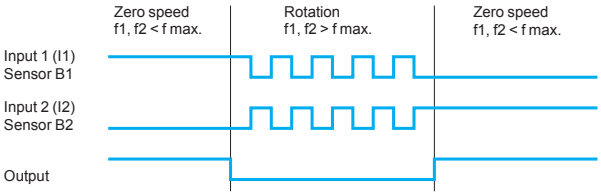
The zero speed signal (validation of the output) will be activated only if:
1: one input is in a high state,
2: the other input is in a low state,
3: the frequency of the two inputs is less than the stated value.

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.
(3) Only one "Zero speed detection" function can be connected to an XPSMC controller, and only to the inputs i1 and i2.

Functional diagram

Sensor control





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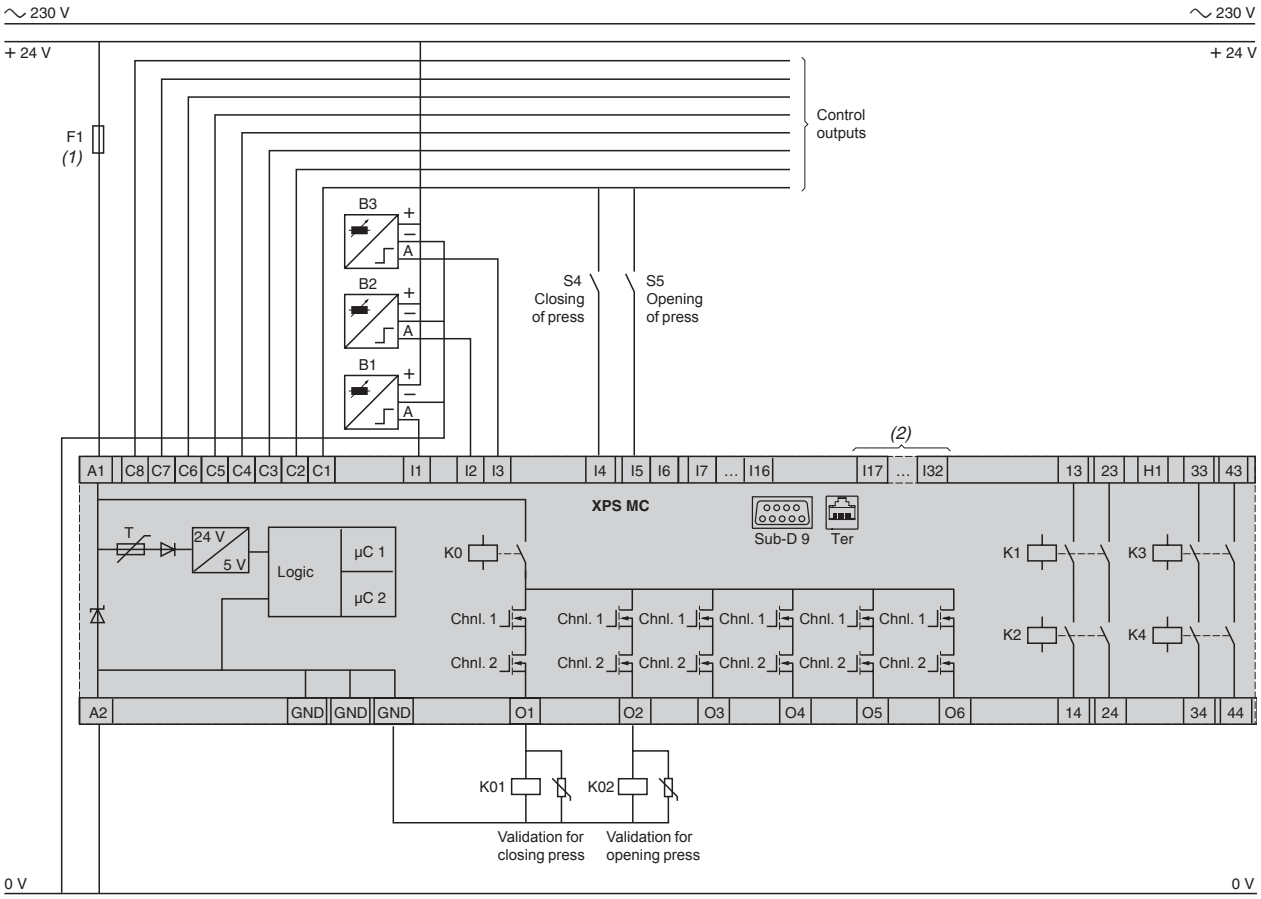
Dynamic monitoring of hydraulic valves on linear presses

Category 4 conforming to standard EN 954-1.

Wiring diagram

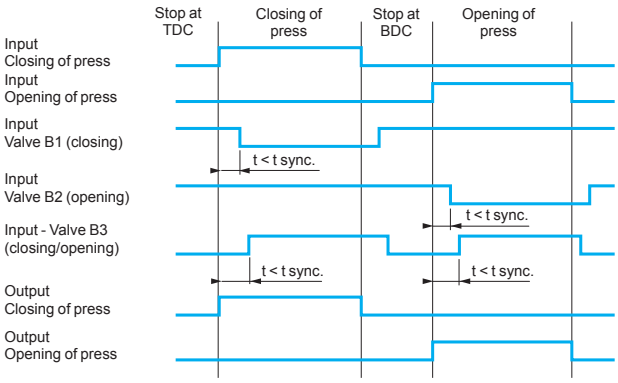


ESC = external start conditions

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagrams

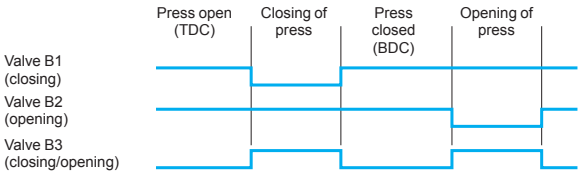
Valve control



Key 0 1

BDC = Bottom Dead Center
TDC = Top Dead Center
t sync. = synchronization time

Valve sensor signals



***Note:** The valve sensor signals must function as described above.*

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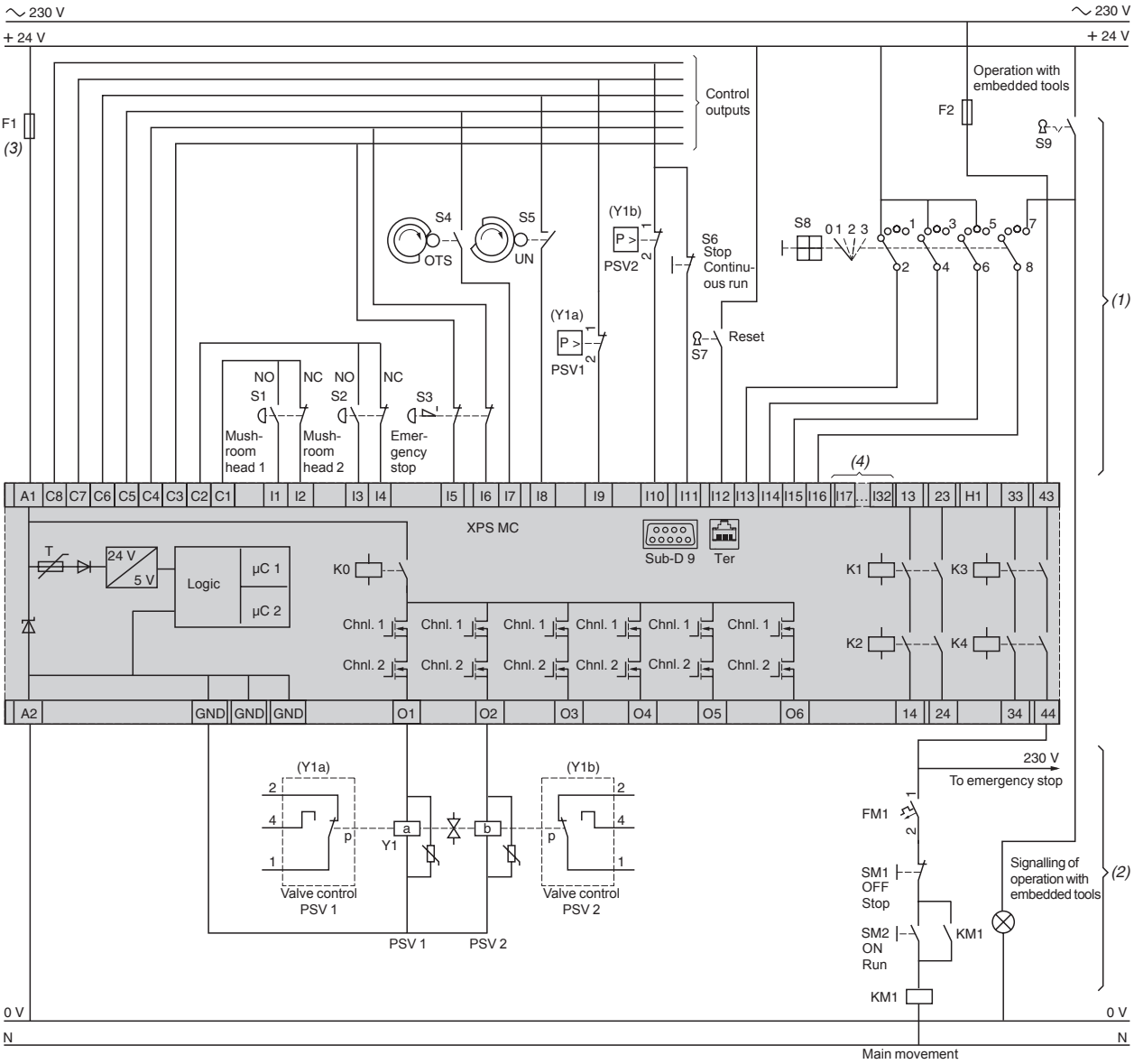
Monitoring safety stop at top dead center on eccentric press

- ■ Category 4 conforming to standard EN 954-1.
- ■ This function consists of several monitoring modes including:
- □ Safety stop at top dead center *(1)*,
- □ monitoring braking travel,
- □ as an option, dynamic monitoring of doubled-bodied solenoid valves *(2)*.

2

Wiring diagram



S8: Operating modes:
0 - stop,
1 - adjust,
2 - jog,
3 - automatic continuous run.
OTS = Limit switch associated with top dead center (TDC)
UN = Limit switch associated with bottom dead center (BDC)
PSV = safety valve

(3) Technical characteristics for maximum rating of fuses, see page 2/122.
(4) Only applicable to XPSMC32Z●.

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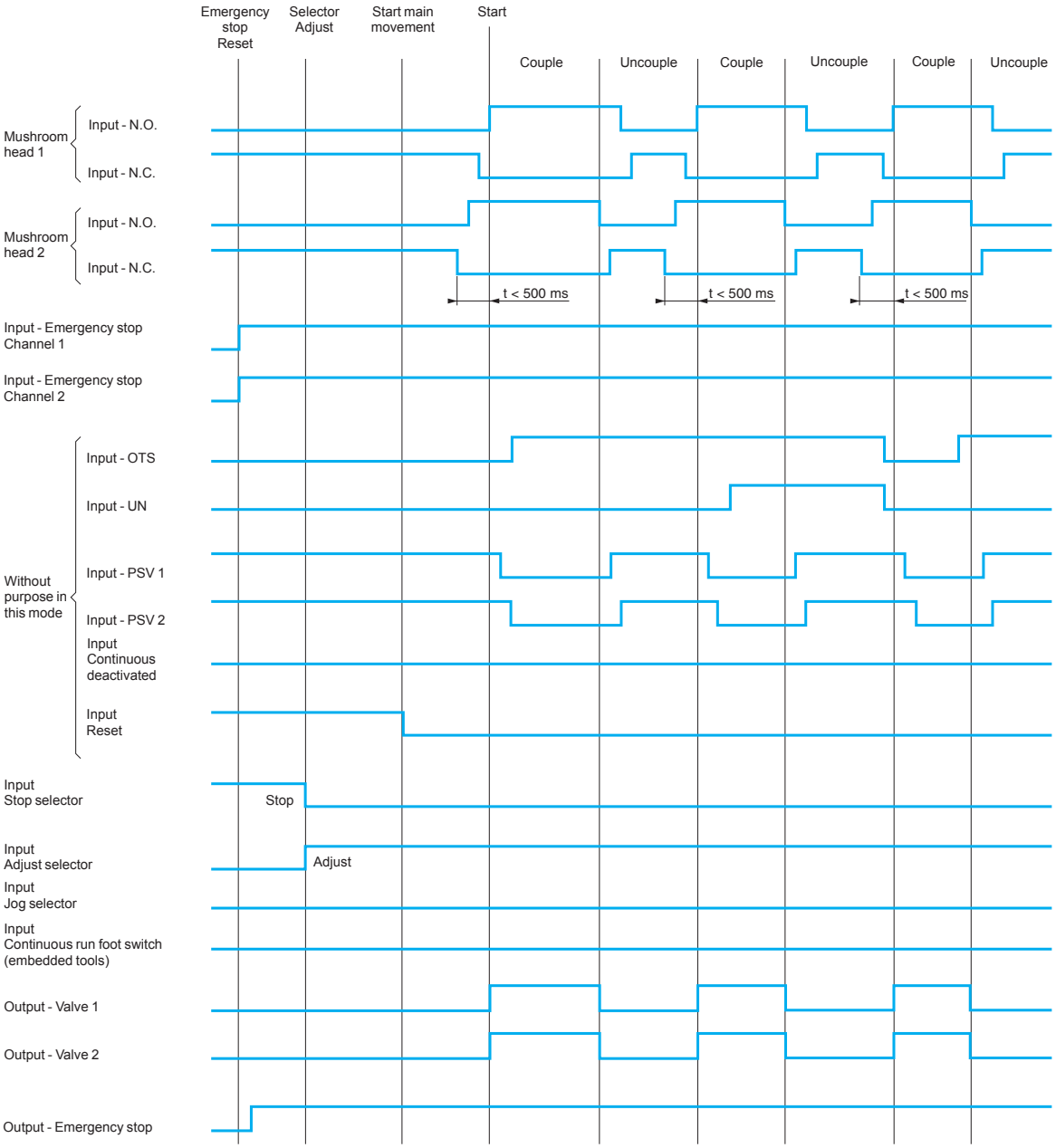
Monitoring safety stop at top dead center on eccentric press (continued)

Functional diagram in adjust mode



Key 0 1

OTS = Limit switch associated with top dead center (TDC)
UN = Limit switch associated with bottom dead center (BDC)
PSV = safety valve
t sync = synchronization time

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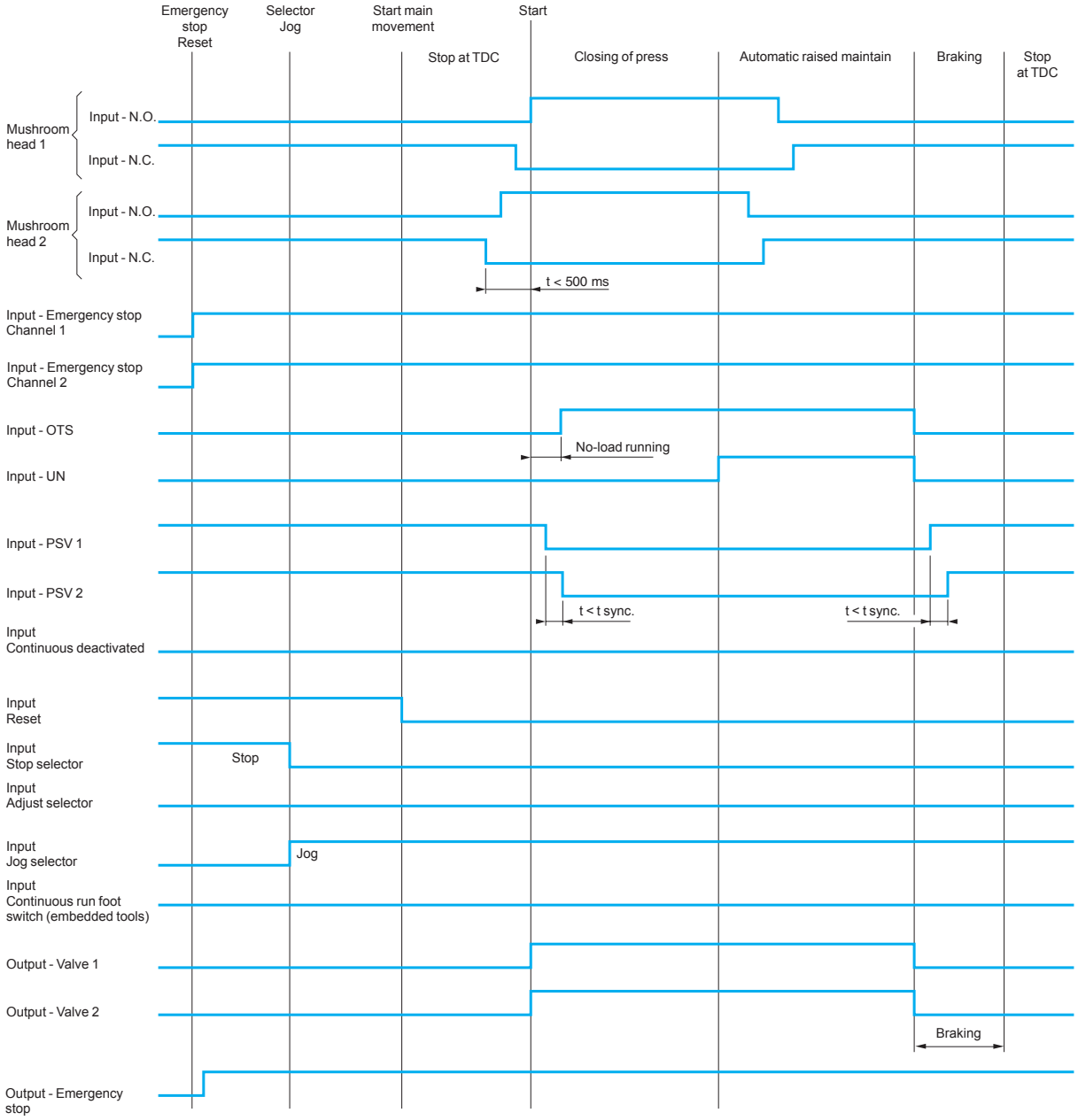
2

Monitoring safety stop at top dead center on eccentric press (continued)

Functional diagram in jog mode



Key 0 1

BDC = Bottom Dead Center
TDC = Top Dead Center
OTS = Limit switch associated with top dead center (TDC)
UN = Limit switch associated with bottom dead center (BDC)
PSV = safety valve
t sync = synchronization time

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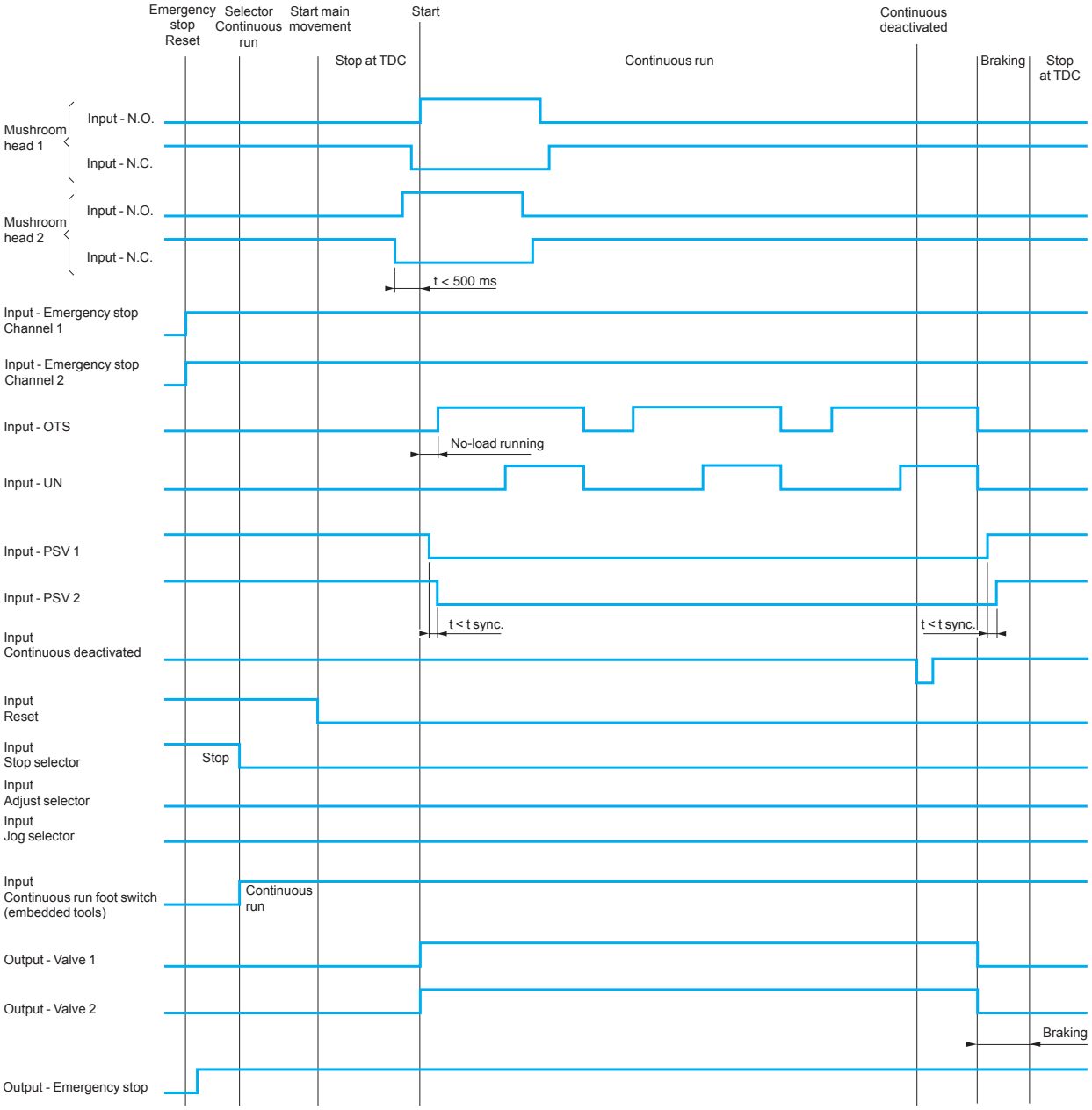
Monitoring safety stop at top dead center on eccentric press (continued)

Functional diagram in automatic continuous run mode



Key 0 1

BDC = Bottom Dead Center
TDC = Top Dead Center
OTS = Limit switch associated with top dead center (TDC)
UN = Limit switch associated with bottom dead center (BDC)
PSV = safety valve
t sync = synchronization time

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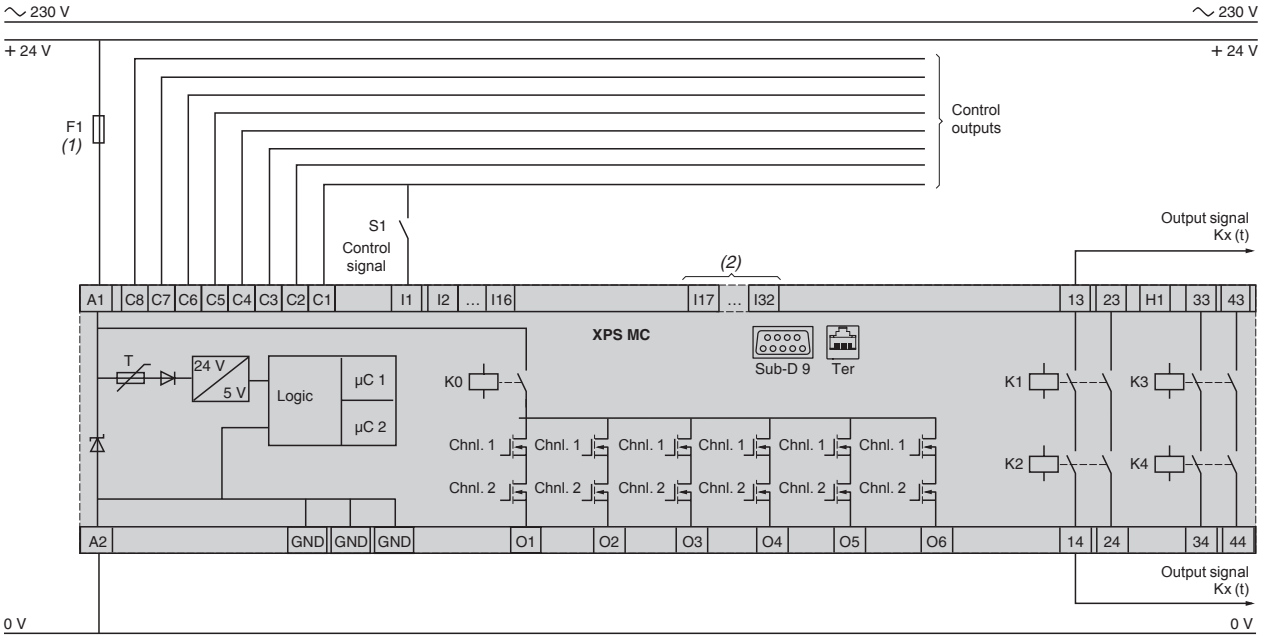
2

Safety time delays

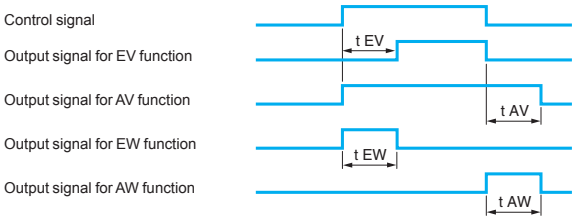
Category 4 conforming to standard EN 954-1.

Wiring diagram



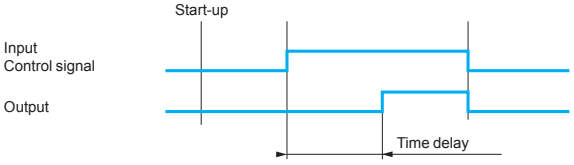
(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagrams

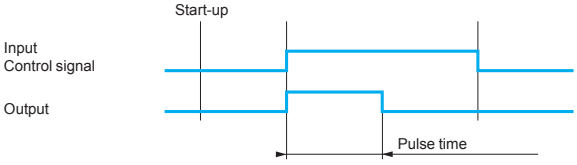


Functions:
EV = On-delay
AV = Off-delay
EW = Pulse on energization
AW = Pulse on de-energization

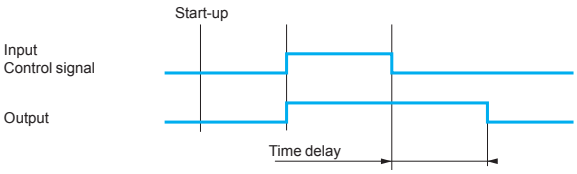
On-delay



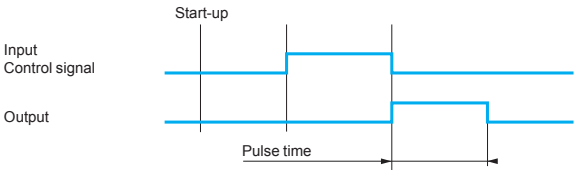
Pulse on energization



Off-delay



Pulse on de-energization



Key 0 1

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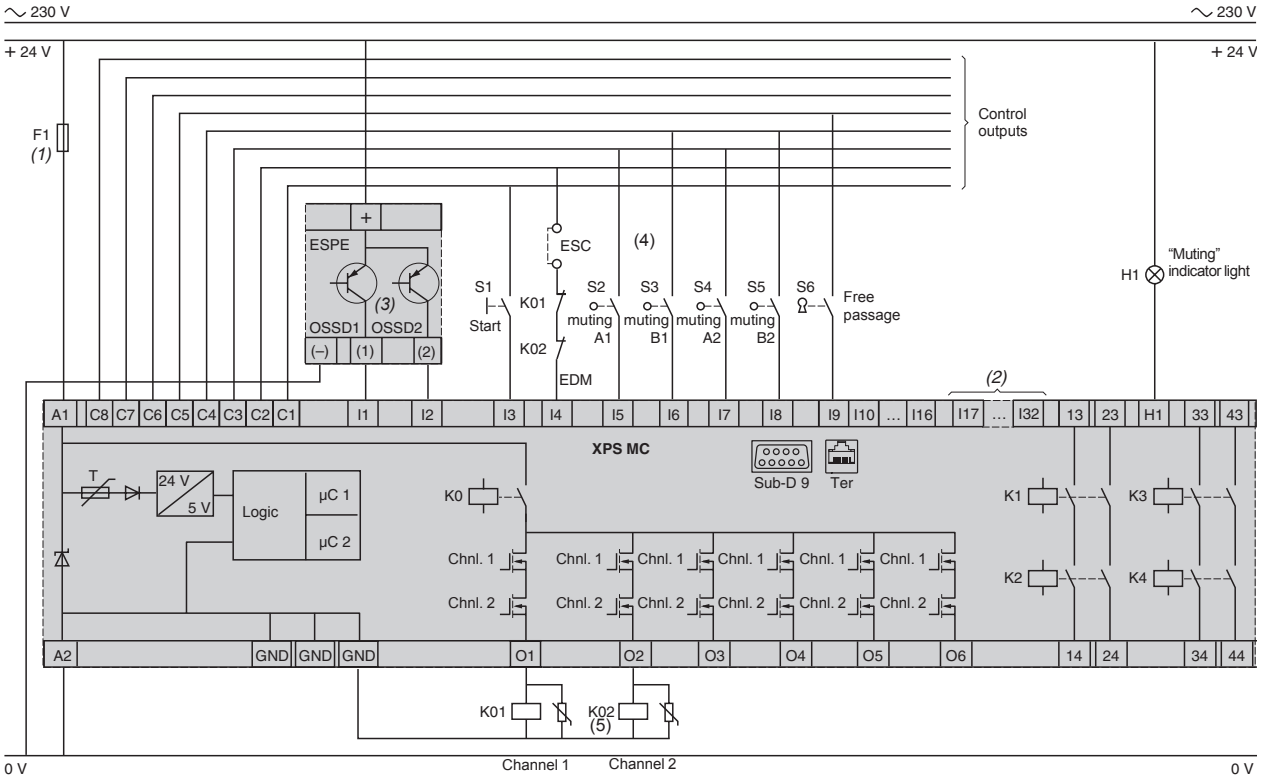
"Muting" function for light curtains

Category 4 conforming to standard EN 954-1.

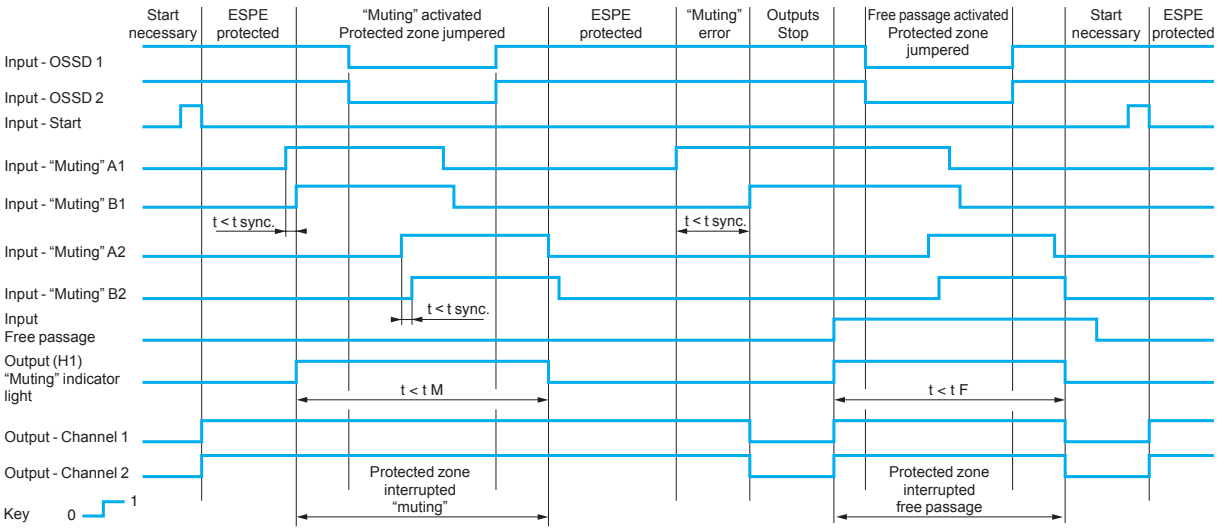
Wiring diagram



ESC = external start conditions
EDM = external devices monitoring
ESPE = electro-sensitive protection equipment
OSSD1/OSSD2 = output signal switching device

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.
(3) A light curtain with relay outputs can also be used with the "Muting" function.
(4) Only one "Muting" function can be connected to an XPSMC controller.
(5) Example using 2 safety outputs to control 2 contactors linked to one safety function.

Functional diagram



tM = "Muting" time
tF = free passage activation time
t sync. = synchronization time

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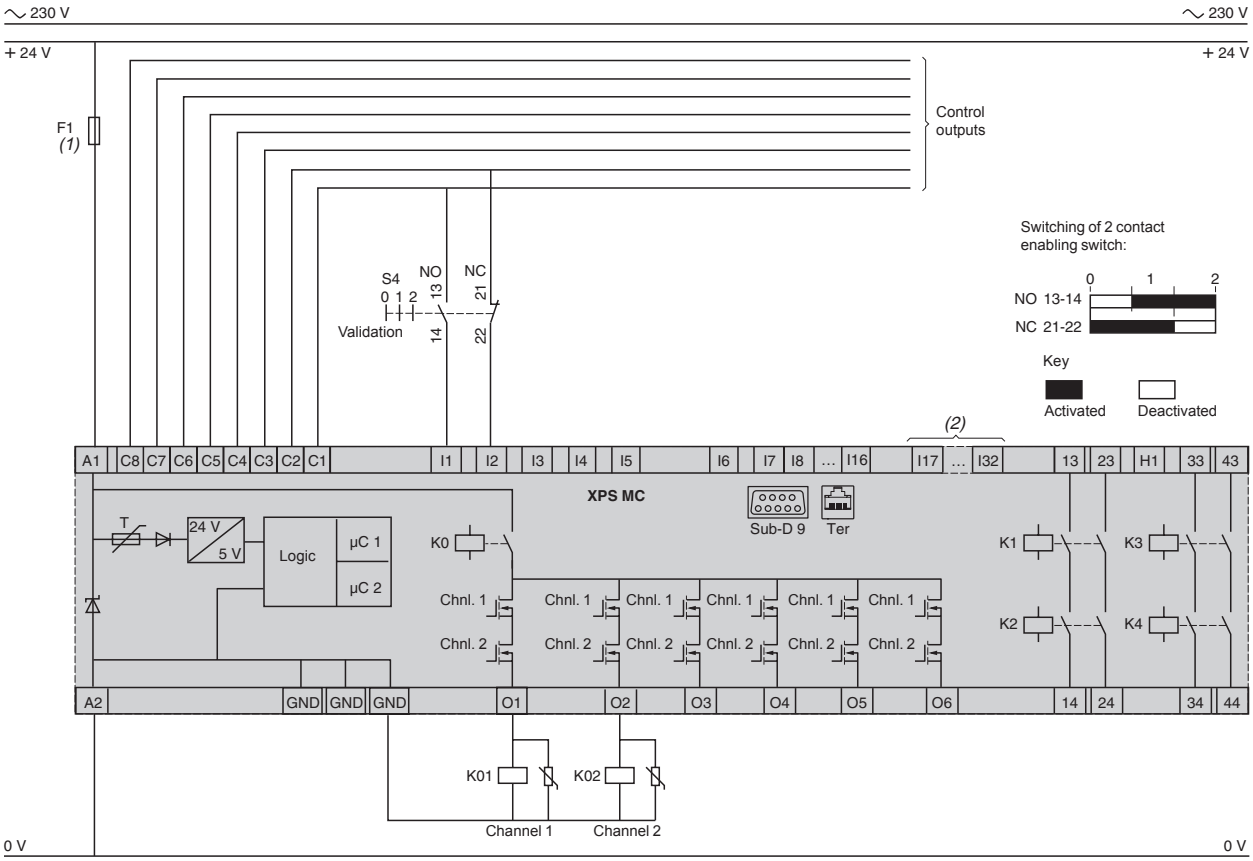
2

Enabling switch monitoring, 2 contact type

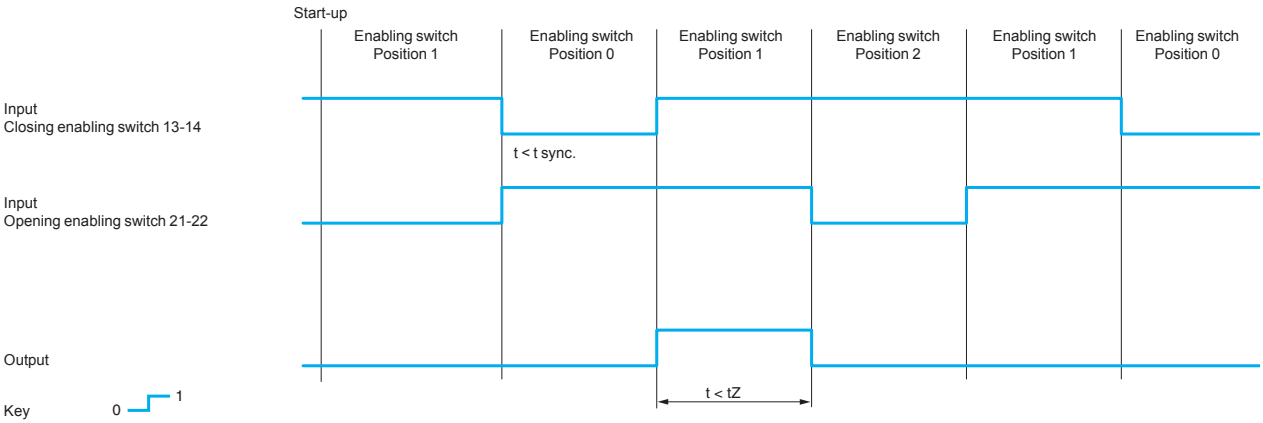
Category 1 conforming to standard EN 954-1.

Wiring diagram



(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagram



t Z = enabling time

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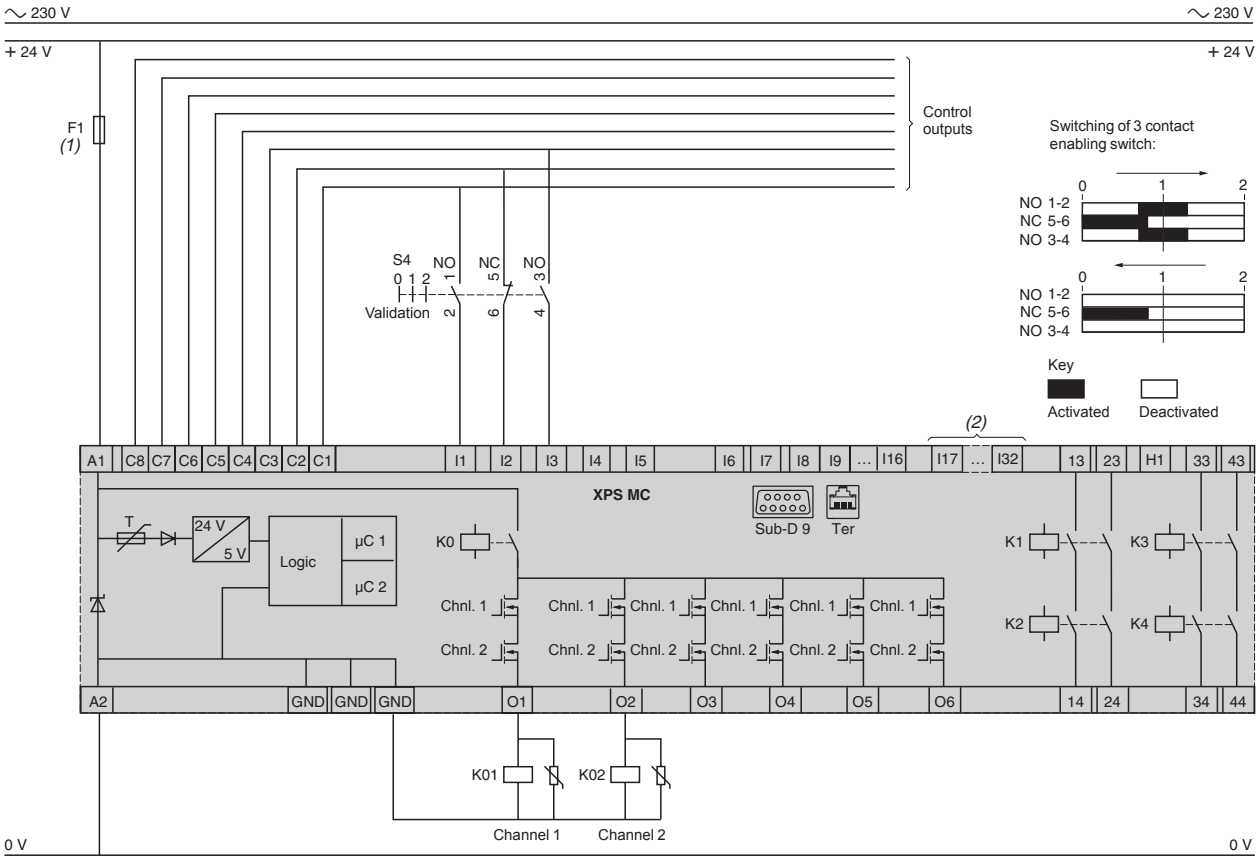
Enabling switch monitoring, 3 contact type

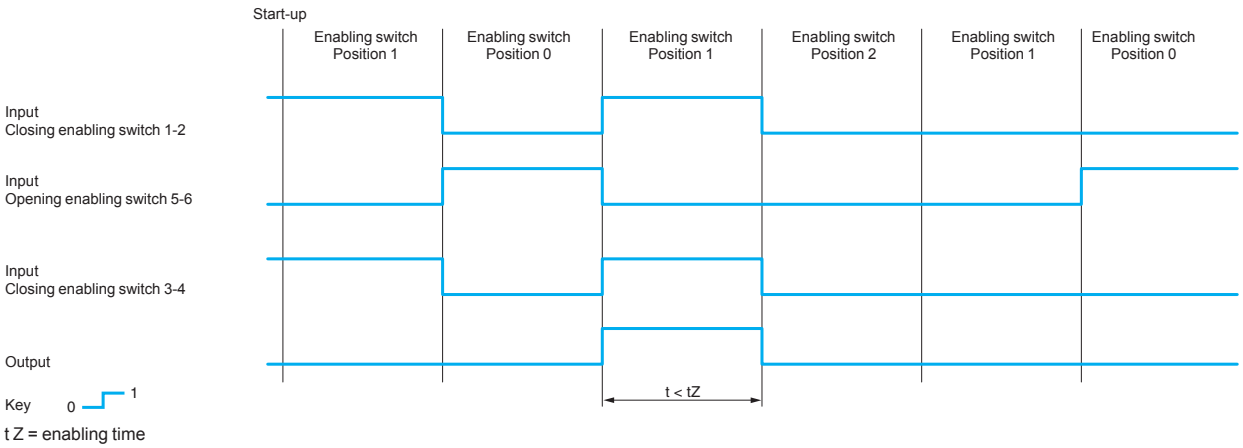
Category 4 conforming to standard EN 954-1.

Wiring diagram



(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagram



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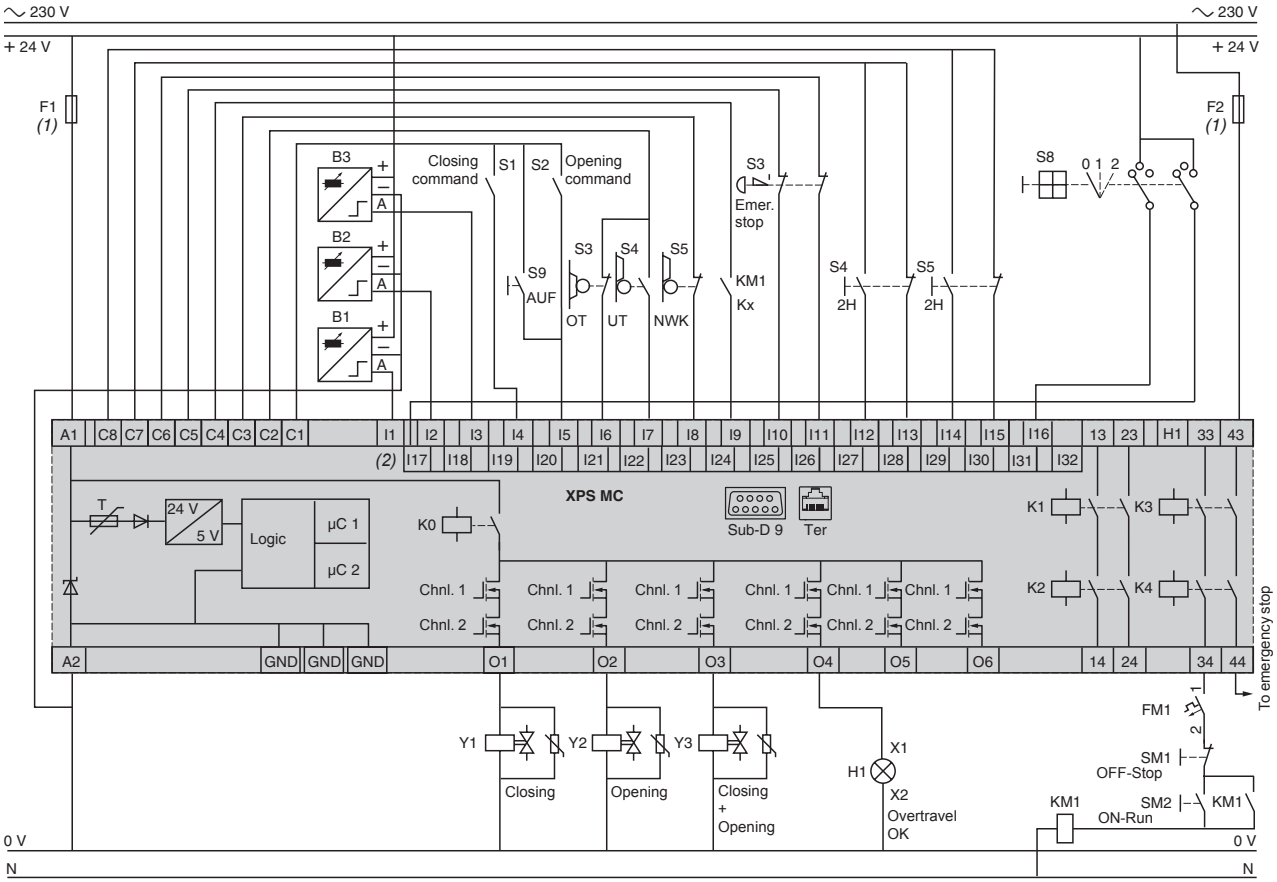
2

Hydraulic press

Category 4 conforming to standard EN 954-1.

Wiring diagram



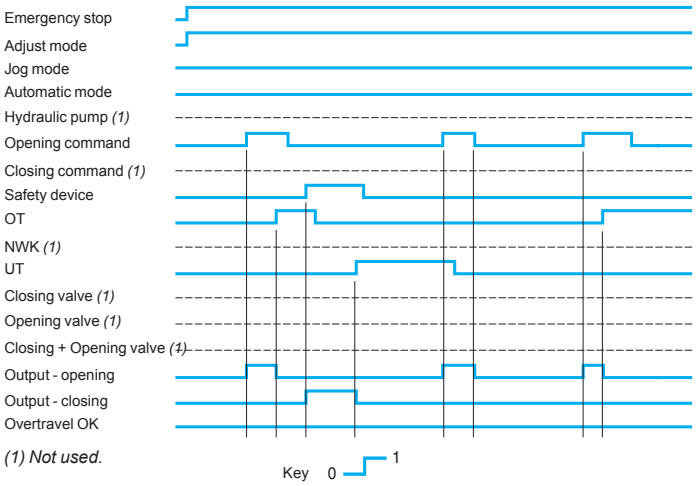
S8: Operating modes:
0 - stop,
1 - adjust,
2 - jog.

AUF = open, to be used in inching.
OT = Limit switch associated with top dead center (TDC).
UT = Limit switch associated with bottom dead center (BDC).
NWK = overtravel monitoring.

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z● (I17…I32).

Functional diagram

Hydraulic press, adjust mode



(1) Not used.

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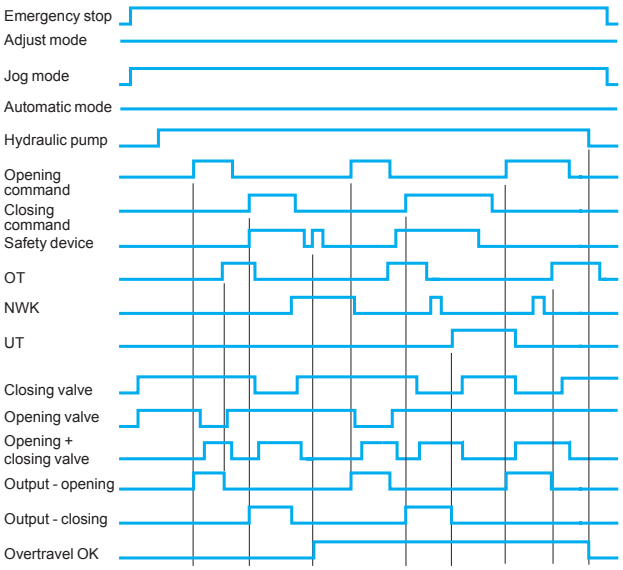
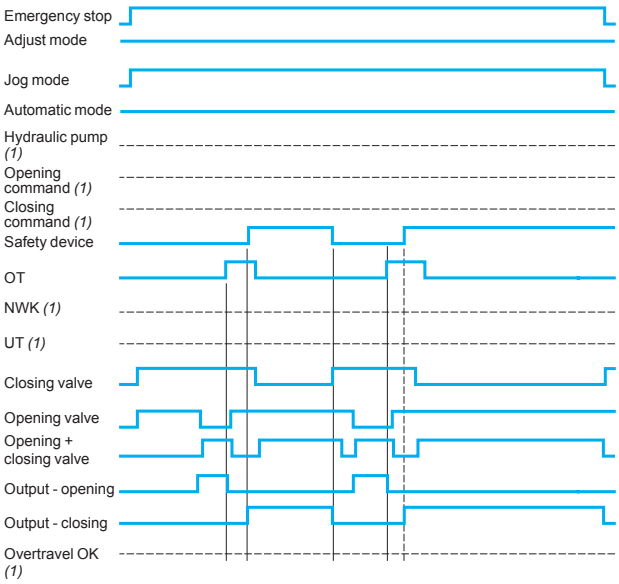
Hydraulic press

Functional diagrams *(continued)*

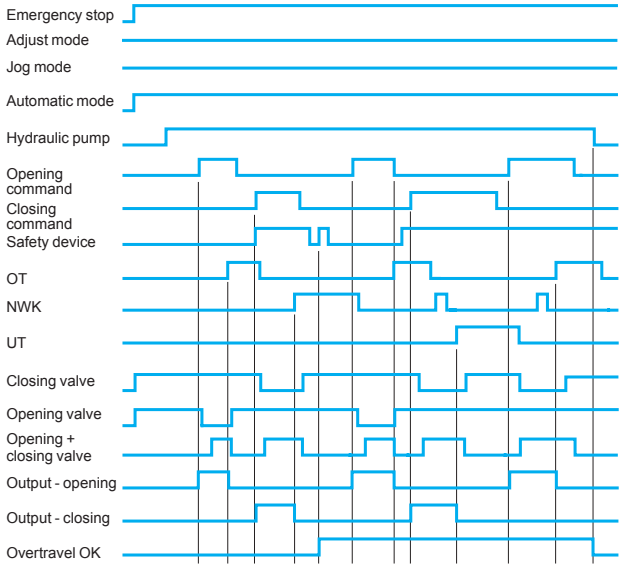
Hydraulic press, mode = jog, with overtravel monitoring and opening and closing control coming from the automation platform



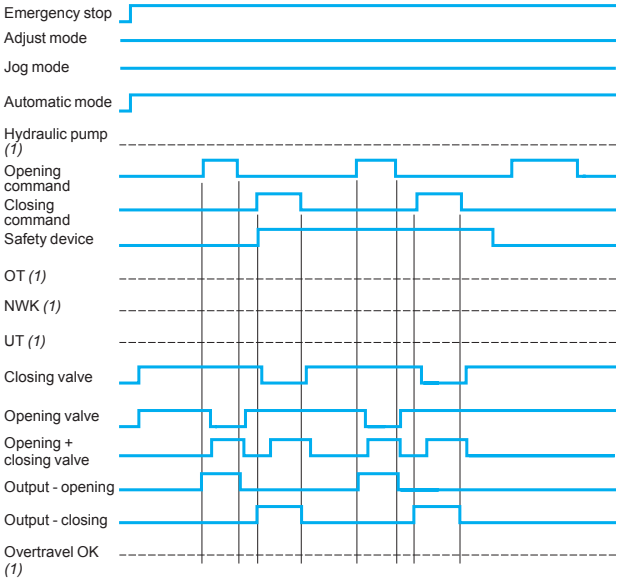
Hydraulic press, mode = jog



Hydraulic press, mode = automatic, with overtravel monitoring and opening and closing control coming from the automation platform



Hydraulic press, mode = automatic



Key 0 1

(1) Not used.

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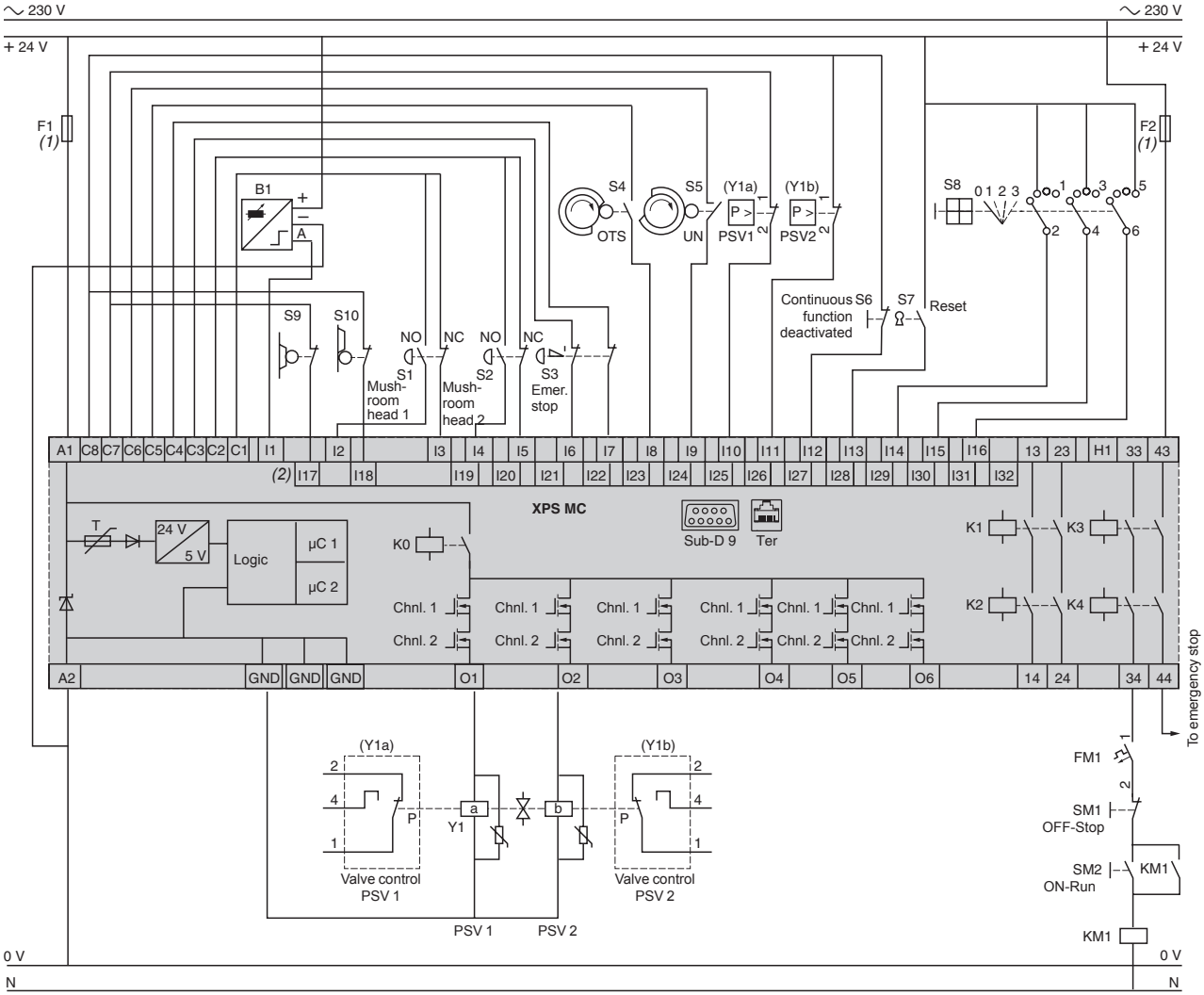
2

Eccentric press

Category 4 conforming to standard EN 954-1.

Wiring diagram



S8: Operating modes:
0 - stop,
1 - adjust,
2 - jog,
3 - automatic continuous run.
OTS = Limit switch associated with top dead center (TDC)
UN = Limit switch associated with bottom dead center (BDC)
PSV = safety valve
B1 = sensor at tooth wheel in cam switch mechanism.

(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z● (I17…I32).

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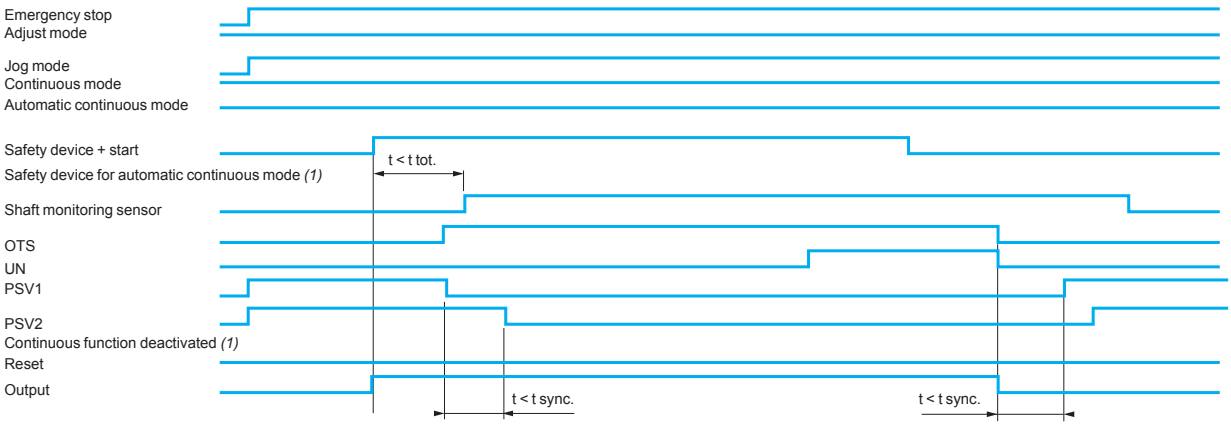
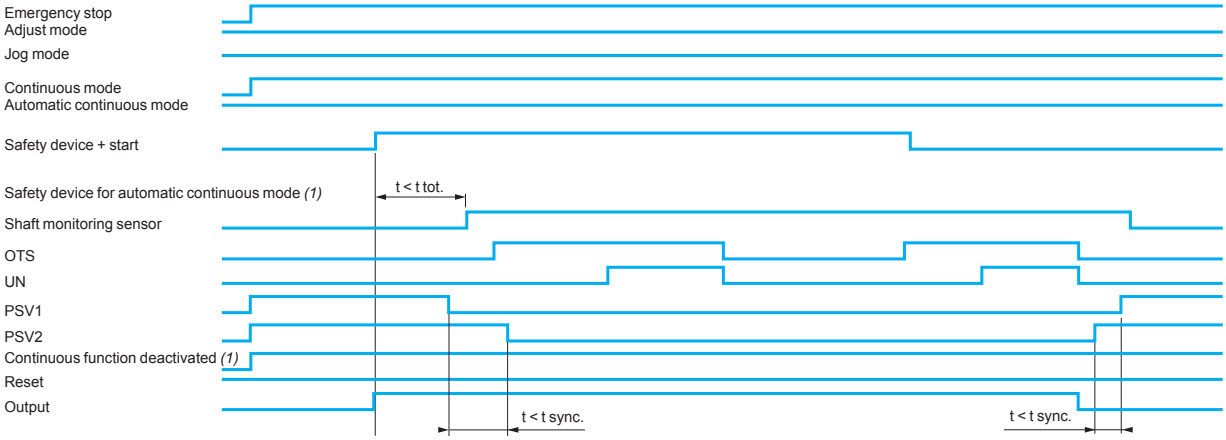
Eccentric press (continued)

Functional diagrams

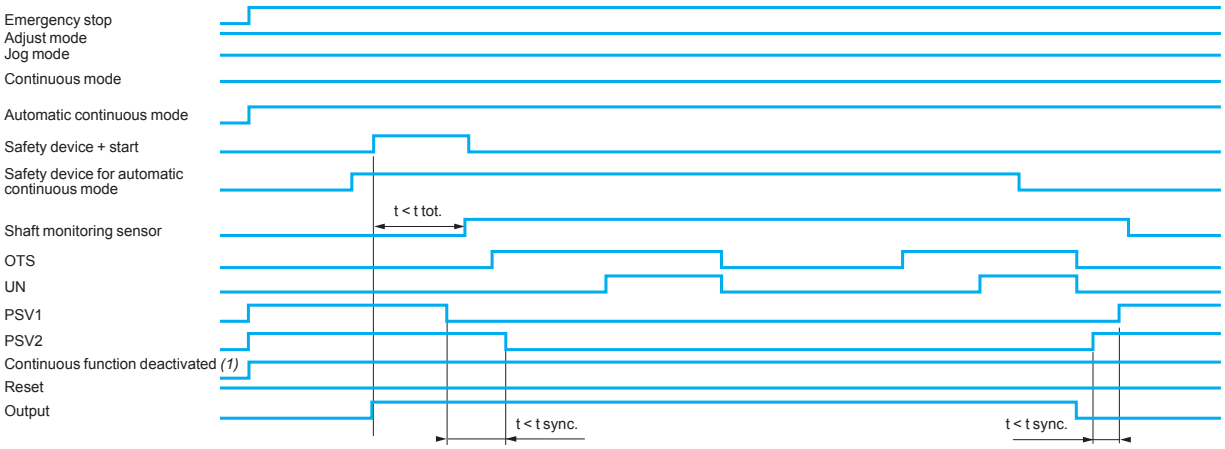
Eccentric press: Jog



Eccentric press: Continuous



Eccentric press: automatic continuous



Key 0 1

t sync. = synchronization time
t tot. = dead time
(1) Not used.

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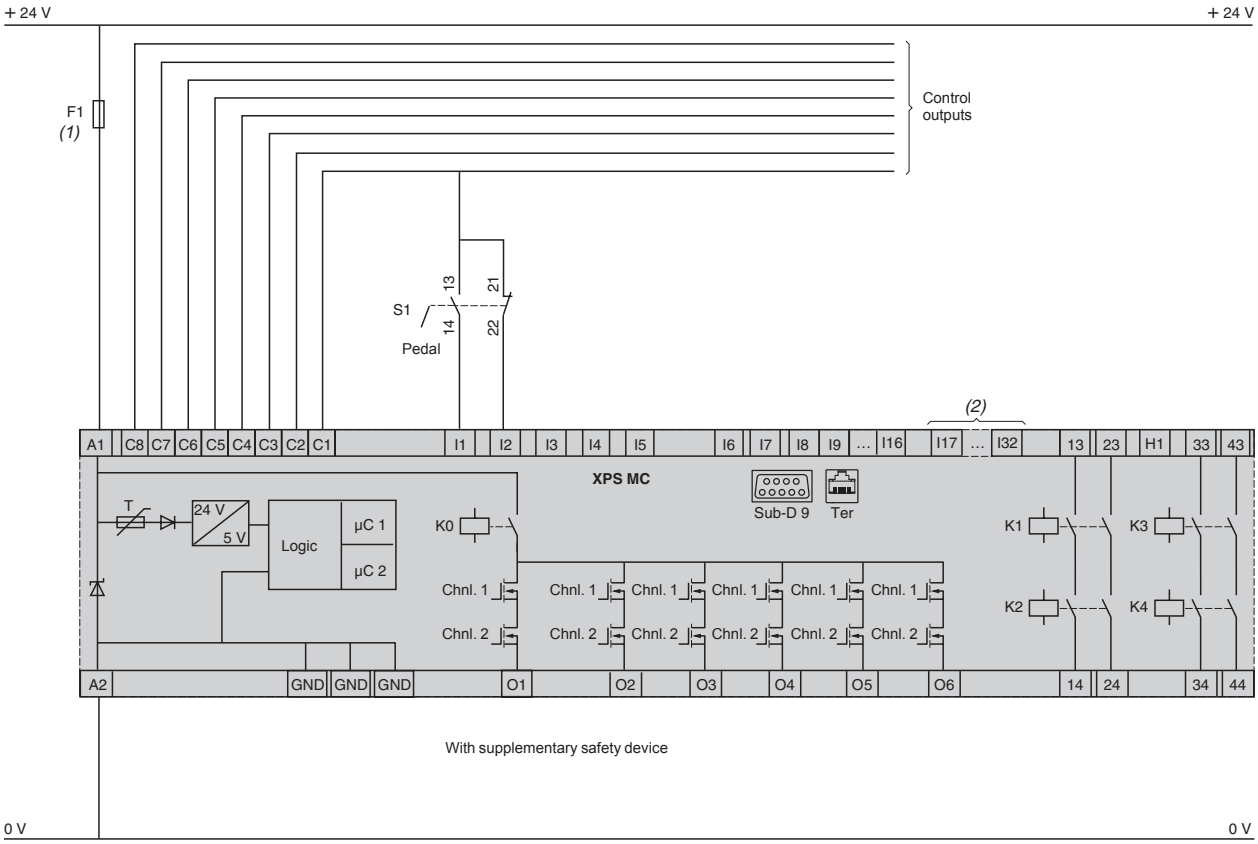
2

Foot switch monitoring

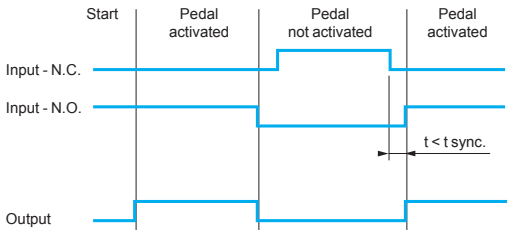
Wiring diagram



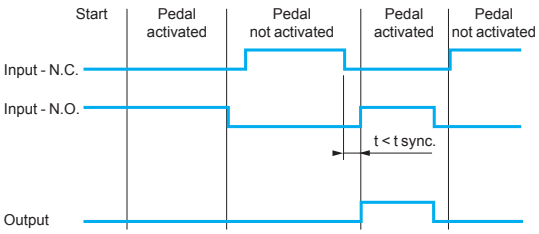
(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagrams

Without start interlock



With start interlock



Key 0 1

t sync. = synchronization time

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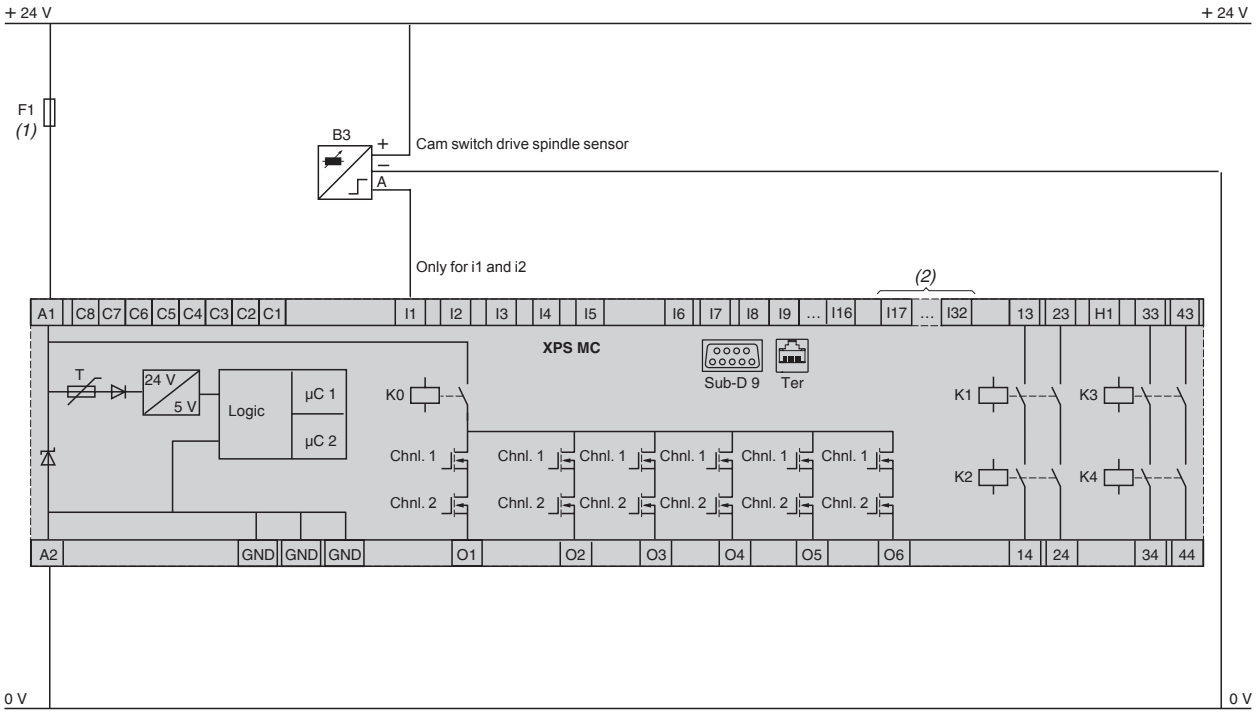
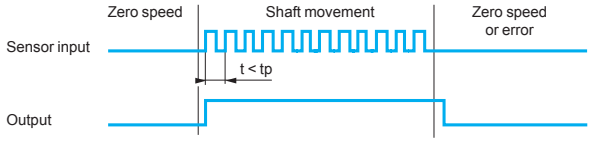
Chain shaft breakage monitoring

Wiring diagram



(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

Functional diagrams



Key 0 1
tp = pulse time

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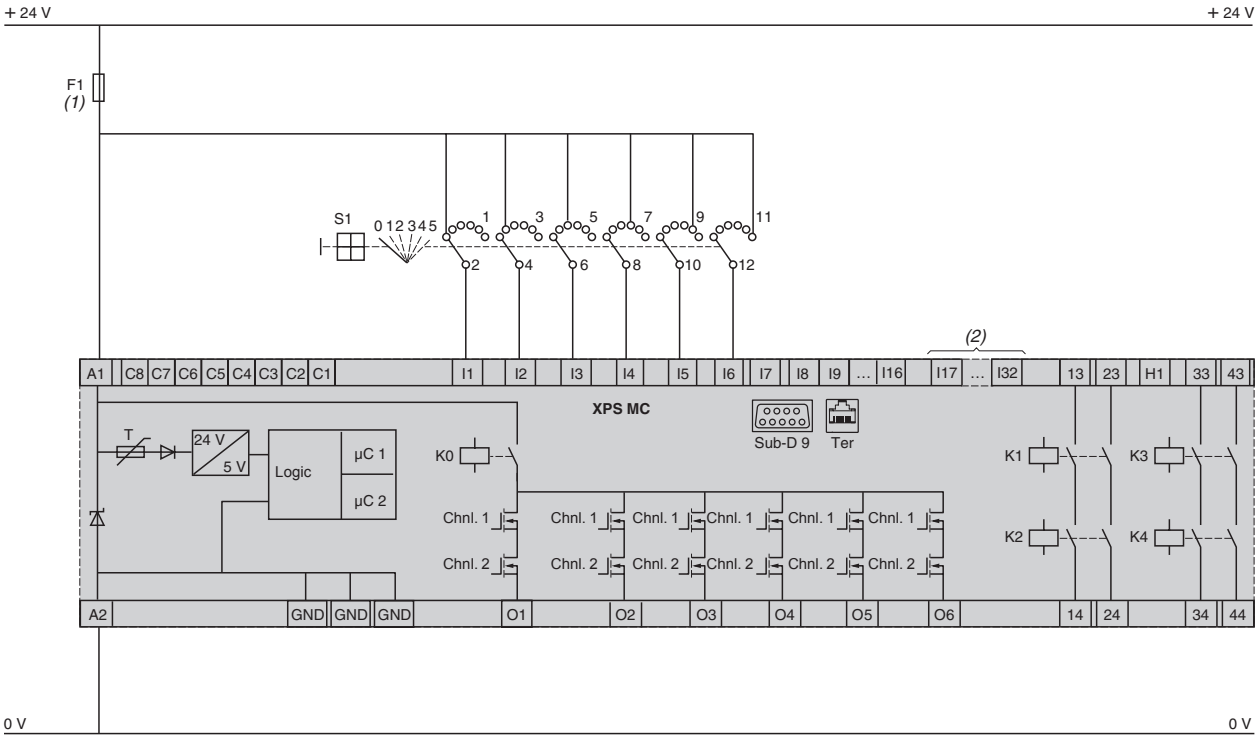
2

Position selector

Wiring diagram



(1) Technical characteristics for maximum rating of fuses, see page 2/122.
(2) Only applicable to XPSMC32Z●.

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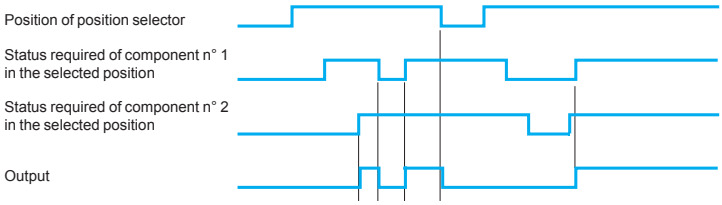
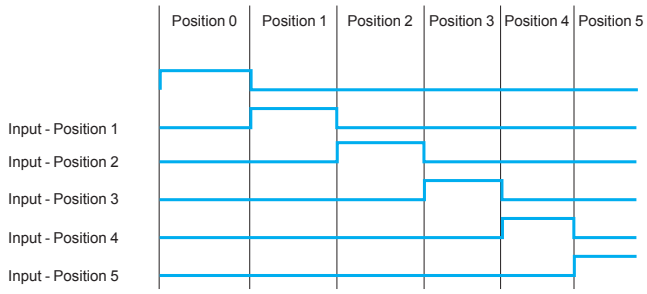
Position selector (continued)

Functional diagrams





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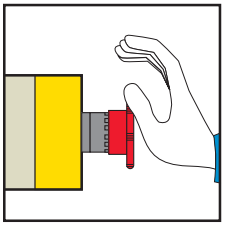
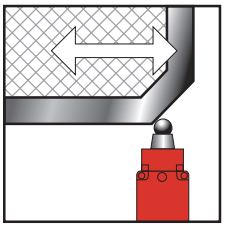
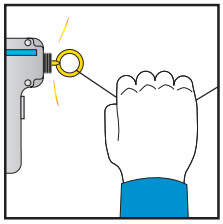
2

Applications			
Modules	**For Emergency stop and switch monitoring**		
Conformity to standards	EN 954-1 - category 3/EN/ ISO 13849-1, EN/IEC 60204-1, EN 1088/ISO 14119, EN ISO 13850, EN/IEC 60947-1 + A11, EN/IEC 60947-5-1	EN 954-1 - category 4/EN/ ISO 13849-1, (instantaneous contacts) EN 954-1 - category 3/ ISO 13849-1 (time delay contacts), EN/IEC 60204-1, EN/IEC 60947-5-1, EN/ISO 13850, EN 50082-2	EN 954-1 - category 4/EN/ ISO 13849-1, EN/IEC 60204-1, DIN V VDE 801 + A1, EN/ISO 13850, EN 1088/ISO 14119, EN/IEC 60947-1 A11, EN/IEC 60947-5-1
Product certifications	UL, CSA, BG	UL, CSA, BG	UL, CSA, BIA
Number of circuits			
Safety	3 N.O.	2 N.O. instantaneous + 3 N.O. time delay	3 N.O. instantaneous + 3 N.O. time delay
Additional	1 solid-state output for signalling to PLC	4 solid-state output for signalling to PLC	3 solid-state outputs for signalling to PLC
Display	2 LEDs	4 LEDs	11 LEDs
Supply voltage	∼ and ⎓ 24 V ∼ 48 V ∼ 115 V ∼ 230 V	∼ and ⎓ 24 V ∼ 115 V ∼ 230 V	⎓ 24 V
Synchronization time between inputs	Unlimited	75 ms (automatic start)	Unlimited or 1.5 s (depending on wiring)
Input channel voltage			
24 V/48 V version	∼ and ⎓ 24 V/∼ 48 V	⎓ 24 V/–	⎓ 24 V/–
24 V/48 V or 110 V/120 V/230 V version	∼ 115 V/230 V –	∼ 48 V/48 V –	– –
Module type	**XPSAC**	**XPSATE**	**XPSAV**
Pages	2/175	2/180	

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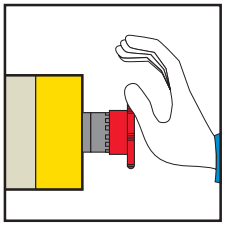

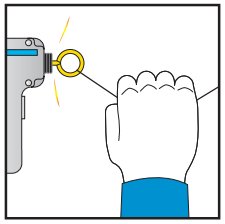

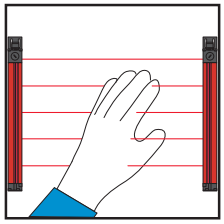

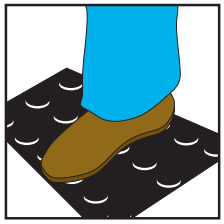

For Emergency stop and switch monitoring	For Emergency stop, switch or solid-state output light curtain monitoring		For Emergency stop, switch, sensing mat/edges or solid-state output light curtain monitoring
EN 954-1 - category 4/EN/ ISO 13849-1, EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN 50082-2	EN 954-1 - category 3, EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN 50082-2 EN/IEC 61496-1 (type 4) Category 4 for the monitoring of light curtains type 4 with solid state outputs and test function	EN 954-1 - category 4/EN/ ISO 13849-1, EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN 954-1 - category 4/EN/ ISO 13849-1, EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN/IEC 60947-1 + A11
UL, CSA, BG	UL, CSA, BG	UL, CSA, BG	UL, CSA, BG
3 N.O.		7 N.O.	3 N.O. instantaneous
–		2 N.C. + 4 solid-state outputs for signalling to PLC	1 N.C. + 4 solid-state outputs for signalling to PLC
3 LEDs		4 LEDs	4 LEDs
∼ and ⎓ 24 V		∼ and ⎓ 24 V ∼ 115 V and ⎓ 24 V ∼ 230 V and ⎓ 24 V	∼ and ⎓ 24 V ∼ 48 V ∼ 110 V and ⎓ 24 V ∼ 120 V and ⎓ 24 V ∼ 230 V and ⎓ 24 V
Unlimited			Unlimited or 2 s, 4 s (depending on wiring)
⎓ 24 V/–		⎓ 24 V/–	⎓ 24 V/–
– –		∼ 24 V/24 V –	– ⎓ 24 V/24 V/24 V
XPSAF	**XPSAFL**	**XPSAR**	**XPSAK**
2/187	2/191	2/195	2/201

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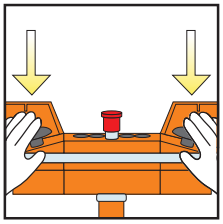
2

Applications



Modules	**For electrical monitoring of two-hand control stations**	
Conformity to standards	EN 954-1 - category 1/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 574 type III A/ISO 13851, EN 50082-2	EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 574 type III C/ISO 13851, EN 50082-2
Product certifications	UL, CSA	UL, CSA, INRS
Number of circuits		
Safety	1 N.O.	2 N.O.
Additional	1 N.C.	1 N.C.
Display	2 LEDs	3 LEDs
Supply voltage	∿ and ⎓ 24 V ∿ 115 V ∿ 230 V	⎓ 24 V ∿ 24 V ∿ 115 V ∿ 230 V
Synchronization time between inputs	500 ms	500 ms
Input channel voltage		
24 V/48 V version	⎓ 24 V/–	⎓ 24 V (⎓ 24 V) ⎓ 48 V (∿ 24 V)
115 V/230 V version	∿ 24 V/24 V	∿ 48 V/48 V
Module type	**XPSBA**	**XPSBC**
Pages	2/209	

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EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 60204-1, EN 574 type III C/ISO 13851, EN/IEC 60947-1, EN/IEC 60947-5-1, DIN V VDE 0801 (1990), DIN V VDE 0801 A1 (1994)
UL, CSA, BIA

2 N.O.
2 solid-state outputs for signalling to PLC
3 LEDs
⎓ 24 V

500 ms
⎓ 24 V/–
–

XPSBF

2/209

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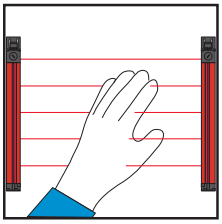
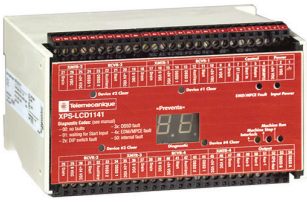
2

Applications



Modules	**For monitoring 2 to 4 type 2 and type 4 light curtains (transmitter-receiver pair)**



Functions	Protects access to a hazardous zone by associating the module with 2 to 4 light curtains type XUSL
Built-in “muting” function	No
Conformity to standards	EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 61496-1, EN/IEC 61496-2
Product certifications	UL, CSA, TÜV
Number of circuits	
Safety	2 solid-state PNP (N.O.)
Additional	1 PNP N.O. + 1 NPN N.O. output for signalling to PLC
Display	9 LEDs + 2-digit display
Supply voltage	⎓ 24 V
Module type	**XPSLCD**
Pages	2/215

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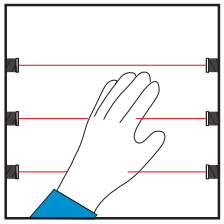
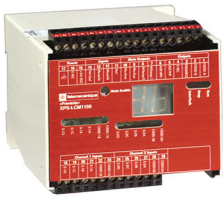


For control of 1 to 4 single-beam photo-electric sensors XU2 S (transmitter-receiver pair)	For monitoring type 4 light curtains Compact and slim ranges
	
Protects access to a hazardous zone by associating the module with 1 to 4 single-beam photo-electric sensors	Protects access to a hazardous zone by associating the module with light curtains XUSL
	2 transmitter-receiver pairs
Yes	Yes
EN 954-1 - category 2/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 61496-1, EN/IEC 60947-5-1, EN/IEC 60947-1	EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 61496-1, EN/IEC 61496-2
UL, CSA, BIA	UL, CSA, TÜV
2 N.O.	2 solid-state
4 solid-state PNP N.O. outputs for signalling to PLC	1 PNP + 1 NPN output for signalling to PLC
4 LEDs	14 LEDs + 2-digit display
⎓ 24 V	
XPSCM	**XPSLCM**
3/134	2/220

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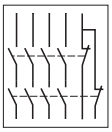
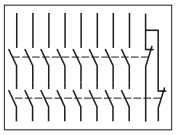
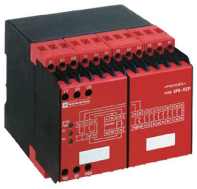
2

Applications		
Modules	**For increasing the number of safety contacts**	
		
Functions	Allows additional safety contacts to be added to another module	
Conformity to standards	EN 954-1 - category 4/EN/ISO 13849-1 (when connected to the appropriate module), EN/IEC 60204-1, EN/IEC 60947-5-1	EN 954-1 - category 4/EN/ISO 13849-1 (when connected to the appropriate module), EN/IEC 60204-1, EN/IEC 60947-5-1
Product certifications	UL, CSA	UL, CSA
Number of circuits		
Safety	4 N.O.	8 N.O.
Additional	1 N.C. + 1 solid-state output for signalling to PLC	
Display	3 LEDs	
Supply voltage	∼ and ⎓ 24 V ∼ 115 V ∼ 230 V	
Module type	**XPSECM**	**XPSECP**
Pages	2/227	

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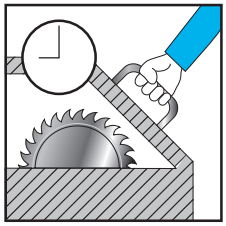

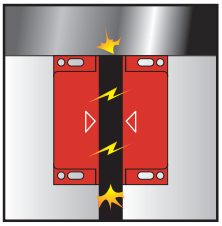

For the monitoring of applications requiring safety time delays		For non-contact (coded magnetic) switch monitoring	
		For 2 max.	For 6 max.
Unlocking of guards after a safety time delay for machines with long rundown time	Jumpering contact in association with XPSVNE modules for zero speed detection, solenoid valve monitoring, etc.	For monitoring 2 to 6 coded switches, depending on model	
EN 954-1 - category 3/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1	EN 954-1 - category 3/EN/ ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1	EN 954-1 - category 4/EN/ ISO 13849-1, EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/IEC 60947-5-3, DIN V VDE 0801 (1990), DIN V VDE 0801 A1 (1994)	EN 954-1 - category 4/EN/ ISO 13849-1, EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/IEC 60947-5-3, DIN V VDE 0801 (1990), DIN V VDE 0801 A1 (1994)
UL, CSA, BG	UL, CSA, BG	UL, CSA, BIA	UL, CSA, BIA
1 N.O. time delayed	1 N.O. pulse type	2 N.O.	
2 N.C. + 2 solid-state outputs for signalling to PLC		2 solid-state outputs for signalling to PLC	
4 LEDs		3 LEDs	15 LEDs
∼ and ⎓ 24 V ∼ 115 V ∼ 230 V		⎓ 24 V	
XPSTSA	**XPSTSW**	**XPSDMB**	**XPSDME**
2/231		2/235	

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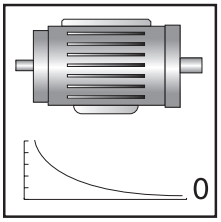
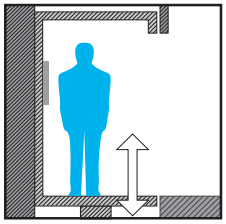
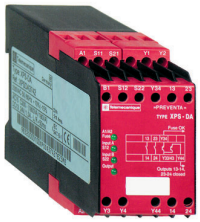
2

Applications		
Modules	**For zero speed detection of a.c. or d.c. motors which produce a remanent voltage in their windings due to residual magnetism**	**For elevator control**
		
Functions	Detecting the stopping of the motor by measuring the remanent voltage in the stator windings (compatible with electronic motor control devices such as: variable speed drives, d.c. injection brakes, etc.)	Checks the height of the elevator cabin when it stops at a landing in order to compensate for any difference generated by variation of the load in the cabin
Conformity to standards	EN 954-1 - category 3/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 50082-2	EN 954-1 - category 4/EN/ISO 13849-1, EN 81-1, EN 81-2, EN/IEC 60947-5-1, EN 50082-2, EN 12015, EN 12016
Product certifications	UL, CSA, BG	UL, CSA, TÜV
Number of circuits		
Safety	1 N.O. + 1 N.C.	2 N.O.
Additional	2 solid-state outputs for signalling to PLC	
Display	4 LEDs	4 LEDs
Supply voltage	⎓ 24 V ∼ 115 V ∼ 230 V	∼ or ⎓ 24 V ∼ 115 V ∼ 230 V
Module type	**XPSVNE**	**XPSDA**
Pages	2/241	2/247

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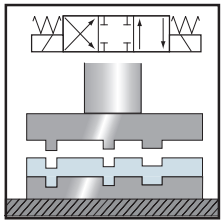
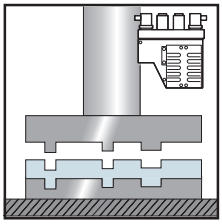
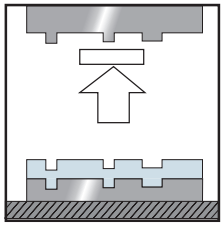
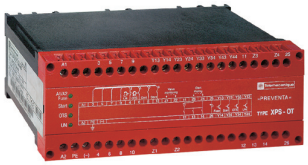






For dynamic monitoring of hydraulic valves on linear presses	For dynamic monitoring of double-bodied solenoid valves	For safety stop at top dead center with automatic overtravel monitoring and control
		
Dynamic monitoring of the position of the valve pistons of the hydraulic safety system on linear presses. Dangerous movements of the machine are allowed when the correct change of signal occurs	Dynamic monitoring of double-bodied safety solenoid valves on eccentric presses. The device prevents engagement of the clutch and engages the brake if an anomaly occurs in the solenoid valve	Automatic monitoring of the stopping distance at each cycle + maintain open function for eccentric presses
EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 693, EN 50082-2	EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 692, EN 50082-2	EN 954-1 - category 4/EN/ISO 13849-1, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 692, EN 50082-2
UL, CSA	UL, CSA	UL, CSA
2 N.O. + 1 N.C.	1 N.O. + 1 N.C.	3 N.O.
–	4 solid-state outputs for signalling to PLC	
8 LEDs		
⎓ 24 V	⎓ 24 V ∼ 115 V ∼ 230 V	– ∼ 115 V ∼ 230 V
XPSPVT	**XPSPVK**	**XPSOT**
2/249	2/253	2/258

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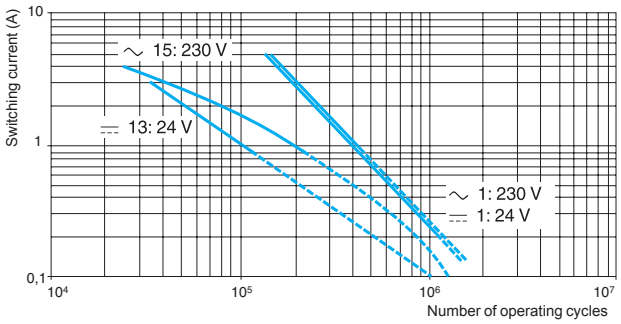
2

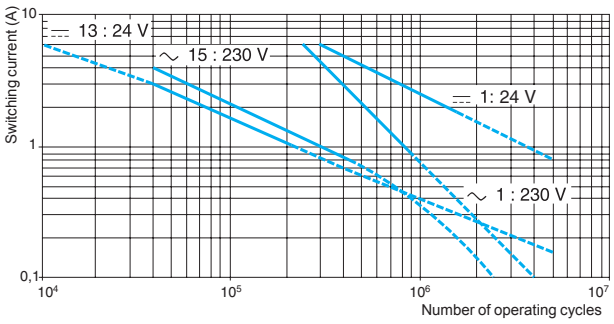
Electrical life

Electrical life ratings of safety contacts conforming to EN 60947-5-1, table C2

XPSAC, XPSTSA, XPSTSW, XPSBA, XPSBC, XPSCM, XPSDA, XPSOT, XPSPVK, XPSPVT, XPSVNE

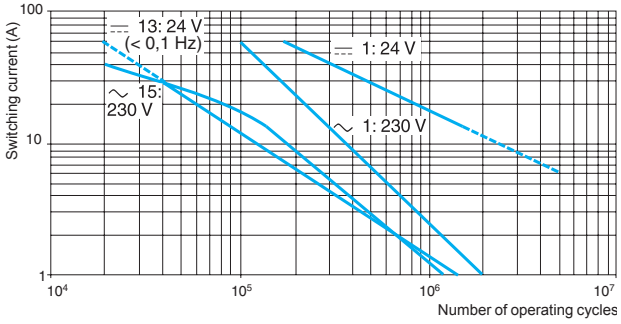


XPSECM, XPSECP

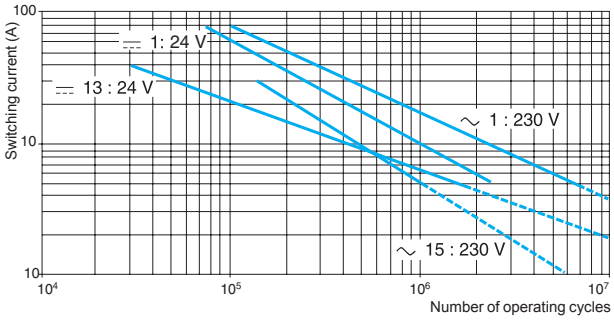


XPSATE

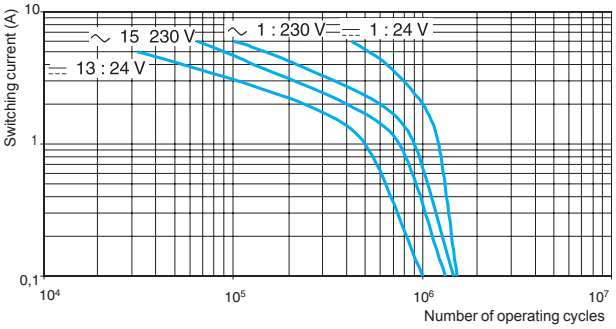
24 V ⎓ version



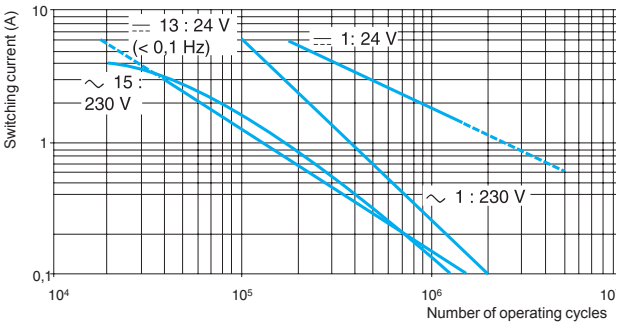
115 V ~ + 230 V ~ version



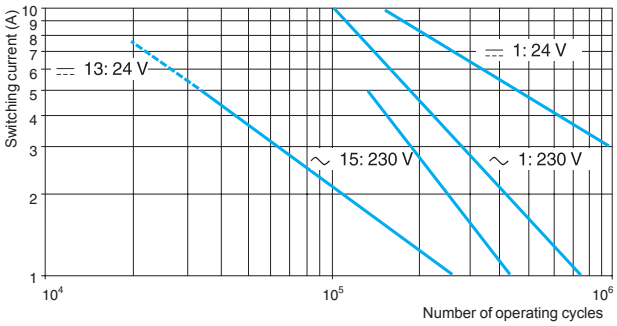
XPSAF, XPSAK, XPSAFL



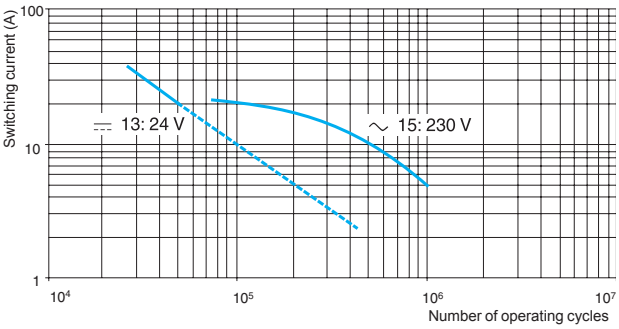
XPSAV, XPSMP, XPSVC, XPSBF, XPSMC



XPSAR



XPSDMB, XPSDME



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Electrical life (continued)

Definition of tests

Determination of electrical life conforming to EN 60947-5-1 (table C2)

Type of current	Utilization category	Start-up			Breaking		
		Current	Voltage	Cos φ	Current	Voltage	Cos φ
a.c. supply	AC-15	10 x Ie	Ue	0.7	Ie	Ue	0.4
Type of current	**Utilization category**	**Start-up**			**Breaking**		
		Current	**Voltage**	**T0.95**	**Current**	**Voltage**	**T0.95**
d.c. supply	DC-13	Ie	Ue	50 ms	Ie	Ue	50 ms

Ie: operational current measured.
Ue: operational voltage measured.
Cos φ: power factor.
T0.95: time taken to reach 95% of nominal current.

The tests are carried out with a frequency of 6 switching operations per minute and with no additional protection of the components connected to the safety outputs. The use of additional protection for the components connected to the safety outputs significantly increases the durability of the safety outputs.

Determination of the breaking capacity conforming to EN 60947-5-1 (table 4)

Utilization category	Start-up			Breaking			Total number of switching operations	Switching operations per minute for 1…1000 switching operations	Switching operations per minute for 1001…6050 switching operations	Minimum duration of switching operation
	Current	Voltage	Cos φ	Current	Voltage	Cos φ				
AC-15	10 x Ie	Ue	0.3	Ie	Ue	0.3	6050	60	6	50 ms
Utilization category	**Start-up**			**Breaking**			**Total number of switching operations**	**Switching operations per minute for 1…1000 switching operations**	**Switching operations per minute for 1001…6050 switching operations**	**Minimum duration of switching operation**
	Current	**Voltage**	**T0.95**	**Current**	**Voltage**	**T0.95**				
DC-13	Ie	Ue	50 ms	Ie	Ue	50 ms	6050	60	6	50 ms

Ie: operational current measured.
Ue: operational voltage measured.
Cos φ: power factor.
T0.95: time taken to reach 95% of nominal current.

Notes:
The maximum values for the breaking capacity of the safety outputs in the various Utilization categories are not fixed and depend on the power factor and on the switching frequency. The test definition for the "breaking capacity" and "electrical life" tables in the European standard EN 60947-5-1 uses different values for the power factor and the switching frequency.

The power factor (cos φ) in the "breaking capacity" table (0.3) is greater than that in the "electrical life" table (0.7).

In the "breaking capacity" table, the switching frequency of the safety outputs is higher for the first 1000 switching operations (60 per minute) than that for 1001 to 6050 switching operations (6 per minute).

Consequently, the maximum breaking capacity values determined using the "breaking capacity" table are lower than those in the "electrical life" table.

Electrical life

The product life expressed is based on average usage and normal operating conditions. The above statements are not intended to nor shall they create any express or implied warranties as to product operation or life. For information on the limited warranty offered on this product please refer to the Square D ® terms and conditions of sale found in Square D ® *Digest*.

AC Voltage and Current Ratings 50-60 HZ

Contact Rating Designation	Thermal Continuous Test Current, Amperes	Maximum Current, Amperes				Volt amperes	
		120 Volts		240 Volts			
		Make	Break	Make	Break	Make	Break
B300	5	30	3.00	15	1.5	3600	360
C300	2.5	15	1.50	7.5	0.75	1800	180

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Operating principle

Safety modules XPSAC are used for monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN 60204-1 and also meet the safety requirements for the electrical monitoring of switches in protection devices conforming to standard EN 1088/ISO 14119. They provide protection for both the machine operator and the machine by immediately stopping the hazardous movement on receipt of a stop instruction from the operator, or on detection of an anomaly in the safety circuit itself.

To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status.

The XPSAC module has 3 safety outputs and a solid-state output for signalling to the PLC.

Characteristics

Module type			XPSAC	XPSACeeeeP
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 3 max.	
Conformity to standards			EN 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1 + A11, EN/IEC 60947-5-1	
Product certifications			UL, CSA, BG	
Supply	Voltage	**V**	∼ and ⎓ 24, ∼ 48, ∼ 115, ∼ 230	
	Voltage limits		- 20…+ 10% (∼ 24 V) - 20…+ 20% (⎓ 24 V) - 15…+ 10% (∼ 48) - 15…+ 15% (115 V) - 15…+10% (230 V)	
	Frequency	**Hz**	50/60	
Power consumption		**W**	< 1.2 (⎓ 24 V)	
		VA	< 2.5 (∼ 24 V) < 6 (∼ 48 V) < 7 (∼ 115 V) < 6 (∼ 230 V)	
Start button monitoring			No	
Control unit voltage (at nominal supply voltage)			Identical to supply voltage	
	24 V version	**V**	∼ 24 (approx. 90 mA), ⎓ 24 (approx. 40 mA)	
	48 V version	**V**	∼ 48 (approx. 100 mA)	
	115 V version	**V**	∼ 115 (approx. 60 mA)	
	230 V version	**V**	∼ 230 (approx. 25 mA)	
Outputs	Voltage reference		Relay hard contacts	
	Number and type of safety circuits		3 N.O. (13-14, 23-24, 33-34)	
	Number and type of additional circuits		1 solid-state	
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13		24 V/2 A L/R = 50 ms	
	Max. thermal current (Ithe)	**A**	6	
	Max. total thermal current	**A**	10.5	
	Output fuse protection, using fuses conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	**A**	4 gG (gI) or 6 fast acting	
	Minimum current	**mA**	10	
	Minimum voltage	**V**	17	
Electrical life			See page 2/172	
Response time on input opening		**ms**	< 100	
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)		**kV**	3 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display			2	
Operating temperature		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature		**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to EN/IEC 60529	Terminals		IP 20	
	Enclosure		IP 40	

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Characteristics

Module type			XPSAC	XPSAC●●●●P
Connection	Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end	Solid or flexible cable: 26-16 AWG (0.14…2.5 mm²)	Solid or flexible cable: 24-16 AWG (0.2…2.5 mm²)
		With cable end	Without bezel, flexible cable: 24-16 AWG (0.25…2.5 mm²)	
			With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)	With bezel, flexible cable: 24-16 AWG (0.25…2.5 mm²)
	2-wire connection	Without cable end	Solid or flexible cable: 26-18 AWG (0.14…0.75 mm²)	Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)
		With cable end	Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
			Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	

References

XPSAC●●●●P

Description	Type of terminal block connection	Number of instantaneous opening safety circuits	Additional outputs	Supply	Reference	Weight oz (kg)
Safety modules for Emergency stop and switch monitoring	Integrated in module	3	1 solid-state	∼ and ⎓ 24 V	**XPSAC5121**	5.644 (0.160)
				∼ 48 V	**XPSAC1321**	7.408 (0.210)
				∼ 115 V	**XPSAC3421**	7.408 (0.210)
				∼ 230 V	**XPSAC3721**	7.408 (0.210)
	Removable from module	3	1 solid-state	∼ and ⎓ 24 V	**XPSAC5121P**	5.644 (0.160)
				∼ 48 V	**XPSAC1321P**	7.408 (0.210)
				∼ 115 V	**XPSAC3421P**	7.408 (0.210)
				∼ 230 V	**XPSAC3721P**	7.408 (0.210)

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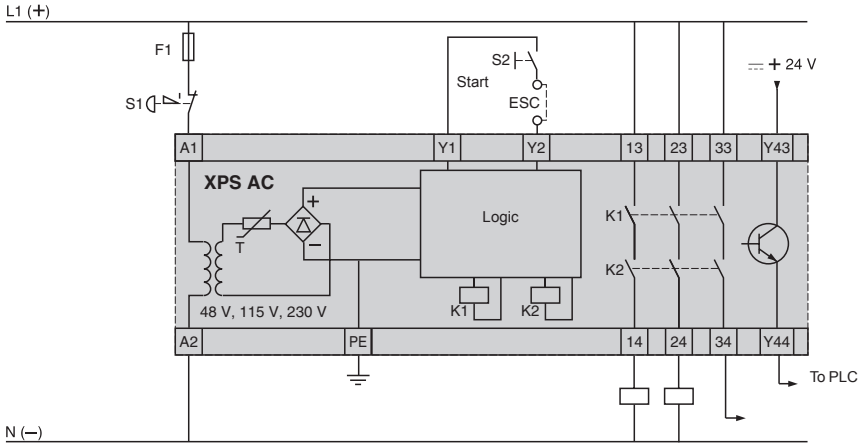
2

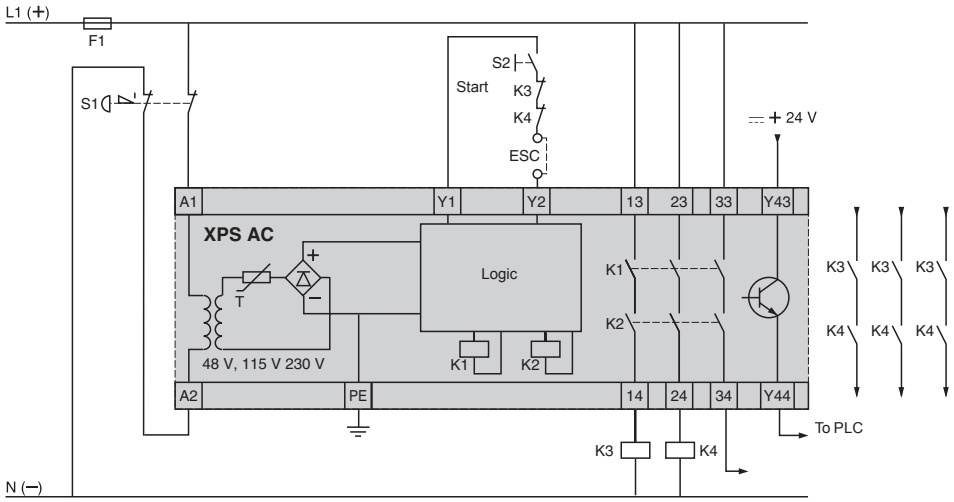
XPSAC

Module XPSAC associated with an Emergency stop button with 1 N.C. contact



Y1-Y2: Feedback loop.
ESC: External start conditions.

Module XPSAC associated with an Emergency stop button with 2 N.C. contacts (recommended application)



Y1-Y2: Feedback loop.
ESC: External start conditions.

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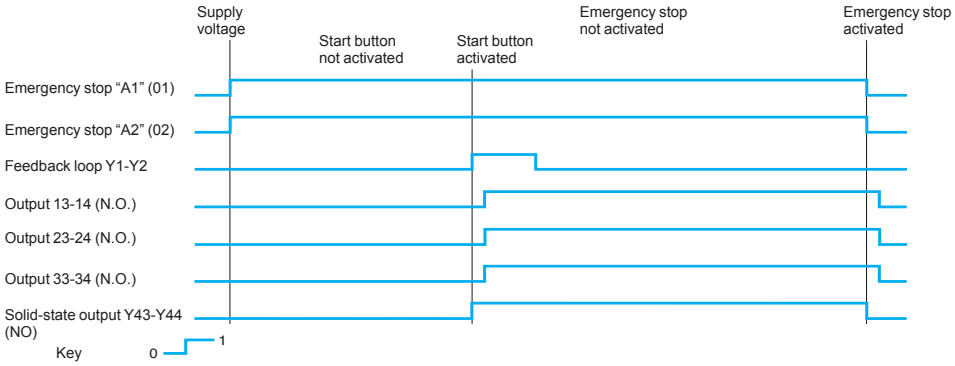
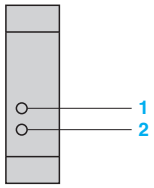
XPSAC

Functional diagram of module XPSAC



LED details



1 Supply voltage A1-A2.
2 K1-K2 status (N.O. safety outputs closed).

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2

Operating principle

Preventa™ Safety relay modules types XPSAV and XPSATE are used for monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1 and also meet the safety requirements for the electrical monitoring of switches in protection devices (i.e.: safety interlock switches) conforming to standard EN 1088/ ISO 14119.
They provide protection for both the machine operator and the machine by immediately stopping the machine movement on receipt of a stop instruction from the operator, or on detection of an anomaly in the safety circuit itself.

In addition to the stop category 0 instantaneous opening safety outputs (3 for XPSAV and 2 for XPSATE), the modules incorporate stop category 1 time delay outputs (3 for XPSAV and 3 for XPSATE) which allow for controlled deceleration of the motor components until a complete stop is achieved (for example, motor braking by variable speed drive).
At the end of the preset delay, the supply is disconnected by opening the time delay output circuits.
For module XPSAV, the time delay of the 3 output circuits is adjustable, in 15 preset values, between 0 and 300 seconds using selector buttons.
For module XPSATE, the time delay of the 3 output circuits is adjustable between 0 and 30 seconds using a 12-position selector switch.
Module XPSAV also incorporates 3 solid-state signalling outputs for signalling to the process PLC. Module XPSATE incorporates 4 solid-state signalling outputs for signalling to the process PLC.
To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status.
The Start button monitoring function is configurable depending on the wiring.

Characteristics

Module type			XPSAV11113 and AV11113P	XPSATE●●●● and ATE●●●●P
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/EN/ISO 13849-1)			Category 4 max.	Category 4 max. (instantaneous safety outputs) Category 3 max. (time delay safety outputs)
Conformity to standards			EN/IEC 60204-1, DIN V VDE 801 + A1, EN/ISO 13850, EN 1088/ISO 14119, EN/IEC 60947-1 A11, EN/IEC 60947-5-1	EN/IEC 60204-1, EN/IEC 60947-5-1, EN/ ISO 13850, EN 50082-2
Product certifications			UL, CSA, BIA	UL, CSA, BG
Supply	Voltage	**V**	⎓ 24	∼ and ⎓ 24, ∼ 115, ∼ 230
	Voltage limits		- 20…+ 20%	- 20…+ 10% (24 V) - 15…+ 15% (115 V) - 15…+ 10% (230 V)
	Frequency	**Hz**	–	50/60
Power consumption		**W**	< 5	< 8
Module inputs fuse protection			Internal, electronic	Internal, electronic
Adjustable time delay		**s**	0…300	0…30
Start button monitoring			Yes/No (configurable by terminal connections)	Yes/No (configurable by terminal connections)
Control unit voltage (at nominal supply voltage)			Between input terminals S21-S22, S31-S32 or S11-S12	Between input terminals S11-S12, S21-S22 or S11-B1
	24 V version	**V**	24	24
	115 V, 230 V version	**V**	–	48
Calculation of wiring resistance RL between input terminals		Ω	100 max. Maximum cable length: 6562 ft. (2000 m)	RL max. = $\frac{\text{U int - U min.}}{\text{I min.}}$ Ue = true voltage applied to terminals A1-A2 U int (terminals S11-S21) = supply voltage Ue - 3 V (24 V version) U int between 42 V and 45 V, with typical value = 45 V (115 V, 230 V version) Calculated max. RL must be equal to or greater than the true value

Principle: page 2/178 | Characteristics: page 2/178 | References: page 2/180 | Wiring Diagrams: page 2/181 | Dimensions: page 2/260

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Characteristics (continued)

Module type				XPSAV11113	XPSAV11113P	XPSATE●●●●	ATE●●●●P
Synchronization time between inputs			s	For guard: 1.5 For Emergency stop: unlimited		Approx. 0.075 For automatic start, terminals S33-Y2 and Y3-Y4 linked	
Outputs	Voltage reference			Relay hard contacts		Relay hard contacts	
	Number and type of instantaneous opening safety circuits			3 N.O. (03-04, 13-14, 23-24)		2 N.O. (13-14, 23-24, 33-34)	
	Number and type of time delay opening safety circuits			3 N.O. (37-38, 47-48, 57-58)		3 N.O. (57-58, 67-68, 77-78)	
	Number and type of additional circuits			3 solid-state		4 solid-state	
	Breaking capacity in AC-15	Instantaneous outputs	VA	C300: inrush 1800, maintained 180		C300: inrush 1800, maintained 180	
		Time delay outputs	VA	C300: inrush 1800, maintained 180		C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13	Instantaneous outputs		24 V/1.25 A L/R = 50 ms		24 V/1.0 A L/R = 50 ms	
		Time delay outputs		24 V/1.25 A L/R = 50 ms		24 V/1.0 A L/R = 50 ms	
	Breaking capacity of solid-state outputs			24 V/20 mA		–	
	Max. thermal current (Ithe)	Instantaneous outputs	A	3.3 for all 3, or 6 for 1 and 2 for 2, or 4 for 2 and for 2 for 1		5	
		Time delay outputs	A	3.3 for all 3, or 6 for 1 and 2 for 2, or 4 for 2 and 2 for 1		2.5	
	Max. total thermal current		A	20		8	
	Output fuse protection, using fuses conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	Instantaneous outputs	A	4 gG or 6 fast acting		6 gG	
		Time delay outputs	A	4 gG or 6 fast acting		4 gG	
	Minimum current		mA	10		10	
	Minimum voltage		V	17		17	
Electrical life				See page 2/172			
Response time on instantaneous opening inputs			ms	< 30		< 20	
Rated insulation voltage (Ui)			V	300 (degree of pollution 2 conforming to EN//IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)			
Rated impulse withstand voltage (Uimp)			kV	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)			
LED display				11		4	
Operating temperature			°F (°C)	+ 14…+ 131 (- 10…+ 55)			
Storage temperature			°F (°C)	- 13…+ 267.8 (- 25…+ 85)			
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20			
		Enclosure		IP 40			
Connections		Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block	Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14 - 2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.20 - 2.5 mm²)	Solid or flexible cable: 26-14 AWG (0.14 - 2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.25 - 2.5 mm²)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25 - 2.5 mm²)			
				With bezel, flexible cable: 24-16 AWG (0.25 - 1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25 - 2.5 mm²)	With bezel, flexible cable: 24-16 AWG (0.25 - 1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25 - 2.5 mm²)
	2-wire connection	Without cable end		Solid or flexible cable: 26-20 AWG (0.14 - 0.75 mm²)	Solid cable: 24-18 AWG (0.2 - 1.0 mm²) Flexible cable: 24-16 AWG (0.20 - 1.5 mm²)	Solid or flexible cable: 26-20 AWG (0.14 - 0.75 mm²)	Solid cable: 24-18 AWG (0.2 - 1.0 mm²) Flexible cable: 24-16 AWG (0.20 - 1.5 mm²)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25 - 1.0 mm²)			
				Double, with bezel, flexible cable: 22-14 AWG (0.5 - 1.5 mm²)			

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Safety automation system solutions

Preventa™ safety relay modules types XPSAV, XPSATE

For Emergency stop and switch monitoring

2

103244

XPSAV11113

103245

XPSAV11113P

105571

XPSAT●●●●

References

Description	Number of safety circuits	Additional outputs	Supply	Type of terminal block connection	Reference	Weight oz (kg)
Safety modules for Emergency stop and switch monitoring	6 N.O. (3 N.O. time delay)	3 solid-state	⎓ 24 V	Integrated in module	**XPSAV11113**	11.288 (0.320)
	6 N.O. (3 N.O. time delay)	3 solid-state	⎓ 24 V	Removable from module	**XPSAV11113P**	11.288 (0.320)
	5 N.O. (3 N.O. time delay)	4 solid-state	∿/⎓ 24 V	Integrated in module	**XPSATE5110**	9.877 (0.280)
				Removable from module	**XPSATE5110P**	9.877 (0.280)
			∿ 115 V	Integrated in module	**XPSATE3410**	13.404 (0.380)
				Removable from module	**XPSATE3410P**	13.404 (0.380)
			∿ 230 V	Integrated in module	**XPSATE3710**	13.404 (0.380)
				Removable from module	**XPSATE3710P**	13.404 (0.380)

XPSAV safety relays are suitable for use in circuits through Category 4 per EN 954-1 and ISO 13849-1.

XPSAT safety relays are suitable for use in circuits through Category 4 per EN 954-1 and ISO 13849-1 when instantaneous break contacts are used.

XPSAT safety relays are suitable for use in circuits through Category 3 per EN 954-1 and ISO 13849-1 when time delay break contacts are used.

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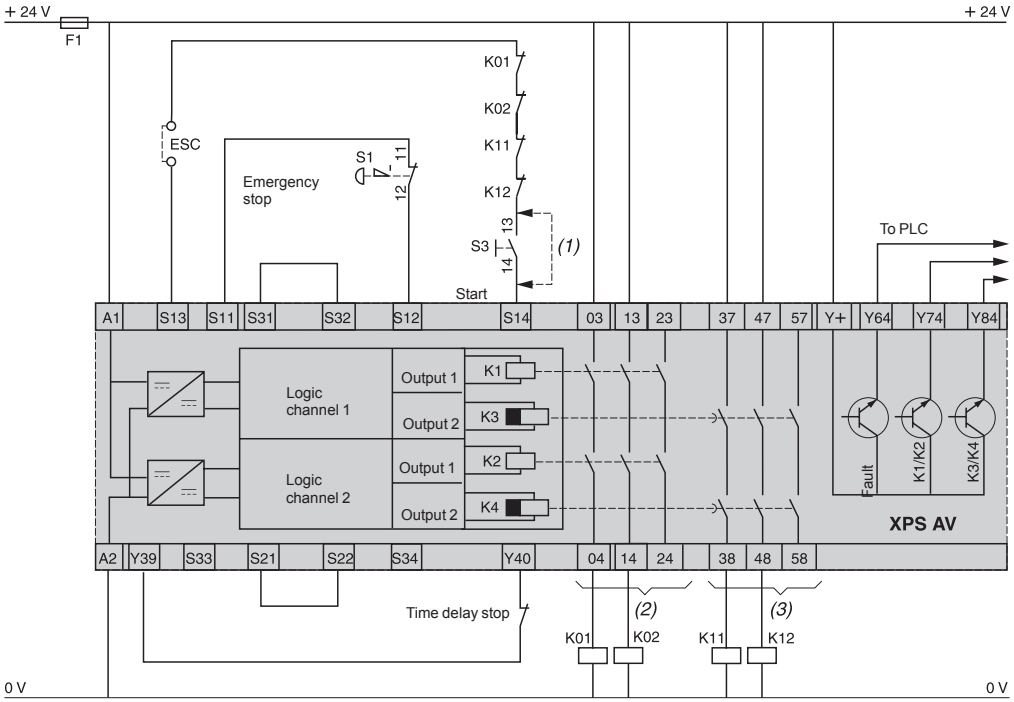
XPSAV

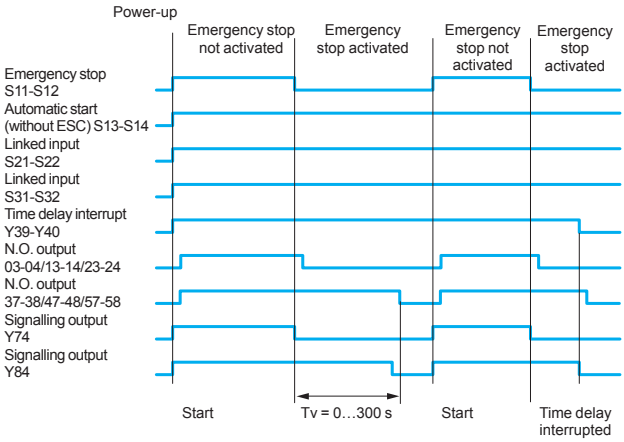
Module XPSAV associated with an Emergency stop button with 1 N.C. contact, automatic start or unmonitored start



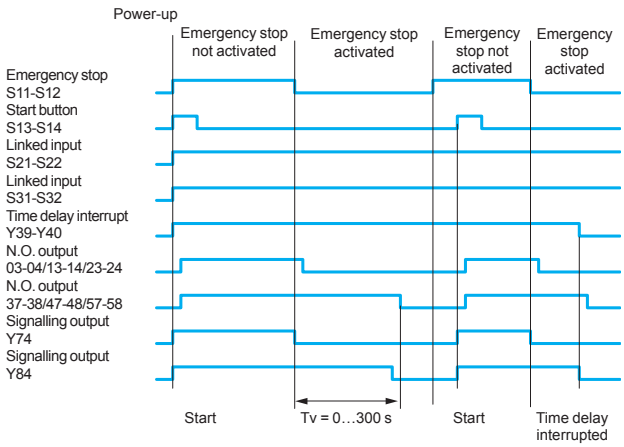
(1) Jumper for automatic start.
(2) Instantaneous opening safety outputs (stop category 0).
(3) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.

Functional diagrams

Automatic start



Unmonitored start



Automatic start
There is no start contact or it is jumpered (wiring between terminals S13 - S14).
Note: Automatic start function is not available on the XPSAV with 2 channel wiring on the inputs. Automatic start function is only available on single channel wiring on the inputs.

Unmonitored start
The output is activated on closing of the start contact (wiring between terminals S13 - S14).

Monitored start
The start input is monitored so that there is no start-up in the event of the start contact being jumpered or the start circuit being closed for more than 10 seconds.
Start-up is triggered following activation of the start button (push-release function) on opening of the contact (wiring between terminals S33 - S34).

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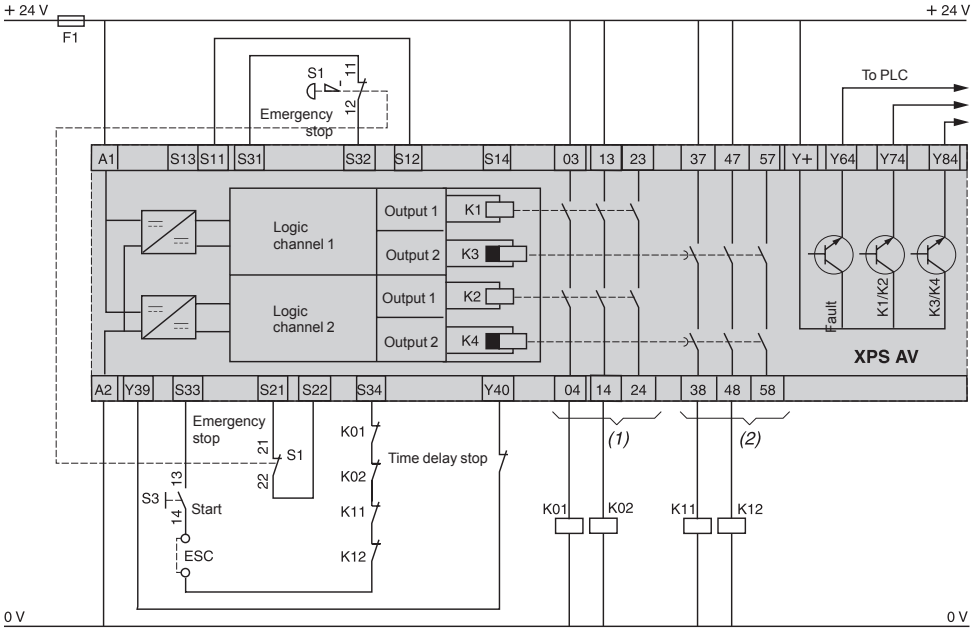
2

XPSAV

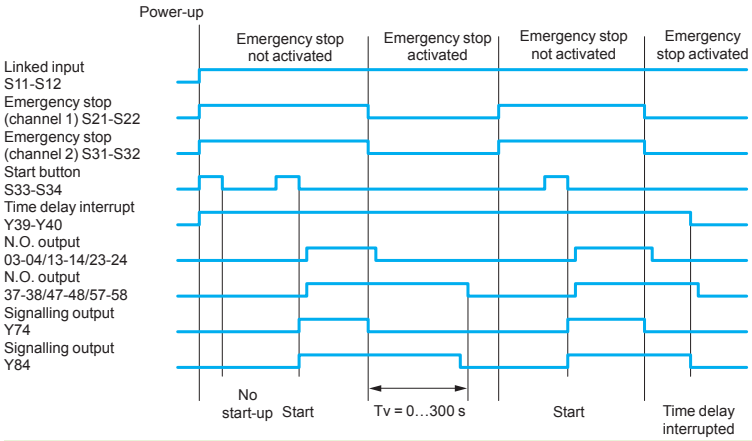
Module XPSAV associated with an Emergency stop button with 2 N.C. contacts, monitored start



(1) Instantaneous opening safety outputs (stop category 0).
(2) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.
Note: Automatic start function is not available on the XPSAV with 2 channel wiring on the inputs. Automatic start function is only available on single channel wiring on the inputs.

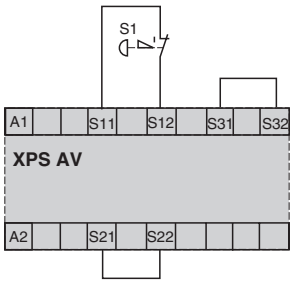
Functional diagram

Monitored start

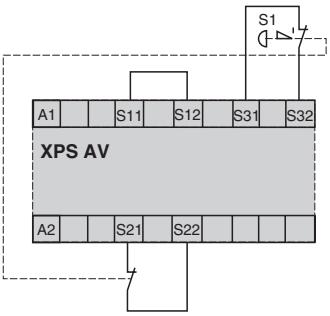


Emergency stop monitoring function configuration

1-channel wiring



2-channel wiring, with short-circuit detection



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Dimensions: page 2/260

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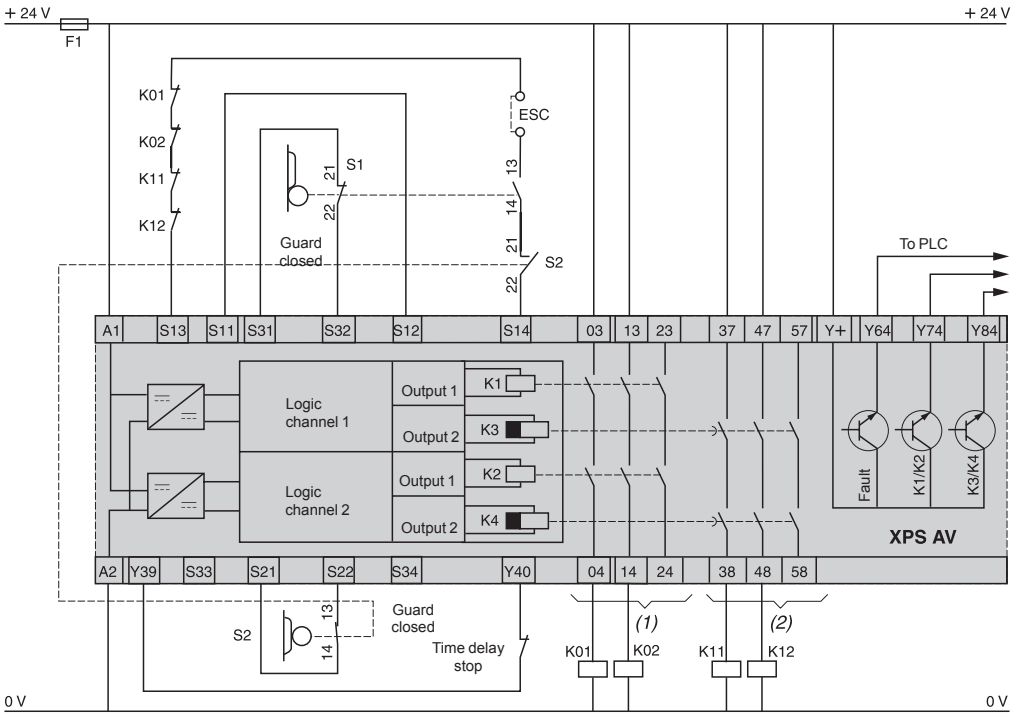
2

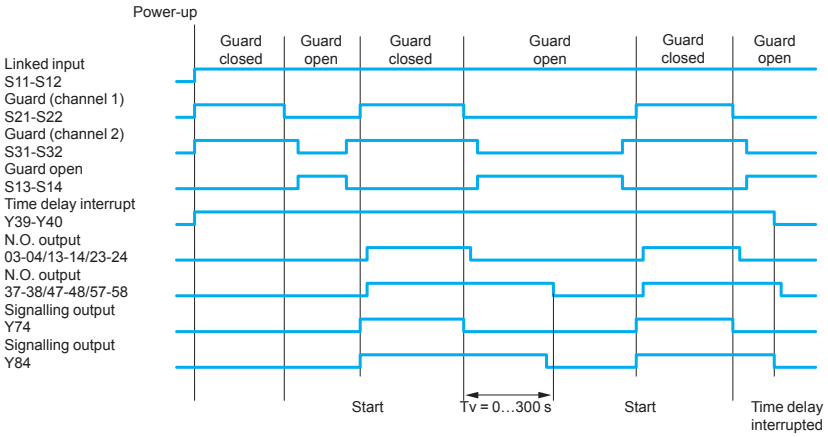
XPSAV

Monitoring of a movable guard associated with 2 switches
Automatic start (diagram shown for guard closed)

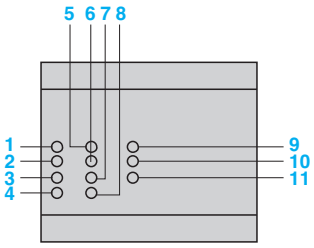


(1) Instantaneous opening safety outputs (stop category 0).
(2) Time delay opening safety outputs (stop category 1).
ESC = External start conditions.

Functional diagram



LED details



1 S12 input status.
2 S22 input status.
3 S32 input status.
4 S34 input status.
5 S14 input status.
6 Y40 input status (time delay stop).
7 K1/K2 status (N.O. instantaneous opening safety outputs).
8 K3/K4 status (time delay opening safety outputs).
9 Supply voltage A1-A2.
10 Fault.
11 Configuration mode

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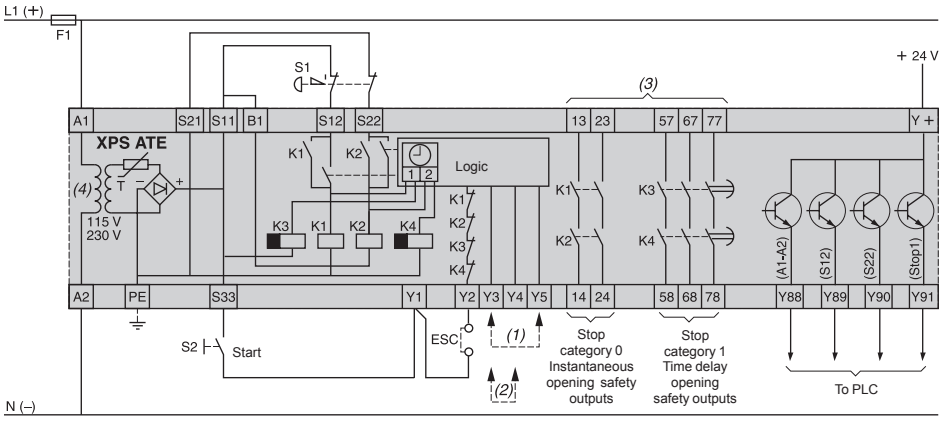
2

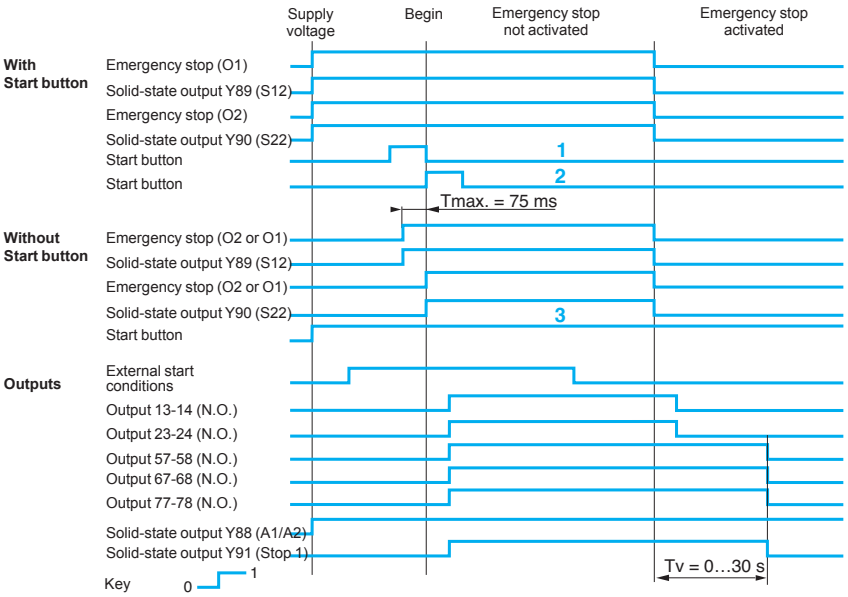
XPSATE

Module XPSATE associated with an Emergency stop button



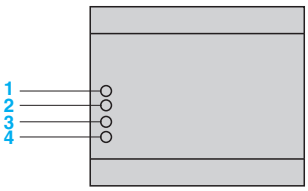
S1: Emergency stop button with 2 N.C. contacts (recommended application).
S2: Start button.
ESC: External start conditions.
Y1 (S33) - Y2: Feedback loop.
F1: 4 A max.
(1) With start button monitoring.
(2) Without start button monitoring.
(3) The outputs must be fuse protected. Technical characteristics for maximum rating of fuses, see page 4.
(4) ∼ 115/230 V only.
(5) For automatic start, jumper S2 (N.O. start button between terminals S33-Y1). This is only feasible when configured without start button monitoring (Y3 and Y4 jumpered). If S2 is jumpered and the module is configured for start button monitoring (Y3 and Y5 jumpered), the N.O. safety contacts will not close.

Functional diagram of module XPSATE with Emergency stop button monitoring



1 With start button monitoring (Y3-Y5 connection).
2 Without start button monitoring (Y3-Y4 connection).
3 Without start button (connection Y3-Y4 and S33-Y1).
Tv: adjustable time.

Description of LEDs



1 Supply voltage A1-A2, internal electronic fuse status.
2 S12 (A) input status.
3 S22 (B) input status.
4 Stop category 1 outputs closed.

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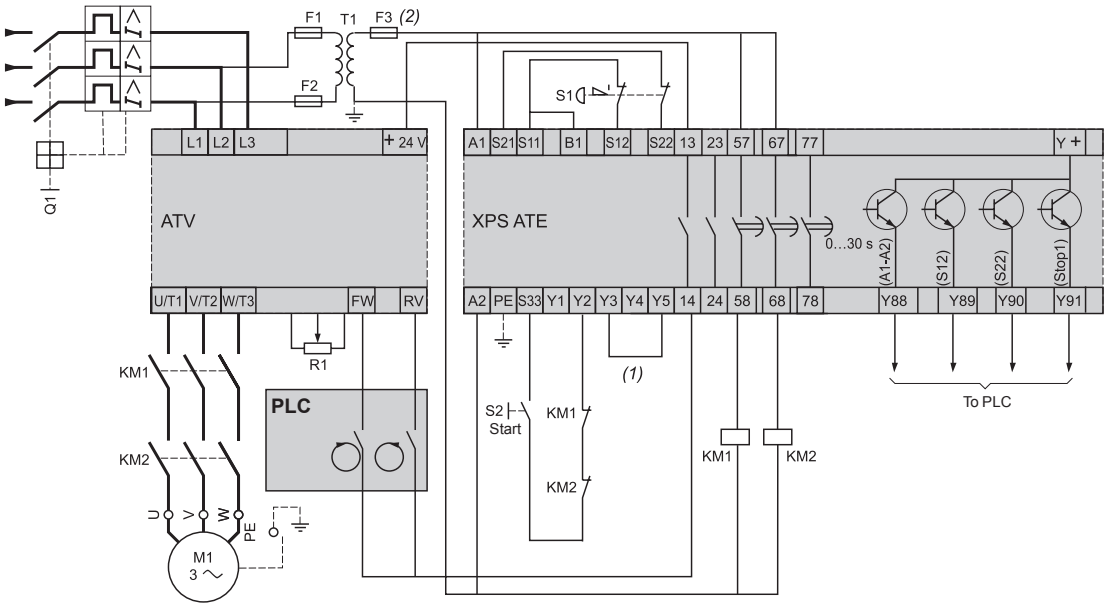
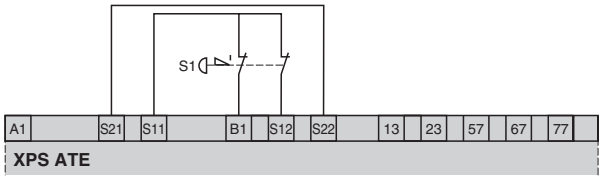
XPSATE

Example of a safety circuit combining an Emergency stop module with a variable speed drive



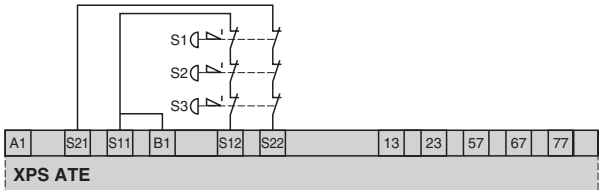
S1: Emergency stop button with 2 N.C. contacts (recommended application).
S2: Start button
(1) With start button monitoring.
(2) Technical characteristics for maximum rating of fuses, see page 4.

Connection with 1 Emergency stop button



Both input channels are supplied at the same potential.
S1: Emergency stop button with 2 N.C. contacts.
A short-circuit between the 2 inputs is not detected.

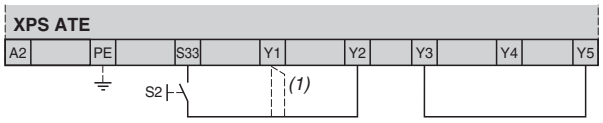
Connection with multiple Emergency stop buttons



The 2 input channels are supplied at different polarities.
A short-circuit between the 2 inputs is detected.

Configuration with start button monitoring

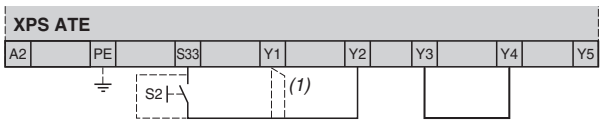
(functional diagram for Start button 1, see *page 9*)



(1) Auxiliary terminal (to be used to separate the feedback loop from the wiring to the start button).

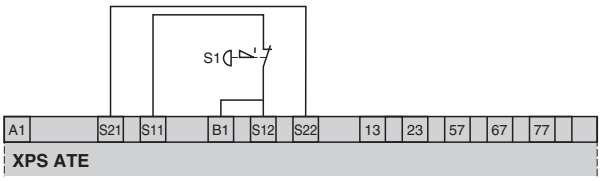
Configuration without start button monitoring

(functional diagram for Start button 2, see *page 9*)



(1) Auxiliary terminal (to be used to separate the feedback loop from the wiring to the start button).

Monitoring an Emergency stop button with 1 N.C. contact



S1: Emergency stop button with 1 N.C. contact.
Not all anomalies are detected: a short-circuit on the Emergency stop button is not detected.

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2

Operating principle

Safety modules XPSAF are designed to conform with category 4 of the standard EN 954-1/ISO 13849-1.
They are used for:
■ Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
■ Electrical monitoring of switches activated by protection devices conforming to standard EN 1088/ISO 14119.

Housed in a compact enclosure, the modules have 3 safety outputs.
Preventa™ safety relay modules XPSAF●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.
To aid diagnostics, the modules have 3 LEDs on the front cover which provide information on the monitoring circuit status.
The Start button monitoring function is configurable depending on the wiring.

Characteristics

Module type				XPSAF5130	XPSAF5130P
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)				Category 4 max.	
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN 50082-2	
Product certifications				UL, CSA, BG	
Supply	Voltage		V	∼ and ⎓ 24	
	Voltage limits			- 15…+ 10%	
	Frequency		Hz	50/60	
Power consumption			VA	≤ 5	
Module inputs fuse protection				Internal, electronic	
Start button monitoring				Yes/No (configurable by terminal connections)	
Control unit voltage and current				⎓ 24 V/30 mA approx. (at nominal supply voltage)	
Maximum wiring resistance RL			Ω	90	
Synchronization time between inputs A and B				Unlimited	
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			3 N.O. (13-14, 23-24, 33-34)	
	Breaking capacity in AC-15		VA	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Max. thermal current (Ithe)		A	6	
	Max. total thermal current		A	18	
	Output fuse protection		A	4 gG or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		mA	10	
	Minimum voltage		V	17	
Electrical life				See page 2/172	
Response time on input opening			ms	≤ 40	
Rated insulation voltage (Ui)			V	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			kV	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				3	
Operating temperature			°F (°C)	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			°F (°C)	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connections		Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm²)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm²)	Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)

Principle: page 2/178 | Characteristics: page 2/178 | References: page 2/187 | Wiring Diagrams: page 2/187 | Dimensions: page 2/260

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References

XPSAF5130

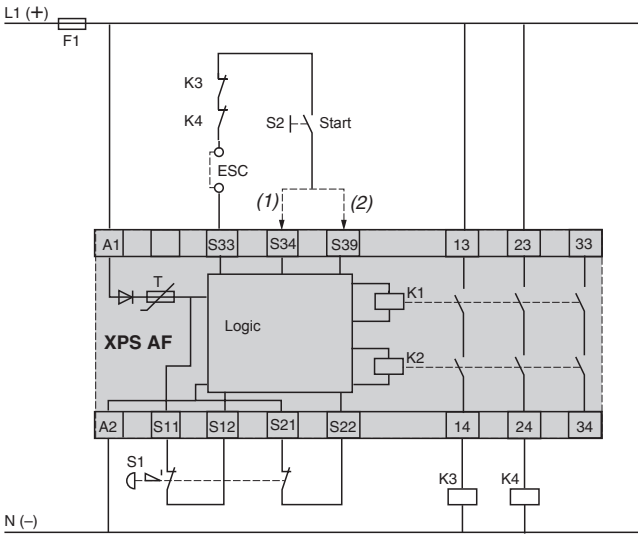
XPSAF5130P

Description	Type of terminal block connection	Number of safety circuits	Supply	Reference	Weight oz (kg)
Safety modules for Emergency stop and limit switch monitoring	Integrated in module	3	∼ and ⎓ 24 V	**XPSAF5130**	8.818 (0.250)
	Removable from module	3	∼ and ⎓ 24 V	**XPSAF5130P**	8.818 (0.250)

Wiring diagrams

XPSAF

Module XPSAF associated with an Emergency stop button with 2 N.C. contacts



(1) With start button monitoring.
(2) Without start button monitoring.
ESC = External start conditions.

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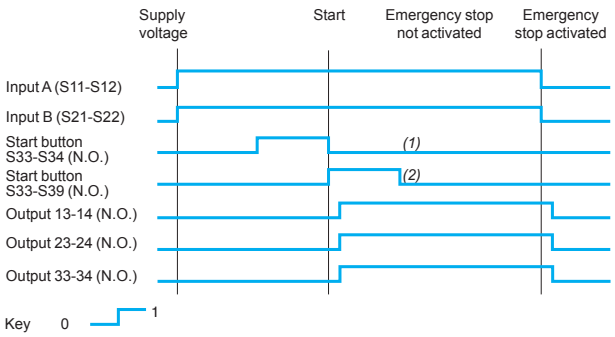
2

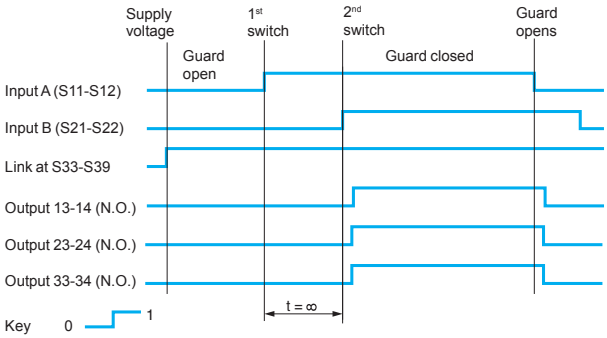
XPSAF

Functional diagrams

Emergency stop function

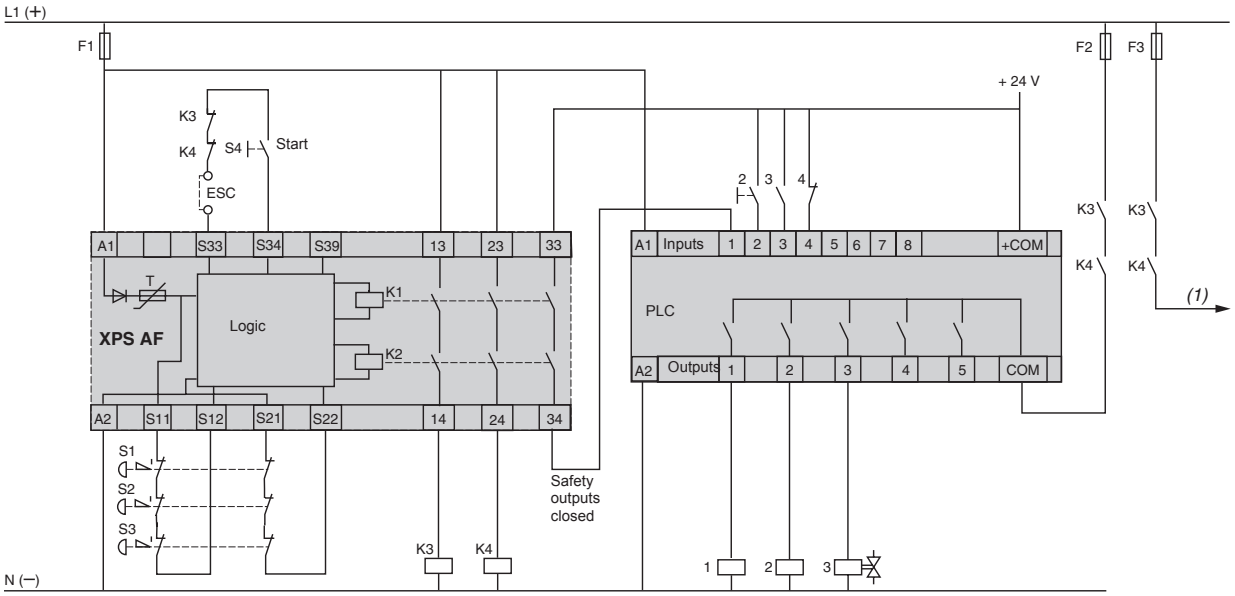


Guard function with automatic start



(1) With start button monitoring.
(2) Without start button monitoring.

Module XPSAF with connection of multiple Emergency stop buttons, combined with a PLC



(1) Other circuits controlled by the XPSAF module.
ESC = External start conditions.

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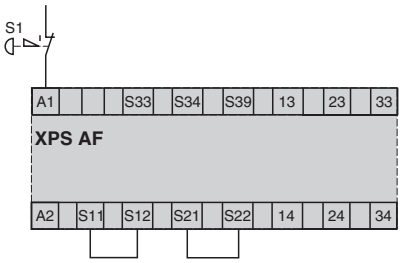
XPSAF

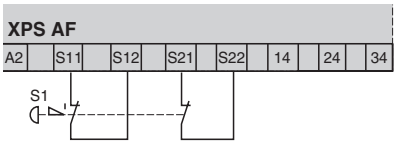
Emergency stop monitoring function configuration

1-channel wiring

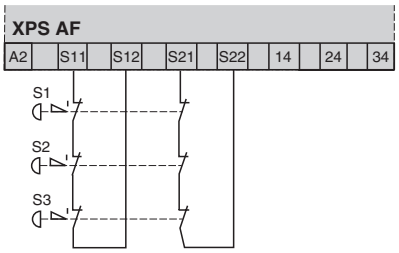


Emergency stop button with a single N.C. contact.
Not all anomalies are detected: a short-circuit on the Emergency stop pushbutton is not detected.

2-channel wiring

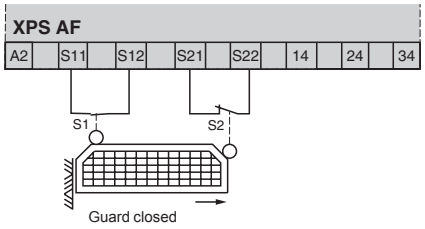


Emergency stop button with 2 N.C. contacts (recommended application).
The 2 input channels are supplied at different potentials. A short-circuit between the 2 inputs is detected.

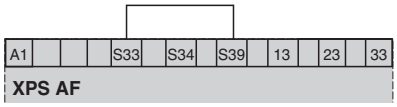


Connection of multiple Emergency stop buttons with 2 N.C. contacts (recommended application).
The 2 input channels are supplied at different potentials. A short-circuit between the 2 inputs is detected.

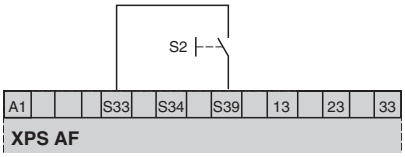
Monitoring of a movable guard associated with 2 switches with 1 contact each in combined mode (switch 1 with N.O. contact, switch 2 with N.C. contact)



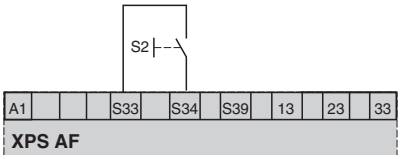
Configuration with automatic or manual start



Automatic start.

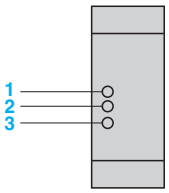


Without start button monitoring, manual reset.



Function: push-release.
With start button monitoring, manual reset.

LED details



1 Supply voltage A1-A2 internal electronic, fuse status.
2 Relay K1 energized.
3 Relay K2 energized.

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2

Operating principle

Safety modules XPSAFL are designed to conform with category 3 of the standard EN 954-1. They are used for:
■ Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
■ Electrical monitoring of switches activated by protection devices conforming to standard EN 1088/ISO 14119, devices such as safety interlocks or safety limit switches.

They can also be used for monitoring type 4 light curtains conforming to EN/IEC 61496-1 which have solid-state safety outputs with test function (for example, light curtains type XUSL, see page 3/113). This system would be conforming to category 4 of standard EN 954-1/EN/ISO 13849-1.

Housed in a compact enclosure, the modules have 3 safety outputs.
Preventa™ safety relay modules XPSAFL●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.
To aid diagnostics, the modules have 3 LEDs on the front cover which provide information on the monitoring circuit status.
The Start button monitoring function is configurable depending on the wiring.

Characteristics

Module type				XPSAFL5130	XPSAFL5130P
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1)				Category 3 Category 4 for the monitoring of light curtains type 4 with solid state outputs and test function	
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN 50082-2, EN/IEC 61496-1 (type 4)	
Product certifications				UL, CSA, BG	
Supply	Voltage		V	∼ and ⎓ 24	
	Voltage limits			- 15…+ 10%	
	Frequency		Hz	50/60	
Power consumption			VA	≤ 5	
Module inputs fuse protection				Internal, electronic	
Start button monitoring				No (configurable by terminal connections)	
Control unit voltage and current				⎓ 24 V/30 mA approx. (at nominal supply voltage)	
Maximum wiring resistance RL			Ω	90	
Synchronization time between inputs A and B				Unlimited	
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			3 N.O. (13-14, 23-24, 33-34)	
	Breaking capacity in AC-15		VA	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Max. thermal current (Ithe)		A	6	
	Max. total thermal current		A	18	
	Output fuse protection		A	4 gG or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		mA	10	
	Minimum voltage		V	17	
Electrical life				See page 2/172	
Response time on input opening			ms	≤ 20	
Rated insulation voltage (Ui)			V	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			kV	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				3	
Operating temperature			°F (°C)	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			°F (°C)	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connection		Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm²)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm²)	Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	

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Safety automation system solutions

Preventa™ safety relay modules type XPSAFL

For Emergency stop, switch and light curtain monitoring

References

	Description	Type of terminal block connection	Number of safety circuits	Supply	Reference	Weight oz (kg)
103240 *XPSAFL5130*	**Safety modules for Emergency stop, switch and light curtain monitoring**	Integrated in module	3	∼ and ⎓ 24 V	**XPSAFL5130**	8.818 (0.250)
103241 *XPSAFL5130P*		Removable from module	3	∼ and ⎓ 24 V	**XPSAFL5130P**	8.818 (0.250)

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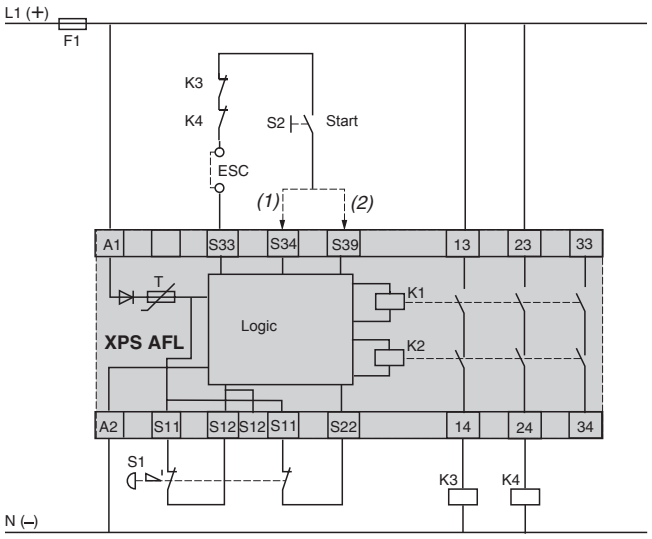
2

XPSAFL

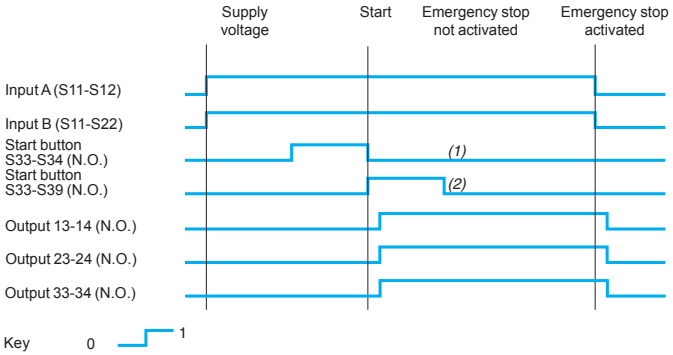
Module XPSAFL associated with an Emergency stop button with 2 N.C. contacts



(1) With start button monitoring.
(2) Without start button monitoring.
ESC: External start conditions.

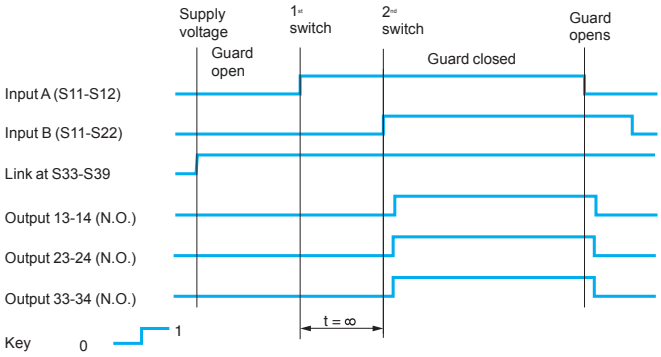
Functional diagrams

Emergency stop function



(1) With start button monitoring.
(2) Without start button monitoring.

Guard function with automatic start



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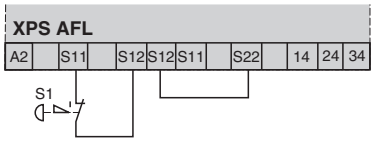
XPSAFL

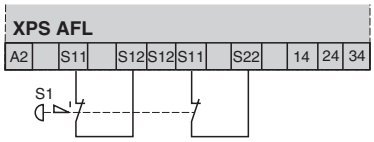
Emergency stop monitoring function configuration

1-channel wiring
Emergency stop button with a single N.C. contact



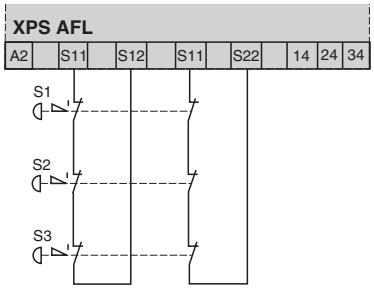
A short-circuit on the Emergency stop pushbutton is not detected.

2-channel wiring
Emergency stop button with 2 N.C. contacts



A short-circuit between the 2 inputs is not detected.

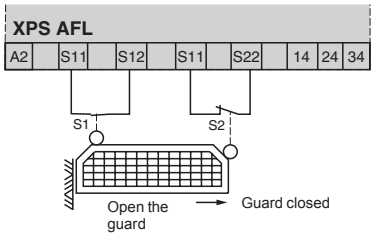
2-channel wiring
Connection of multiple Emergency stop buttons



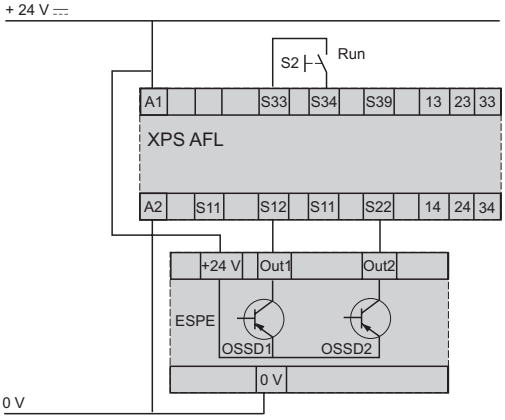
A short-circuit between the 2 inputs is not detected.

Monitoring of a movable guard associated with 2 switches with 1 contact each in combined mode (switch 1 with N.O. contact, switch 2 with N.C. contact)

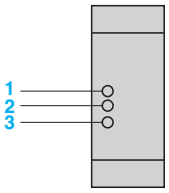
Without short-circuit detection



Monitoring of electro-sensitive protection equipment (ESPE)



LED details



1 Supply voltage A1-A2, fuse status.
2 Relay K1 energized.
3 Relay K2 energized.

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Operating principle

Safety modules XPSAR meet the requirements of category 4 of the standard EN 954-1/EN/ISO 13849-1 and are designed for the following safety applications:

■ Monitoring Emergency stop circuits conforming to EN/ISO 13850 and EN/IEC 60204-1.

■ Electrical monitoring of switches activated by protection devices conforming to standard EN 1088/ISO 14119.

■ Monitoring type 4 light curtains conforming to EN/IEC 61496-1 which have solid-state safety outputs with test function (for example, light curtains type XUSL), conforming to category 4 of standard EN 954-1/ISO 13849-1.

In addition to 7 safety outputs, modules XPSAR incorporate 2 relay signalling outputs and 4 solid-state signalling outputs for signalling to the process PLC.

Safety modules XPSAR●●●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.

To aid diagnostics, the modules have 4 LEDs on the front cover which provide information on the monitoring circuit status.

The Start button monitoring function is configurable depending on the wiring.

Characteristics

Module type				XPSAR3●1144	XPSAR3●1144P
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1/EN/ISO 13849-1)				Category 4 max.	
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	
Product certifications				UL, CSA, BG	
Supply	Voltage		**V**	∼ and ⎓ 24, ∼ 115, ∼ 230	
	Voltage limits	⎓ 24 V	**%**	- 15…+ 10	
		∼ 24 V	**%**	- 15…+ 10	
		∼ 115 V	**%**	- 15…+ 15	
		∼ 230 V	**%**	- 15…+ 10	
	Frequency		**Hz**	50/60	
Power consumption				⎓ 24 V version: < 4 W, ∼24 V version: < 7 VA, 115/230 V version: < 9 VA	
Module inputs fuse protection				Internal, electronic	
Start button monitoring				Yes/No (configurable by terminal connections)	
Control unit voltage and current (between terminals S11-S52 and S21-S22). 24 V, 115 V and 230 V version			**V**	⎓ 24 (20 mA approx.) (at nominal supply voltage)	
Maximum wiring resistance RL (between terminals S11-S52 and S21-S22)			Ω	50	
Synchronization time between inputs A and B Automatic start, terminals S33, S34 linked			**ms**	100	
Safety outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			7 N.O. (13-14/23-24/33-34/43-44/53-54/63-64/73-74)	
	Number and type of additional outputs			4 solid-state (Y31-Y32, Y31-Y64, Y31-Y74, Y31-Y35)	
	Number and type of auxiliary contacts			2 N.C. (81-82/91-92)	
	Breaking capacity in AC-15		**VA**	B300 (inrush: 3600, maintained: 360)	
	Breaking capacity in DC-13			24 V/2 A, L/R = 50 ms	
	Breaking capacity of solid-state outputs			24 V/20mA	
	Max. thermal current (Ithe)		**A**	10	
	Max. total thermal current		**A**	40	
	Output fuse protection		**A**	6 gG or 10 fast acting, conforming to EN/IEC 947-5-1, DIN VDE0660 part 200	
	Minimum current		**mA**	170	
	Minimum voltage		**V**	17	
Electrical life				See page 2/172	
Response time on input opening			**ms**	< 20	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				4	
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC 529				Terminals: IP 20, enclosure: IP 40	
Connection	Type			Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm²)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm²)	Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	

Principle: page 2/194 | Characteristics: page 2/194 | References: page 2/195 | Wiring Diagrams: page 2/196 | Dimensions: page 2/260

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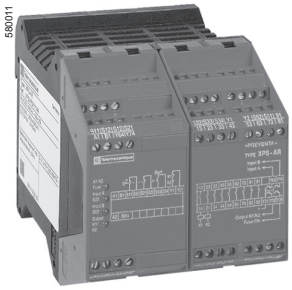
Safety automation system solutions

Preventa™ safety relay modules type XPSAR

For Emergency stop, switch or light curtain monitoring



XPSAR3●1144

References

Description	Type of terminal block connection	Number of safety circuits	Additional outputs/ solid-state outputs to PLC	Supply	Reference	Weight
				V		oz (kg)
Safety modules for Emergency stop, switch or light curtain monitoring	Integrated in module	7	2 / 4	∼ 24 ⎓ 24	**XPSAR311144**	10.582 (0.300)
				∼ 115 ⎓ 24	**XPSAR351144**	14.110 (0.400)
				∼ 230 ⎓ 24	**XPSAR371144**	14.110 (0.400)
	Removable from module	7	2 / 4	∼ 24 ⎓ 24	**XPSAR311144P**	10.582 (0.300)
				∼ 115 ⎓ 24	**XPSAR351144P**	14.110 (0.400)
				∼ 230 ⎓ 24	**XPSAR371144P**	14.110 (0.400)

2

Principle: page 2/194
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Wiring Diagrams: page 2/196
Dimensions: page 2/260

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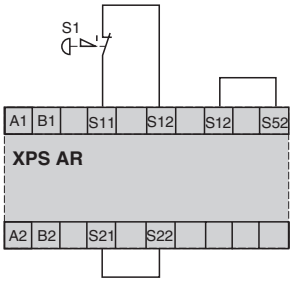
2

XPSAR

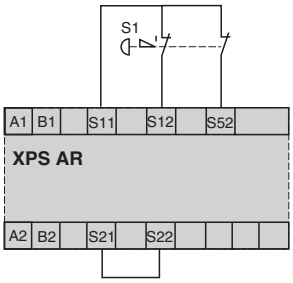
Emergency stop monitoring function configuration

1-channel wiring
Emergency stop button with a single N.C. contact

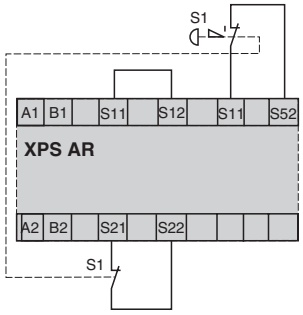


Not all faults are detected:
a short-circuit on the Emergency stop pushbutton is not detected

2-channel wiring
Emergency stop button with 2 N.C. contacts, without short-circuit detection

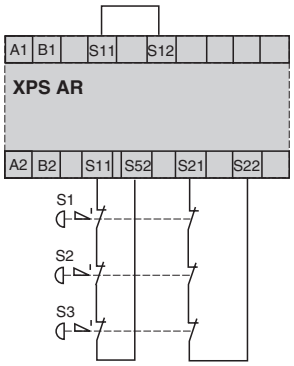


Emergency stop button with 2 N.C. contacts, with short-circuit detection (recommended application)



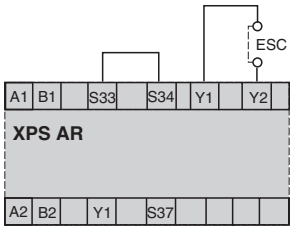
The 2 input channels are supplied at different potentials.
A short-circuit between the 2 inputs is detected

Connection of multiple Emergency stop buttons with 2 N.C. contacts (recommended application)

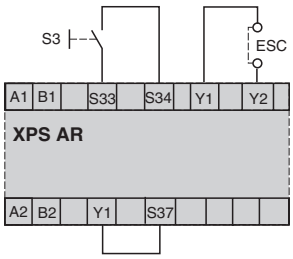


Start configurations

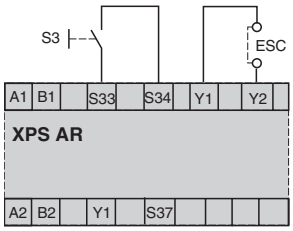
Automatic start



With start button monitoring



Without start button monitoring



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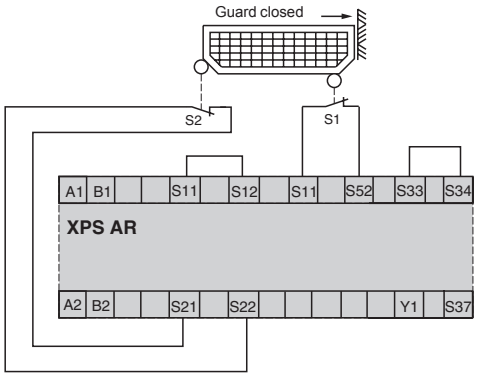
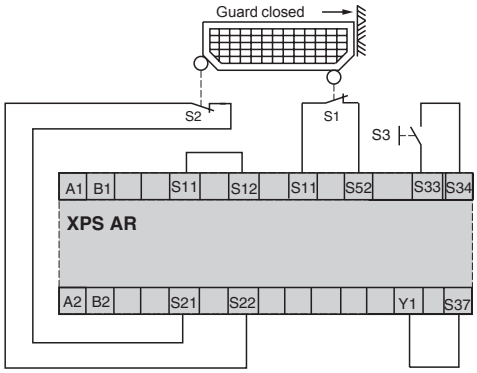
XPSAR

Monitoring of a movable guard associated with 2 switches with 1 contact each in combined mode (switch 1 with N.O. contact, switch 2 with N.C. contact)

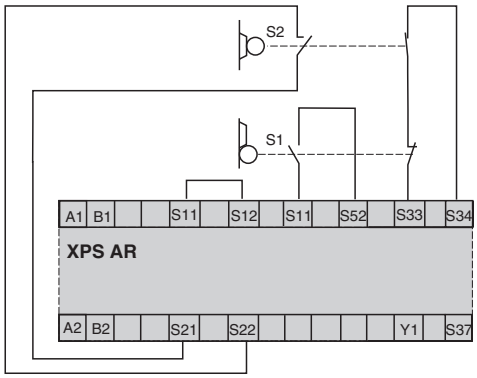
Automatic start, without synchronization time monitoring



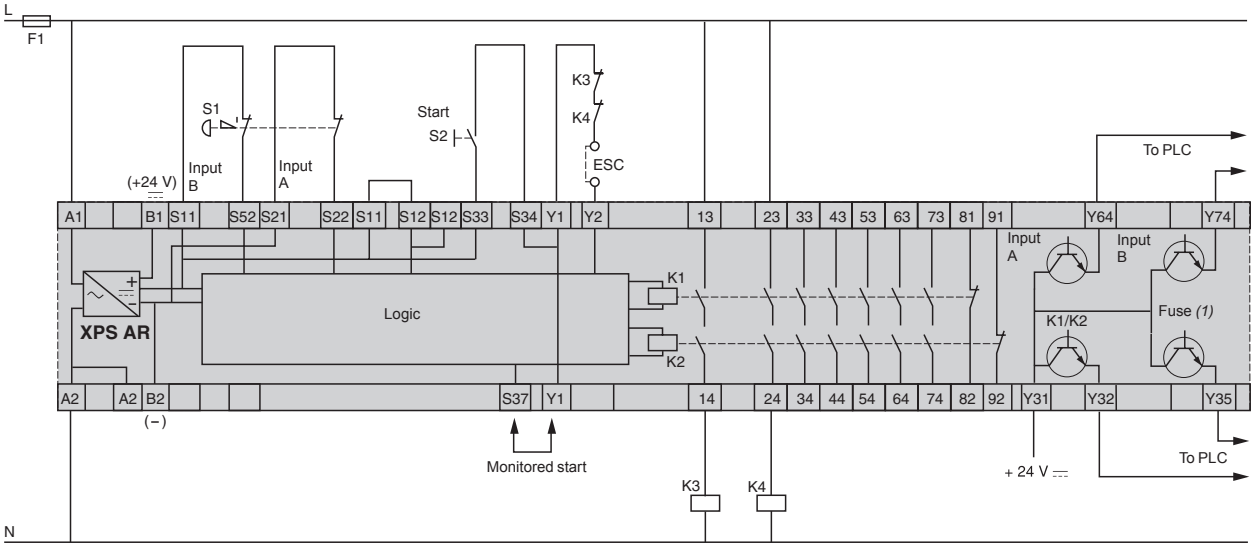
Manual start by start button



Monitoring of a movable guard associated with 2 switches in combined mode and automatic start
(shown with guard open)



Module XPSAR associated with an Emergency stop button with 2 N.C. contacts



Supply connection according to voltage:
∼ across terminals A1/A2, or ⎓ 24 V across terminals B1/B2

ESC: External start conditions
(1) Operating status of internal electronic fuse

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Characteristics: page 2/194
References: page 2/195
Wiring Diagrams: page 2/196
Dimensions: page 2/260

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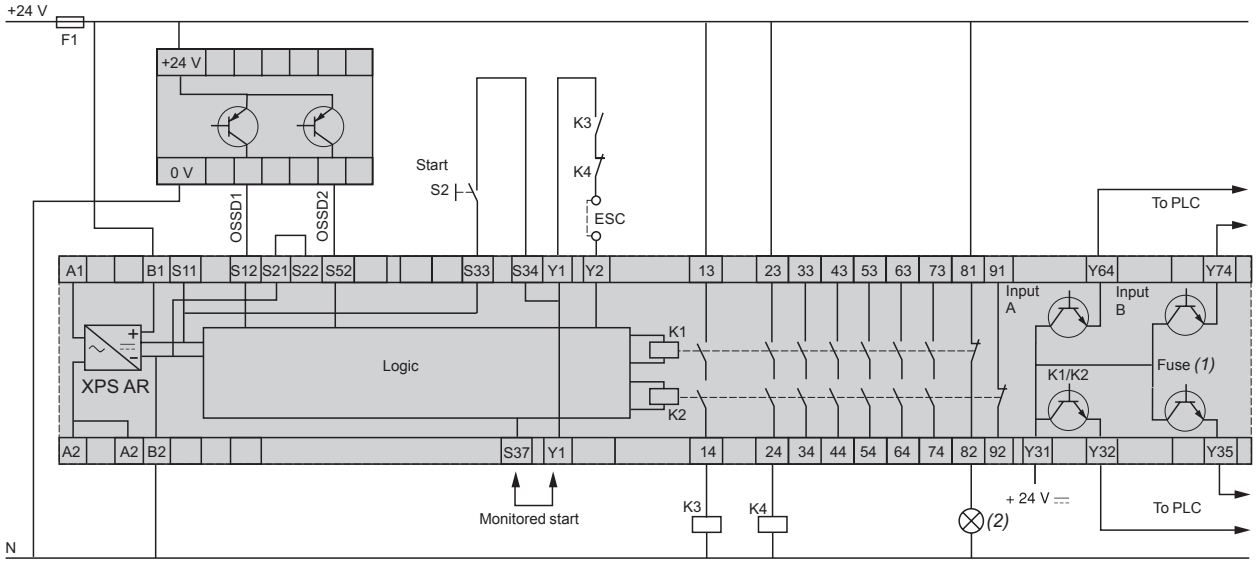
2

XPSAR

Module XPSAR for monitoring electro-sensitive protection equipment (ESPE)

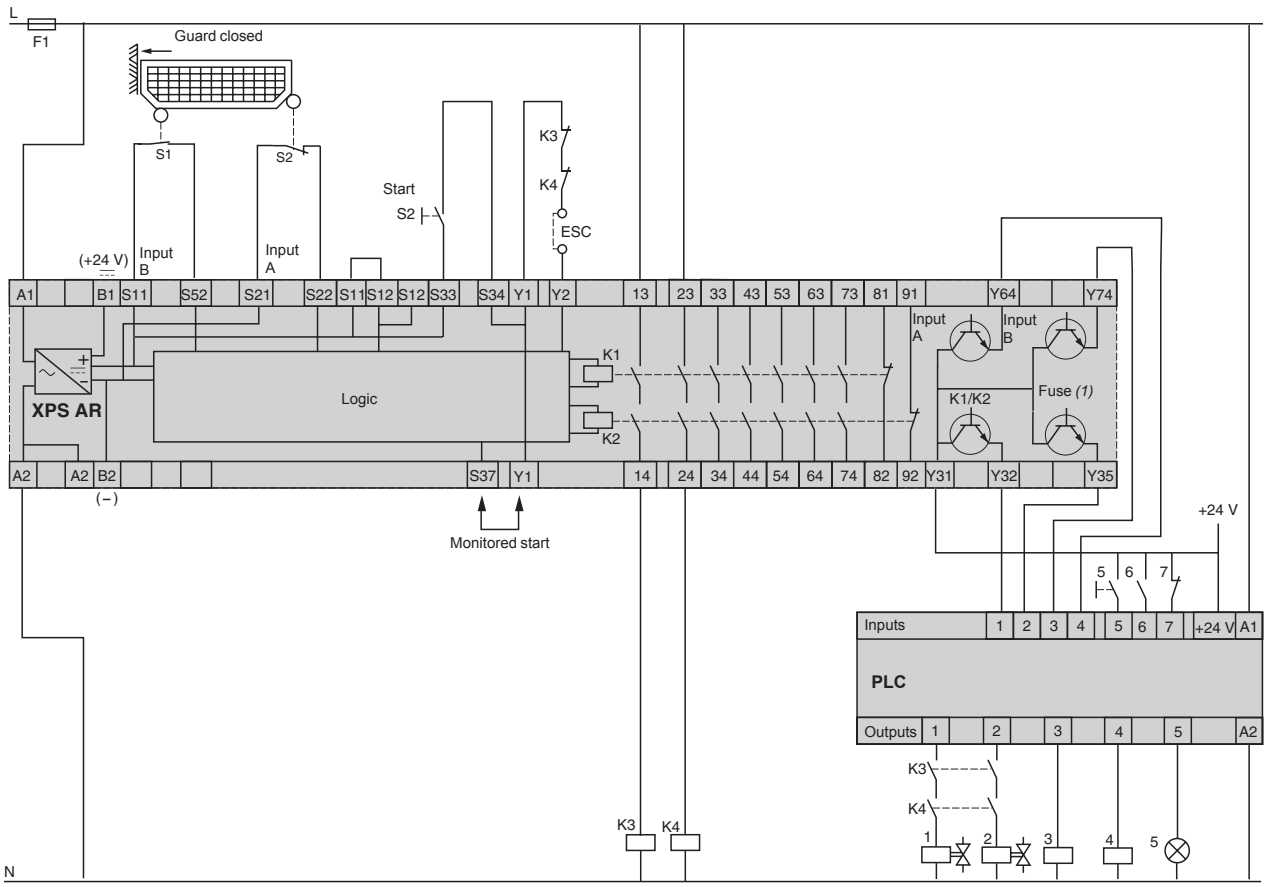


ESC: External start conditions

(1) Operating status of internal electronic fuse

(2) ESPE indicator light deactivated

Example of safety circuit combining module XPSAR for switch monitoring and a PLC



ESC: External start conditions

(1) Operating status of internal electronic fuse

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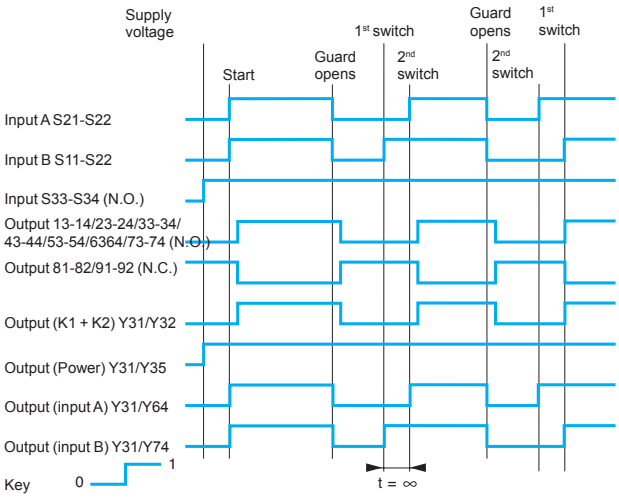
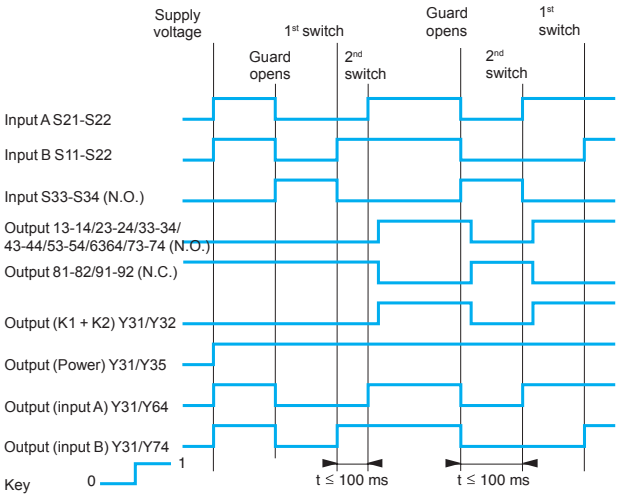
Functional diagrams of module XPSAR

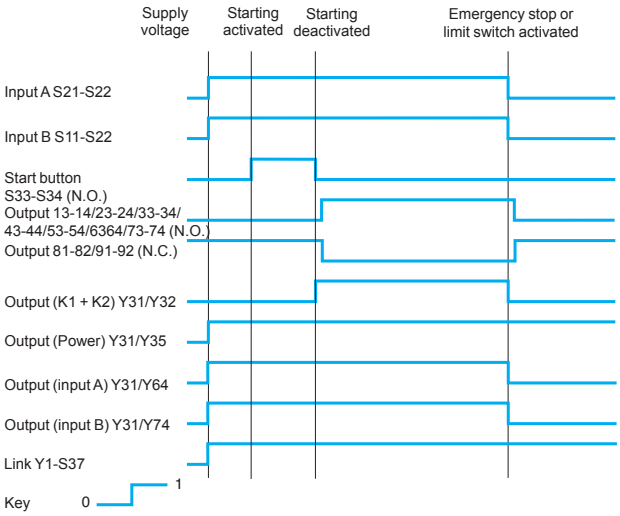
Limit switch monitoring function with automatic start



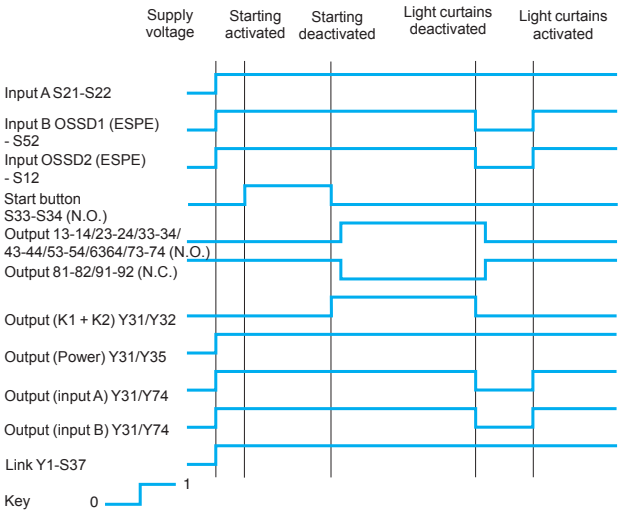
Limit switch monitoring function with automatic start and synchronization time monitoring



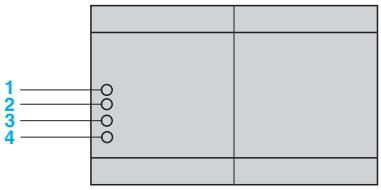
Emergency stop monitoring or limit switch monitoring function with monitored start



Light curtain monitoring (ESPE) function, curtains with solid-state outputs, and monitored start



LED details



1 Supply voltage A1-A2, internal electronic fuse status
2 Input S22 (A)
3 Input S52 (B)
4 K1/K2 status (N.O. safety outputs closed)

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Safety automation system solutions

Preventa™ safety relay modules type XPSAK

For Emergency stop, switch, sensing mat/edges or light curtain monitoring

Operating principle

Safety modules XPSAK are designed to conform with category 4 of the standard EN 954-1/ISO 13849-1.
They are used for:
■ Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
■ Electrical monitoring of switches activated by protection devices, with optional selection of synchronization time between signals.
■ Monitoring 4-wire sensing mats or edges.
■ Monitoring type 4 light curtains conforming to EN/IEC 61496-1 which have solid-state safety outputs with test function (for example, light curtains type XUSL, conforming to the category 4 of standard EN 954-1/ISO 13849-1.
Housed in a compact enclosure, the modules have 3 safety outputs, a relay signalling output and 4 solid-state signalling outputs for signalling to the process PLC.
Preventa™ safety relay modules XPSAK●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.
To aid diagnostics, the modules have 4 LEDs on the front cover which provide information on the monitoring circuit status.
The Start button monitoring function is configurable depending on the wiring.

Characteristics

Module type				XPSAK3●1144	XPSAK3●1144P
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)				Category 4 max.	
Conformity to standards				EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/ISO 13850, EN/IEC 60947-1 + A11	
Product certifications				UL, CSA, BG	
Supply	Voltage		**V**	∼ and ⎓ 24, ∼ 48, ∼ 110 and ⎓ 24, ∼ 120 and ⎓ 24, ∼ 230 and ⎓ 24	
	Voltage limits			- 15…+ 10%	
	Frequency		**Hz**	50/60	
Power consumption	24 V version		**VA**	≤ 5	
	110/120/230 V versions			≤ 6	
Module inputs fuse protection				Internal, electronic	
Start button monitoring				Yes/No (configurable by terminal connections)	
Control unit voltage and current between terminals S21-S22, S31-S32				⎓ 24 V/30 mA approx. (at nominal supply voltage)	
Maximum wiring resistance RL between terminals S21-S22, S31-S32			Ω	28	
Synchronization time between inputs A and B (terminals S21-S22, S31-S32)			**s**	Automatic start: 2 or 4 depending on wiring Manual start (start button between S33 and S34): unlimited	
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			3 N.O. (13-14, 23-24, 33-34)	
	Number and type of additional circuits			1 N.C. (41-42) + 4 solid-state	
	Breaking capacity in AC-15		**VA**	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Breaking capacity of solid-state outputs			24 V/20 mA, 48 V/10 mA	
	Max. thermal current (Ithe)		**A**	6	
	Max. total thermal current		**A**	18	
	Output fuse protection		**A**	4 gG or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		**mA**	10	
	Minimum voltage		**V**	17	
Electrical life				See page 2/172	
Response time on input opening			**ms**	≤ 40	
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				4	
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			**°F (°C)**	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection	Conforming to IEC 60529	Terminals		IP 20	
		Enclosure		IP 40	
Connections		Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm²)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm²)	Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	

Principle: page 2/200 | Characteristics: page 2/200 | References: page 2/201 | Wiring Diagrams: page 2/202 | Dimensions: page 2/260

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Safety automation system solutions

Preventa™ safety relay modules type XPSAK

For Emergency stop, switch, sensing mat/edges or light curtain monitoring

References

DF566754

XPSAK3●1144

DF566755

XPSAK3●1144P

Description	Type of terminal block connection	Number of safety circuits	Outputs: Additional / Solid-state for PLC	Supply	Reference	Weight oz (kg)
Safety modules for Emergency stop, switch, sensing mat/edges or light curtain monitoring	Integrated in module	3	1 / 4	∼ 24 V ⎓ 24 V	**XPSAK311144**	10.582 (0.300)
				∼ 110 V ⎓ 24 V	**XPSAK361144**	14.110 (0.400)
				∼ 120 V ⎓ 24 V	**XPSAK351144**	14.110 (0.400)
				∼ 230 V ⎓ 24 V	**XPSAK371144**	14.110 (0.400)
	Removable from module	3	1 / 4	∼ 24 V ⎓ 24 V	**XPSAK311144P**	10.582 (0.300)
				∼ 48 V	**XPSAK331144P**	10.582 (0.300)
				∼ 110 V ⎓ 24 V	**XPSAK361144P**	14.110 (0.400)
				∼ 120 V ⎓ 24 V	**XPSAK351144P**	14.110 (0.400)
				∼ 230 V ⎓ 24 V	**XPSAK371144P**	14.110 (0.400)

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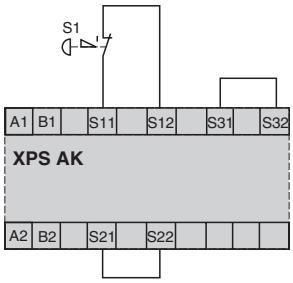
2

XPSAK

Emergency stop monitoring function configuration

1-channel wiring

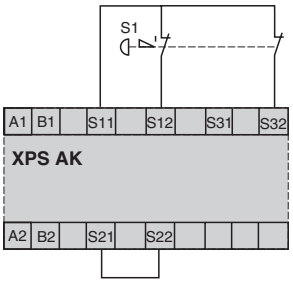
Emergency stop button with a single N.C. contact



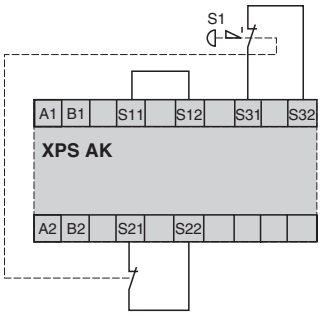
Not all anomalies are detected: a short-circuit on the Emergency stop pushbutton is not detected.

2-channel wiring

Emergency stop button with 2 N.C. contacts, without short-circuit detection

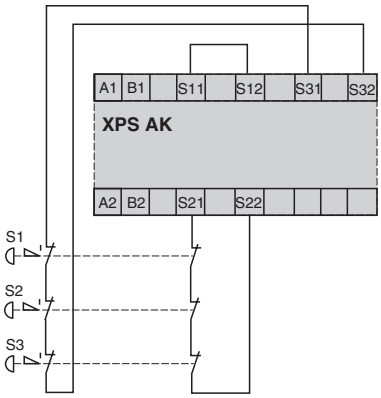


Emergency stop button with 2 N.C. contacts, with short-circuit detection (recommended application)



The 2 input channels are supplied at different potentials. A short-circuit between the 2 inputs is detected.

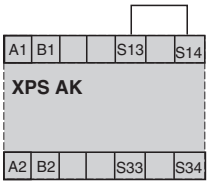
Connection of multiple Emergency stop buttons with 2 N.C. contacts (recommended application).



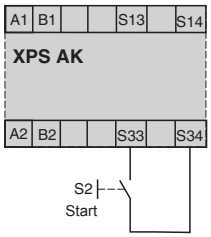
The 2 input channels are supplied at different potentials. A short-circuit between the 2 inputs is detected.

Start configurations

Automatic start

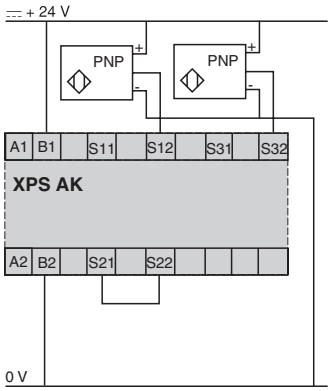


With start button monitoring

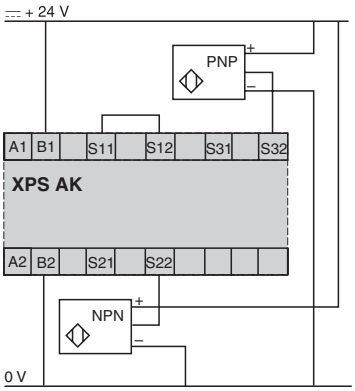


Proximity sensor monitoring

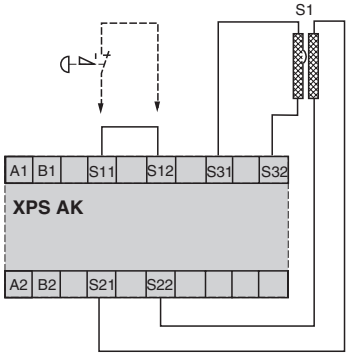
Proximity sensors with PNP outputs
Without short-circuit detection



Proximity sensors with NPN and PNP outputs
With short-circuit detection



Sensing mat or edges monitoring



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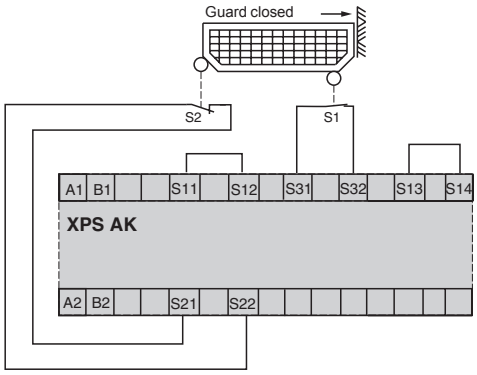
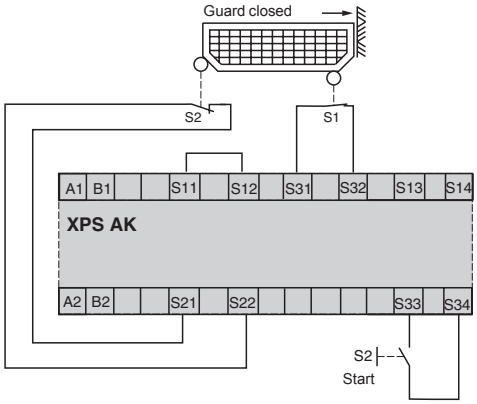
XPSAK

Monitoring of a movable guard associated with 2 switches with 1 contact each in combined mode (switch 1 with N.O. contact, switch 2 with N.C. contact)

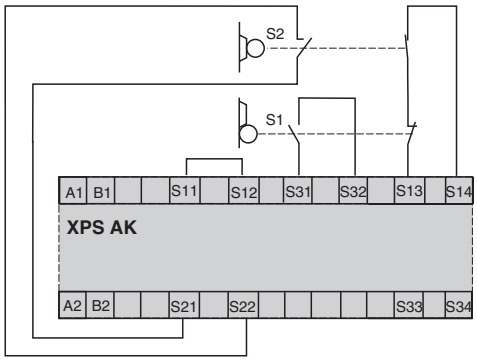
Automatic start, without synchronization time monitoring



Manual start by Start button

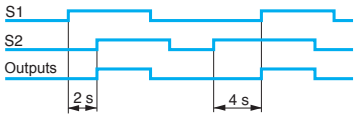


Monitoring of a movable guard associated with 2 switches and automatic start
(shown with guard open)

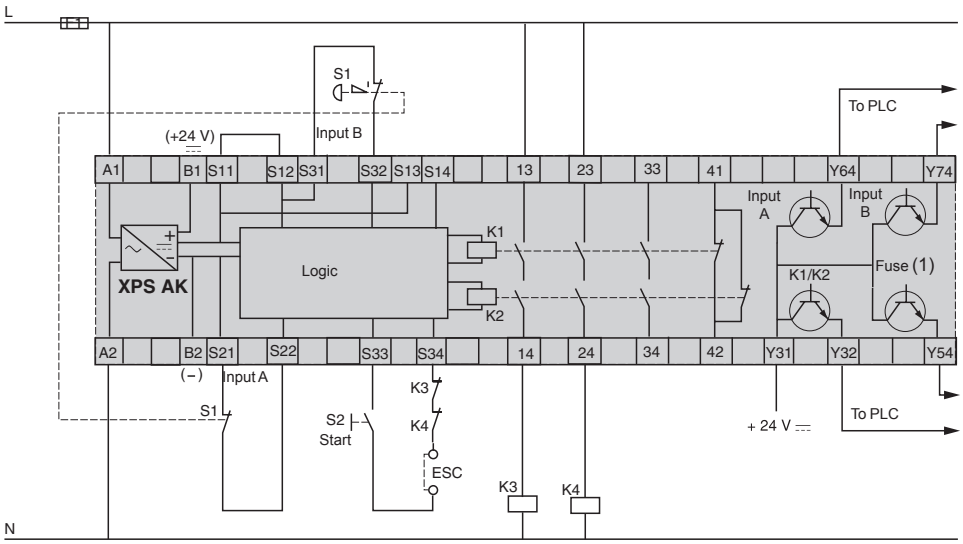


For synchronization monitoring of the inputs, S13 and S14 must be wired per the diagram to the left (if S13 and S14 are jumpered, the result would be automatic start without synchronization monitoring). The synchronization time is determined by the first limit switch that is activated.
If S1 is actuated before S2, then the synchronization time is two seconds on closing.
If S2 is actuated before S1, then the synchronization time is four seconds on closing.
There is no synchronization on opening the door or guard.

Functional diagram of outputs



Module XPSAK associated with an Emergency stop button with 2 N.C. contacts



Supply connection according to voltage: ∿ across terminals A1/A2, or ⎓ 24 V across terminals B1/B2.
(1) Operating status of internal electronic fuse.
ESC: External start conditions.

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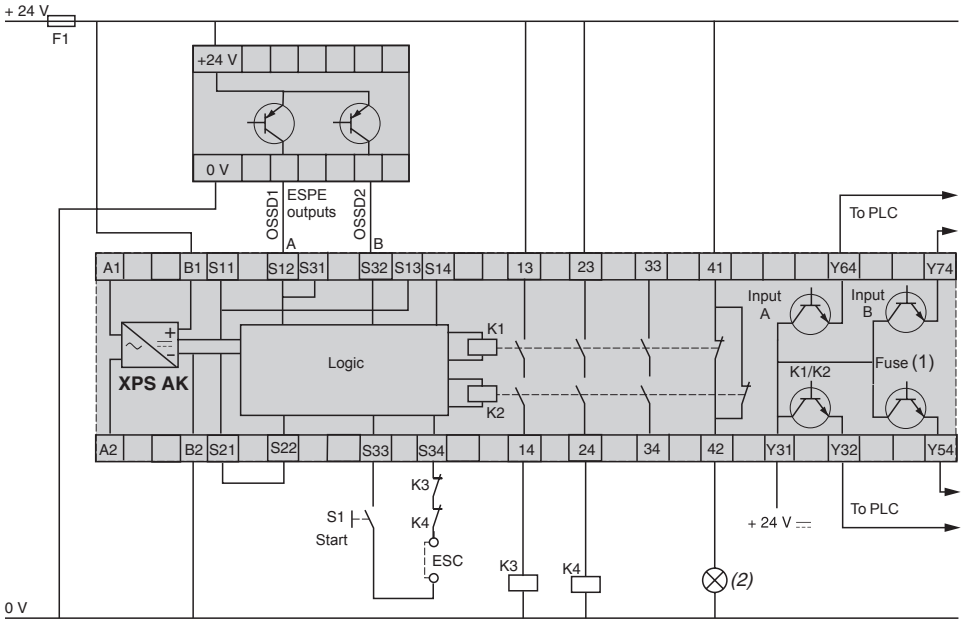
2

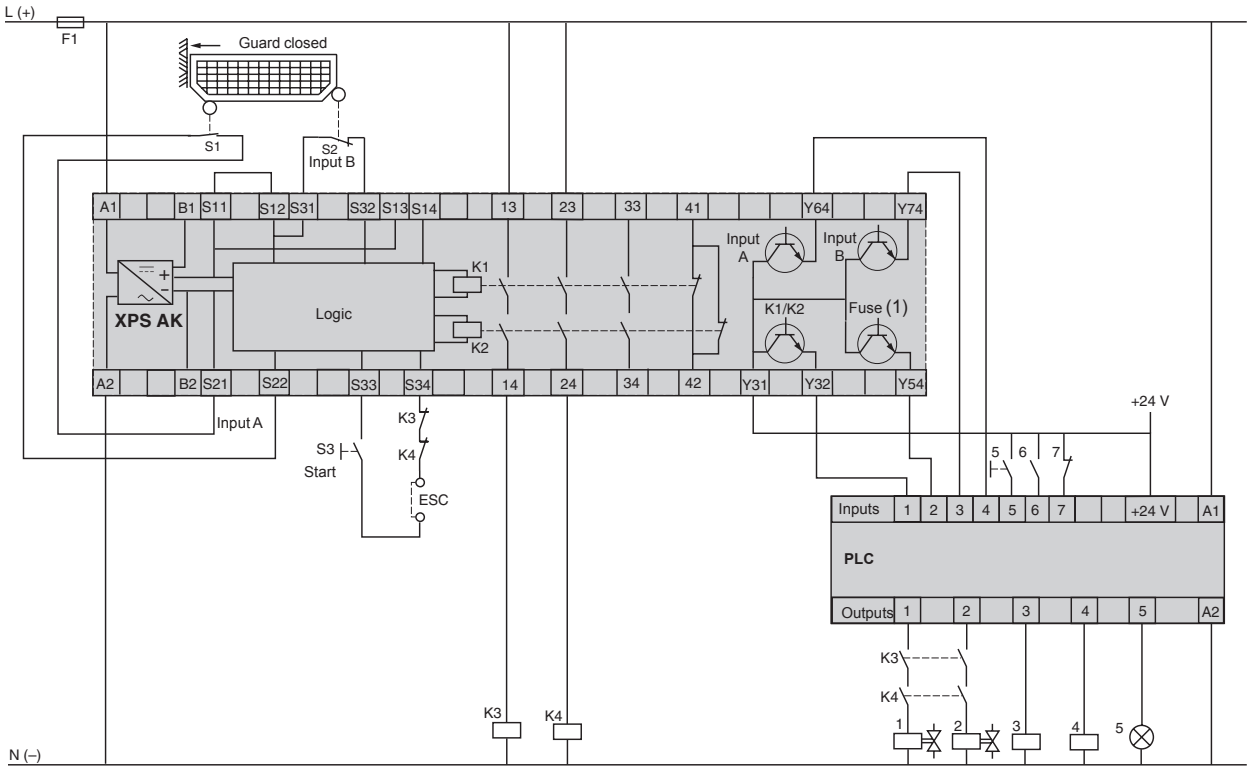
XPSAK

Module XPSAK for monitoring electro-sensitive protection equipment (ESPE)



(1) Operating status of internal electronic fuse.
(2) ESPE indicator light deactivated.
ESC: External start conditions.

Example of safety circuit combining module XPSAK for limit switch monitoring and a PLC



(1) Operating status of internal electronic fuse.
ESC: External start conditions.

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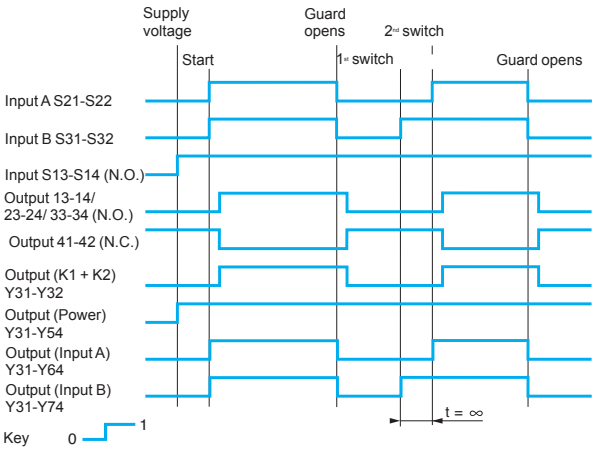
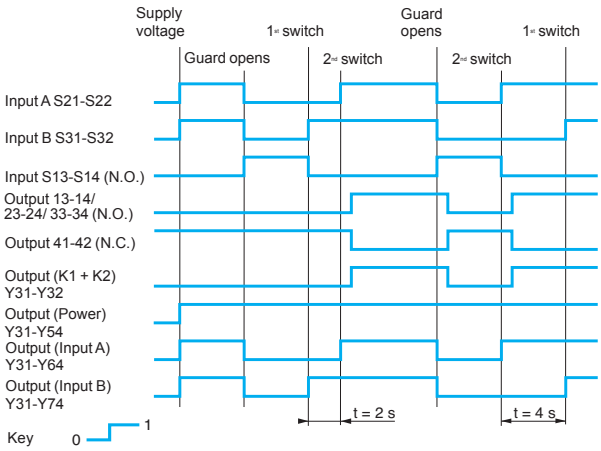
XPSAK

Functional diagrams

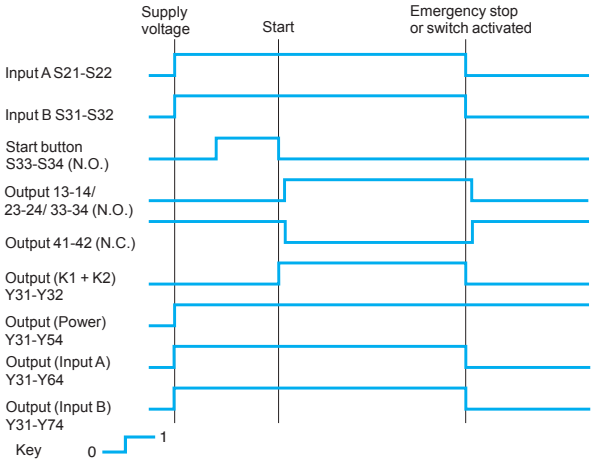
Switch monitoring function with automatic start



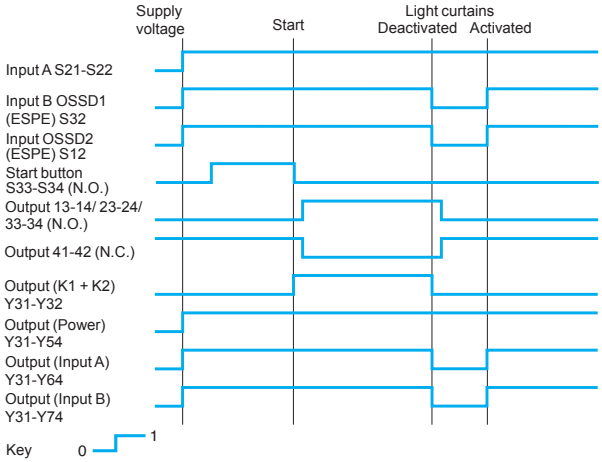
Switch monitoring function with automatic start and synchronization time monitoring



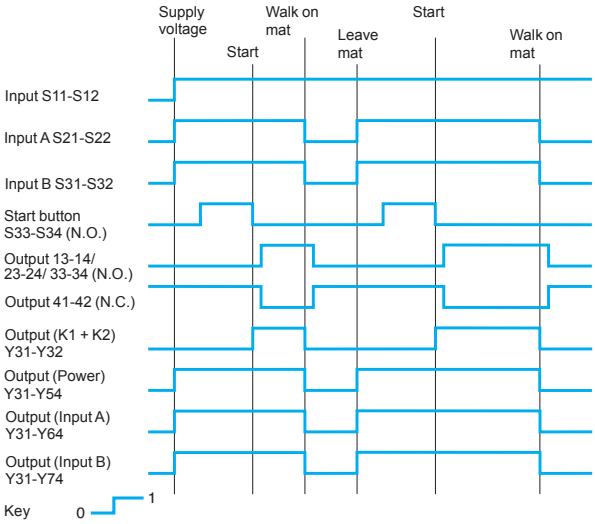
Emergency stop monitoring or switch monitoring function



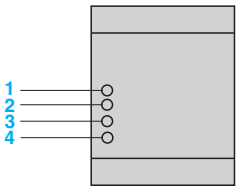
Light curtain monitoring (ESPE) function, curtains with solid-state outputs



Sensing mat or edge monitoring function, with monitored start



LED details



1 Supply voltage A1-A2, fuse status.
2 Input S22 (A).
3 Input S32 (B).
4 K1/K2 status (N.O. safety outputs closed).

Principle: page 2/200
Characteristics: page 2/200
References: page 2/201
Wiring Diagrams: page 2/202
Dimensions: page 2/260

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Safety automation system solutions

Preventa™ safety relay modules types XPSBA, XPSBC, XPSBF

For electrical monitoring of two-hand control stations

Operating principle

Two-hand control stations are designed to provide protection against hand injury. They require machine operators to keep their hands clear of the hazardous movement zone.

The use of two-hand control is an individual protective measure, which can safely protect only one operator. Separate two-hand control stations must be provided for each operator in a multiple-worker environment.

Safety modules XPSBA, BC and BF for two-hand control stations comply with the requirements of European standard EN 574/ISO 13851 for two-hand control systems.

The control stations must be designed and installed such that they cannot be activated involuntarily or easily rendered inoperative. Depending on the application, the requirements of type C standards specific to the machinery involved must be met (additional personal protection methods may have to be considered).

To initiate a hazardous movement, both operators (two-hand control pushbuttons) must be activated within an interval ≤ 0.5 s (synchronous activation). If one of the two pushbuttons is released during a hazardous operation, the control sequence is cancelled. Resumption of the hazardous operation is possible only if both pushbuttons are returned to their initial position and reactivated within the required time interval.

The control sequence does not occur if:

- Both two-hand control push buttons are pressed during a time period greater than 0.5 seconds,
- A short-circuit is present in a push button contact,
- The feedback loop is not closed at start-up.

The safety distance between the control units and the hazardous zone must be sufficient to ensure that when only one operator is released, the hazardous zone cannot be reached before the hazardous movement has been completed or stopped.

XPSBA

This module is designed for use on lighter duty applications where a two-hand control function is desired, but where the safety category is B or 1 (per EN 954-1) and the two-hand control requirements meet Type III A (per EN 574). **This module is not to be used for applications, such as presses, which require a Type III C module or where the application is not a category B or 1.** For press applications, for applications in category 2, 3, or 4, or if application calls for a Type III C module, use XPSBC or XPSBF module.

XPSBC and XPSBF

These modules can be used on applications, such as presses, which require a Type III C module. The XPSBC and XPSBF can be used for a two-hand control application, including presses and similar equipment.

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Safety automation system solutions

Preventa™ safety relay modules types XPSBA, XPSBC

For electrical monitoring of two-hand control stations

Characteristics

Module type				XPSBA	XPSBC
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)				Category 1 max.	Category 4 max.
Conformity to standards				EN/IEC 60204-1, EN/IEC 60947-5-1, EN 574/ISO 13851 type III A, EN 50082-2	EN/IEC 60204-1, EN/IEC 60947-5-1, EN 574 type III C/ISO 13851, EN 50082-2
Product certifications				UL, CSA	UL, CSA, INRS
Supply	Voltage		V	⎓ 24, ∼ 115, ∼ 230	⎓ 24, ∼ 24, ∼ 115, ∼ 230
	Voltage limits			- 20…+ 20% (⎓ 24 V), - 20…+ 10% (∼ 24 V), - 15…+ 15% (∼ 115 V), - 15…+ 10% (∼ 230 V)	- 20…+ 10% (⎓ 24 V), - 15…+ 10% (∼ 24 V), - 15…+ 15% (∼ 115 V), - 15…+ 10% (∼ 230 V)
	Frequency		Hz	50/60	
Power consumption			VA	< 20 (apparent power)	< 6
Module inputs fuse protection				Internal, electronic	
Inputs				S1: 1 N.C. + N.O., S2: 1 N.C. + N.O.	
Two-hand control type Conforming to EN 574/ISO 13851				III A	III C
Synchronization time			s	0.5 maximum	
Control unit voltage	⎓ 24 V version		V	24	24
	∼ 24 V, 115 V, 230 V version		V	24	48
Minimum voltage and current				**Between terminals T11-T12, T11-T13**	**Between terminals T11-T13, T21-T23**
	U min./I min. - ⎓ 24 V version 68 °F (20 °C)			18 V/30 mA	18 V/140 mA
	U min./I min. - ∼ 24 V/115 V/230 V version 68 °F (20 °C)			18 V/30 mA	30 V/50 mA
Calculation of wiring resistance RL (for XPSBC only) between terminals T11-T13, T21-T23 as a function of the internal supply voltage U int (terminals T13-T23)			Ω	–	RL max. = $\frac{\text{U int - U min.}}{\text{I min.}}$ Ue = true voltage applied to terminals A1-A2 U int = supply voltage Ue -1 V (24 V version) (115 V, 230 V version) RL max. must not exceed 50 Ω U int between 30.5 V and 35 V, with typical value = 35 V
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			1 N.O. (11-14)	2 N.O. (13-14, 23-24)
	Number and type of additional circuits			1 N.C. (11-12)	1 N.C. (31-32)
	Breaking capacity in AC-15		VA	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Max. thermal current (Ithe)		A	5	2.5
	Output fuse protection, using fuses conforming to EN/IEC 60947-5-1, VDE 0660 part 200		A	4 gG or 6 fast acting	4 gG
	Minimum current		mA	10	
	Minimum voltage		V	17	
Electrical life				See page 2/172	
Response time			ms	< 25	< 30
Rated insulation voltage (Ui)			V	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			kV	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				2	3
Operating temperature			°F (°C)	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			°F (°C)	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connections		Type		Captive screw clamp terminals	
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm²)	
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)	
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm²)	
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	

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2

Characteristics

Module type				XPSBF1132	XPSBF1132P
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)				Category 4 max.	
Conformity to standards				EN/IEC 60204-1, EN 574 type III C/ISO 13851, EN/IEC 60947-1, EN/IEC 60947-5-1, DIN V VDE 0801 (1990), DIN V VDE 0801 A1 (1994)	
Product certifications				UL, CSA, BIA	
Supply		Voltage	V	⎓ 24	
		Voltage limits		- 20…+ 20%	
Power consumption			W	< 2.5	
Module inputs fuse protection				Internal, electronic	
Inputs				S1: 1 N.C. + N.O., S2: 1 N.C. + N.O.	
Two-hand control type				III C conforming to EN 574/ISO 13851	
Synchronization time			s	0.5 maximum	
Control unit voltage			V	24 V/8 mA	
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			2 N.O. (13-14, 23-24)	
	Number and type of additional circuits			2 solid-state (type 24 V - 20 mA)	
	Breaking capacity in AC-15		VA	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Max. thermal current (Ithe)		A	4.2	
	Max. total thermal current		A	8.4	
	Output fuse protection, using fuses conforming to EN/IEC 60947-5-1, VDE 0660 part 200		A	4 gG or 6 fast acting	
	Minimum current		mA	10	
	Minimum voltage		V	17	
Electrical life				See page 2/172	
Response time			ms	< 20	
Rated insulation voltage (Ui)			V	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			kV	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				3	
Operating temperature			°F (°C)	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			°F (°C)	- 13…+ 267.8 (- 25…+ 85)	
Degree of protection conforming to IEC/EN 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connection		Type		Captive screw clamp terminals	Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 26-14 AWG (0.14…2.5 mm²)	Solid or flexible cable: 24-14 AWG (0.2…2.5 mm²)
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
		With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)	With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)
	2-wire connection	Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm²)	Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	

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Safety automation system solutions

Preventa™ safety relay modules types XPSBA, XPSBC, XPSBF

For electrical monitoring of two-hand control stations

Selection

Standard EN 574/ISO 13851 defines the selection of two-hand controls according to the control system category.
The following table details the three types of two-hand control conforming to EN 574/ ISO 13851.
For each type, it lists the operating characteristics and minimum requirements.

Requirements of standard EN 574/ ISO 13851	Type I	Type II	Type III		
			A	B	C
Use of both hands (simultaneous action)					
Link between input and output signals					
Output signal inhibited					
Prevention of accidental operation					
Tamper-proof					
Output signal reinitialized					
Synchronous action (specified time limit)					
Use of proven components (Category 1 conforming to EN 954-1/ ISO 13849-1)			XPSBA●●		
Redundancy with partial error detection (Category 3 conforming to EN 954-1/ ISO 13849-1)				XPSBC XPSBF	
Redundancy + Self-monitoring (Category 4 conforming to EN 954-1/ ISO 13849-1)					XPSBC XPSBF

Meets the requirements of standard EN 574/ISO 13851

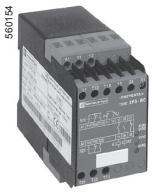
Conforming to standard EN 954-1/ISO 13849-1

References

560153

XPSBA●●●●

560154



XPSBC●●●●

560075

XPSBF1132P

Description	Type conforming to standard EN 574/ ISO 13851	Type of terminal block connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight oz (kg)
Safety modules for electrical monitoring of two-hand control stations	III A	Integrated in module	1 N.O.	1 N.C.	∼ or ⎓ 24 V	**XPSBA5120**	7.055 (0.200)
					∼ 115 V	**XPSBA3420**	7.055 (0.200)
					∼ 230 V	**XPSBA3720**	7.055 (0.200)
	III C	Integrated in module	2 N.O.	1 N.C.	⎓ 24 V	**XPSBC1110**	14.110 (0.400)
					∼ 24 V	**XPSBC3110**	14.110 (0.400)
					∼ 115 V	**XPSBC3410**	14.110 (0.400)
					∼ 230 V	**XPSBC3710**	14.110 (0.400)
			2 N.O.	2 solid-state	⎓ 24 V	**XPSBF1132**	5.291 (0.150)
		Removable from module	2 N.O.	2 solid-state	⎓ 24 V	**XPSBF1132P**	5.291 (0.150)

Principle: page 2/206
Characteristics: page 2/207
References: page 2/209
Wiring Diagrams: page 2/210
Dimensions: page 2/260

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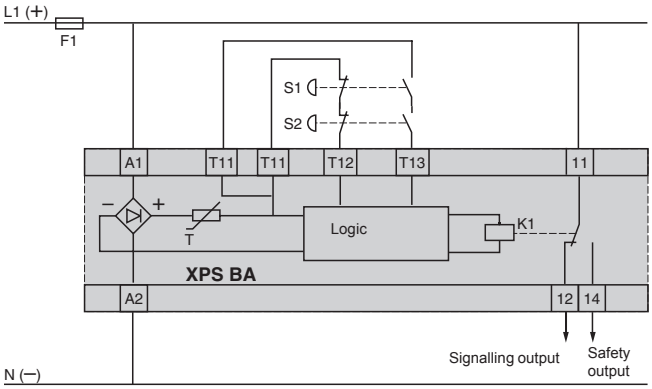
XPSBA

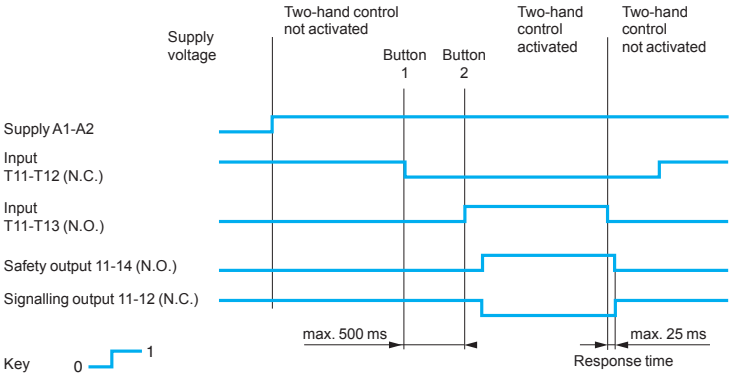
Module XPSBA associated with a two-hand control station

Type III A conforming to EN 574/ISO 13851

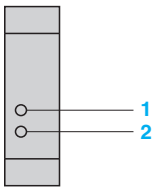


S1 and S2: pushbuttons. Must not be used for applications (presses) which require a type III C module (XPSBC).

Functional diagram of module XPSBA



LED details (XPSBA)



1 Supply voltage A1-A2.
2 K1 status (N.O. safety output 11-14 closed).

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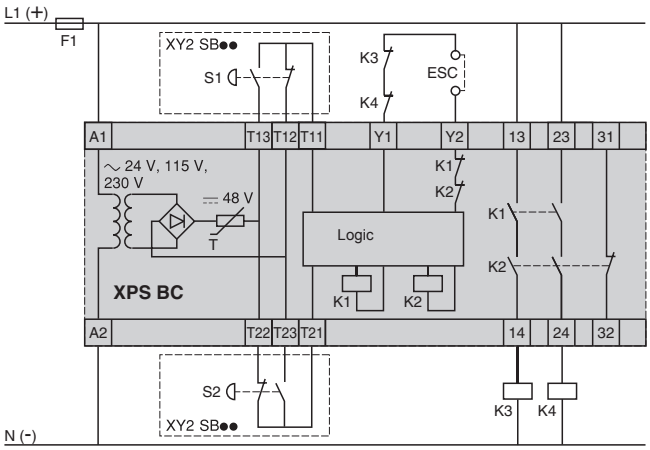
XPSBC

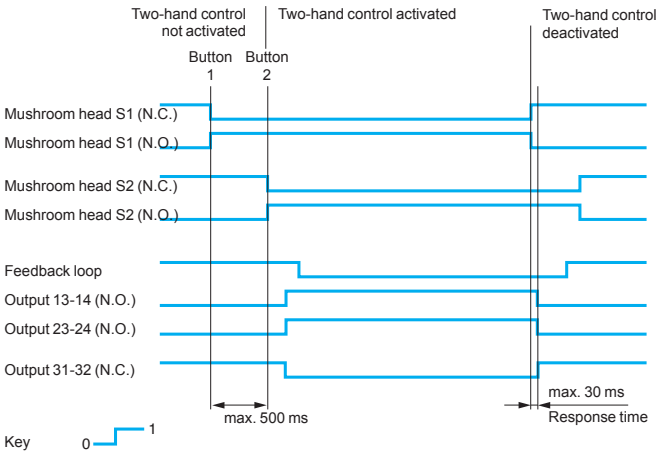
Module XPSBC associated with a two-hand control station

Type III C conforming to EN 574/ISO 13851

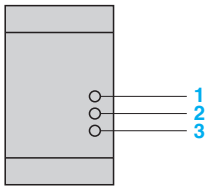


ESC: external start conditions.
Y1-Y2: feedback loop.
Output (31-32) must not be used as a safety circuit. It can be used for non-hazardous machine movements.

Functional diagram of module XPSBC



LED details (XPSBC)



1 Supply voltage A1-A2, S1-S2. LED 1 indicates that buttons S1 and S2 are correctly connected.
2 Feedback loop Y1-Y2.
3 K1-K2 status (N.O. safety outputs closed).

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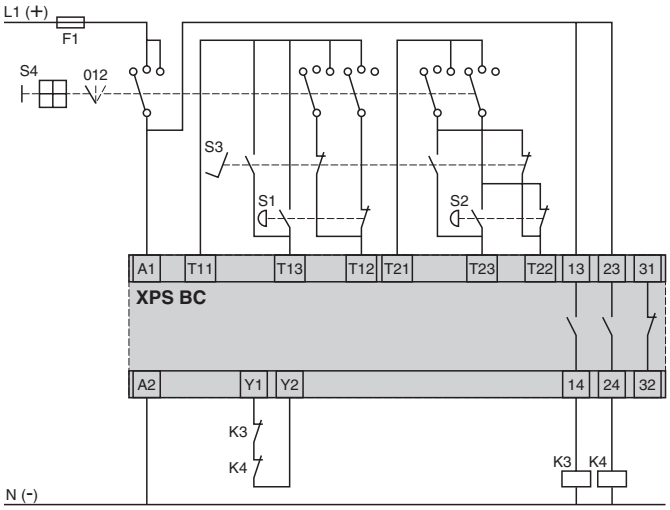
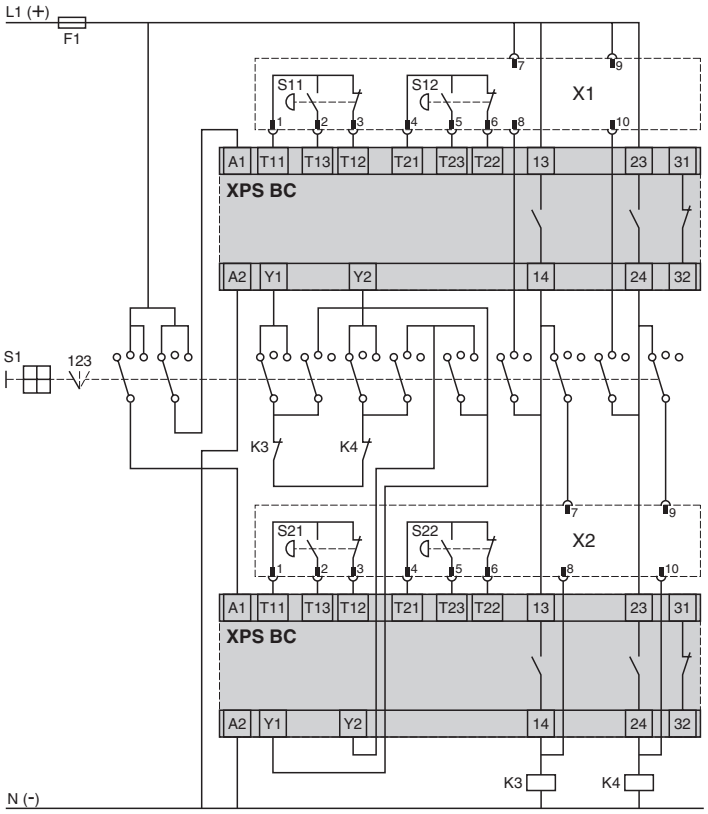
XPSBC

Module XPSBC associated with a two-hand control station and a foot switch



S4 selector switch:
0 = stop
1 = control station
2 = foot switch
S1-S2: two-hand control station pushbuttons
S3: foot switch

Modules XPSBC associated with 2 two-hand control stations



When operator 1 is absent: replace terminal block X1 by X3 and physically remove the two-hand control station.

When operator 2 is absent: replace terminal block X2 by X3 and physically remove the two-hand control station.

S1 selector switch:
1 = operator 1
2 = operator 2
3 = operator 1 and operator 2
S11-S12, S21-S22: two-hand control station pushbuttons

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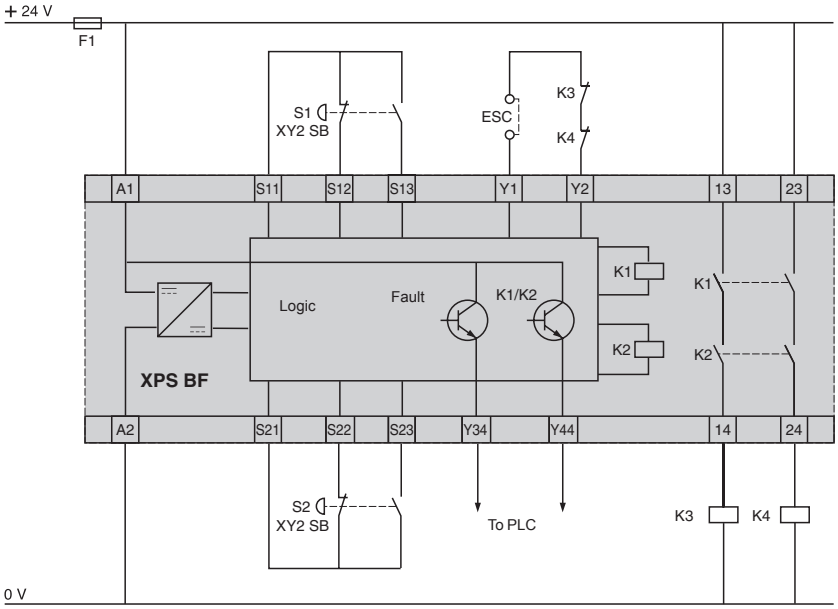
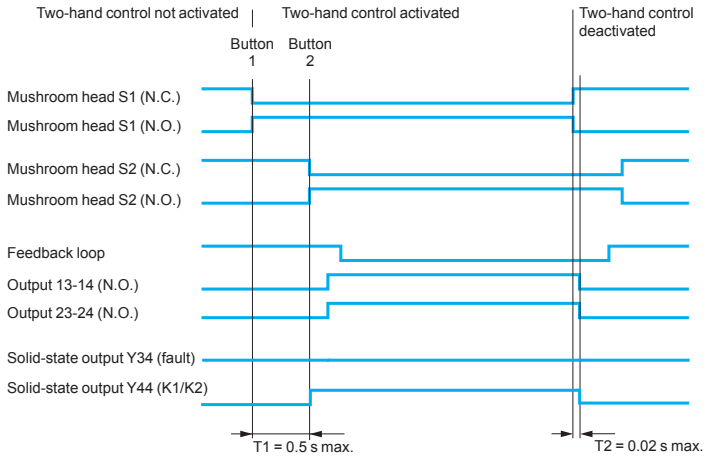
XPSBF

Module XPSBF associated with a two-hand control station

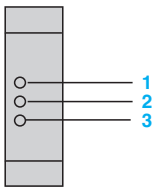


ESC: External start conditions.
Y1-Y2: feedback loop

Functional diagram of module XPSBF



LED details (XPSBF)



1 Supply voltage A1-A2 (fuse status).
2 Fault signalling.
3 K1-K2 status (N.O. safety outputs closed).

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2

Operating principle

The safety monitoring module XPSLCD1141 enables independent monitoring of 2 to 4 light curtains type 2 and type 4.
Each output of the light curtain is separately connected to the inputs of the safety monitoring module, which either authorises or prevents activation of its two safety outputs.
The module manages starting and EMD/MPCE functions and therefore, the light curtains connected to it must be configured for automatic start and the EDM/MPCE function deactivated. The safety monitoring module XPSLCD1141 provides the supply and also manages, in addition to its own auxiliary outputs (1 PNP and 1 NPN), the auxiliary outputs of the light curtains.
At the slightest intrusion through one or more light beams of any of the light curtains, the outputs of the safety monitoring module open. This also applies in the event of any internal fault or output relay(s) fault (subject to the EDM/MPCE configuration on the module).
The light curtain system conforms to the standard EN/IEC 61496-1 (type 4).
The Preventa™ safety monitoring module XPSLCD1141 incorporates removable terminal blocks, thus optimizing machine maintenance.
To aid diagnostics, the safety monitoring module has 9 LEDs and a 2-digit display on the front cover which provide information on the monitoring circuit status.

Environmental characteristics

Safety monitoring module type			XPSLCD1141
Certifications			CE, TÜV, CSA, UL
Ambient air temperature		**°F (°C)**	Operation: 0…+ 55; storage: - 25…+ 75
Relative humidity			95% maximum, without condensation
Degree of protection			IP 20
Shock and vibration resistance	Conforming to EN/IEC 61496-1		Shock resistance: 10 gn, impulse 16 ms. Vibration resistance: 5…55 Hz max. on all 3 axes
Materials			ABS thermoplastic enclosure
Mounting			35 mm rail

Electrical characteristics

Power supply		**V**	⎓ 24 ± 10%
Current		**A**	10 max.
Response time		**ms**	< 1
Safety outputs			2 solid-state PNP outputs (N.O.), 625 mA on ⎓ 24 V
Alarm or auxiliary output			1 solid-state PNP (N.O.), 500 mA on ⎓ 24 V, and 1 solid-state NPN (N.O.),100 mA on ⎓ 24 V, output
Monitoring activation of output switching devices (EDM/MPCE)		**mA**	50 ± 20% on ⎓ 24 V
Signalling			9 LEDs plus 2-digit display
Functions			-Auto/Manual, manual 1st cycle, -Monitoring of external switching devices (EDM: External Devices Monitoring), -Restart request indicator light, -Display of operating modes and alarm by 9 LEDs and 2-digit display. Selection of Auto/Manual, blanking relay monitoring, floating/blanking and blanking + floating/ blanking relay monitoring using configuration switches behind front cover of module. -Independent monitoring of 2 to 4 light curtains.
Monitoring of external switching devices (EDM = External Devices Monitoring)			Monitoring of the function (open or closed) as well as the response time of the power components. Selectable by using configuration switches.
Start input		**mA**	50 at 24 V
Connection	Type		Captive screw clamp terminals, removable terminal block
1-wire connection	Without cable end		Solid cable: 14 AWG (1.63 mm²)
	Without cable end		Flexible cable: 26-16 AWG (0.14...1.5 mm²)
	With cable end		Without bezel, flexible cable: 26-16 AWG (0.14…1.5 mm²)
2-wire connection	Without cable end		Solid cable: 26-16 AWG (0.14...1.5 mm²)
	Without cable end		Flexible cable: 26-16 AWG (0.14...1.5 mm²)

Principle: page 2/214 | Characteristics: page 2/214 | References: page 2/215 | Wiring Diagrams: page 2/215 | Dimensions: page 2/260

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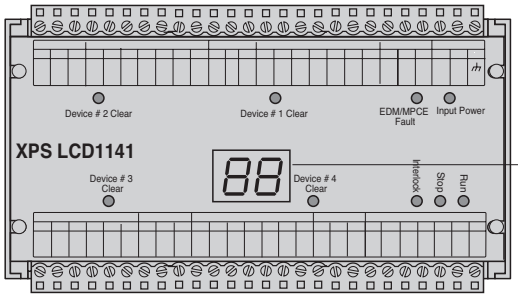
Safety automation system solutions

Preventa™ safety relay modules type XPSLCD

For monitoring 2 to 4 light curtains type 2 and type 4

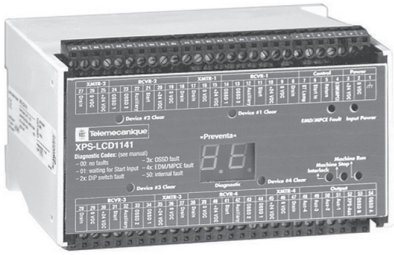
Description

The safety monitoring module XPSLCD has 9 LEDs and a 2-digit display on the front cover.



Reference

107800-55-M



XPSLCD1141

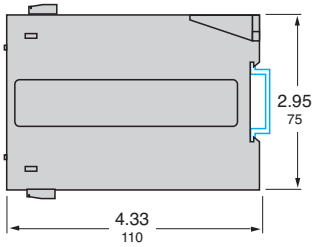
Description	Type of terminal block connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight
				V		oz (kg)
Safety module for monitoring 2 to 4 light curtains type 2 and type 4	Removable from module	2 PNP	5 (4 PNP + 1 PNP or NPN)	⎓ 24 V	**XPSLCD1141**	26.455 (0.750)

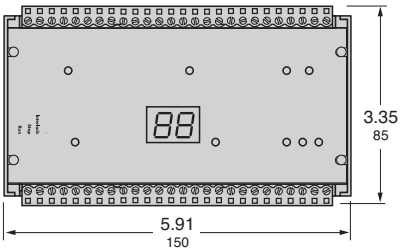
Dimensions

Safety monitoring module

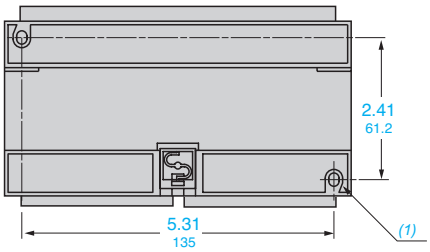
XPSLCD1141

Mounting on 35 mm rail





Rear view



(1) 2 elongated holes Ø 4 x 5.7.

Dual Dimensions: INCHES Millimeters

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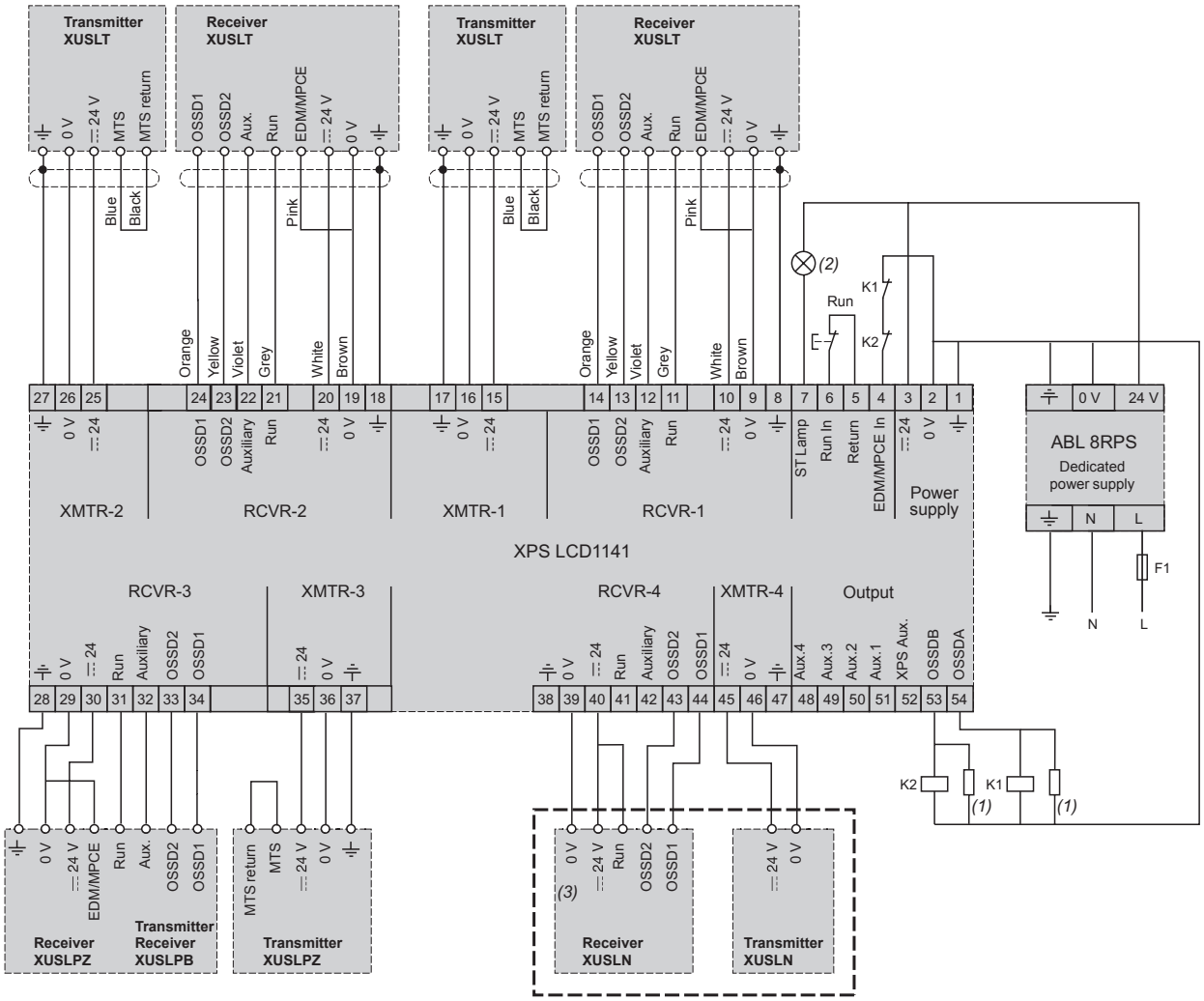
2

Connection via the safety monitoring module XPSLCD1141

Example: configuration with light curtains XUSLT, XUSLP and XUSLN



(1) Arc suppressor.
(2) Restart request indicator light.
(3) When module XPSLCD1141 is used with a type 2 light curtain (example: XUSLN), the entire protection system is downgraded to category 2.

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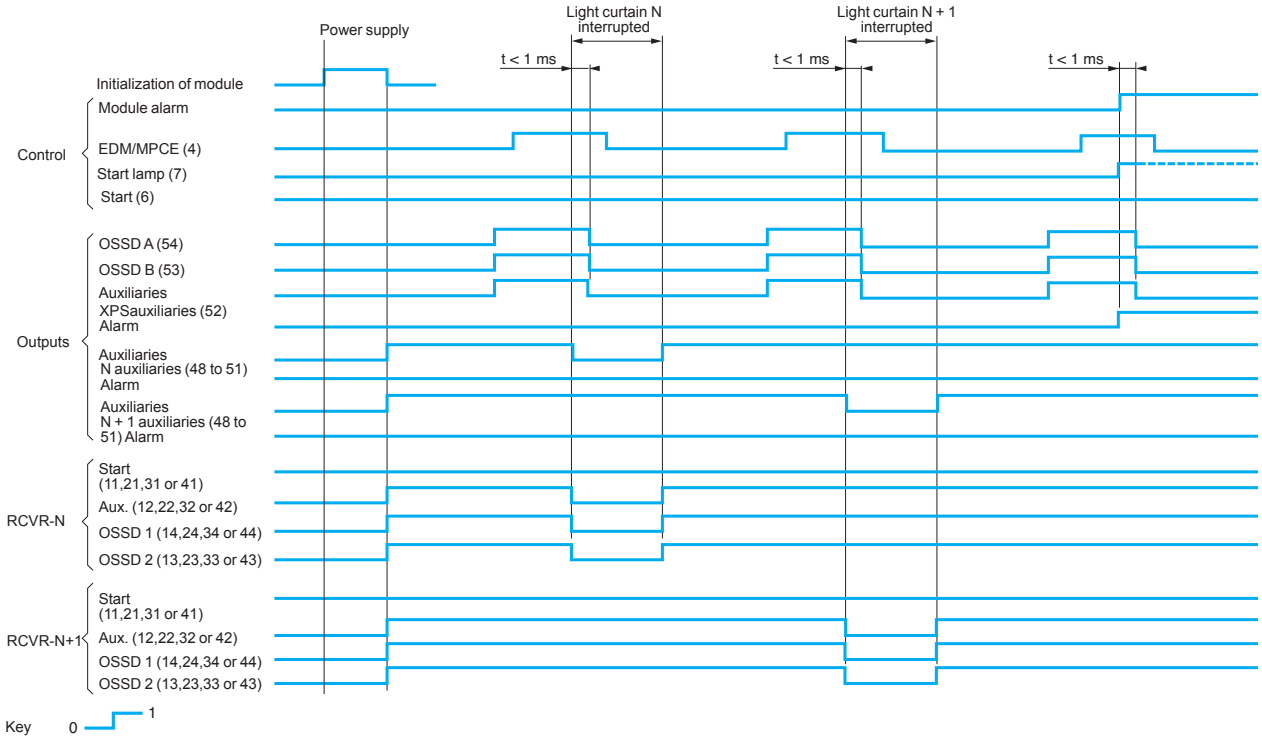
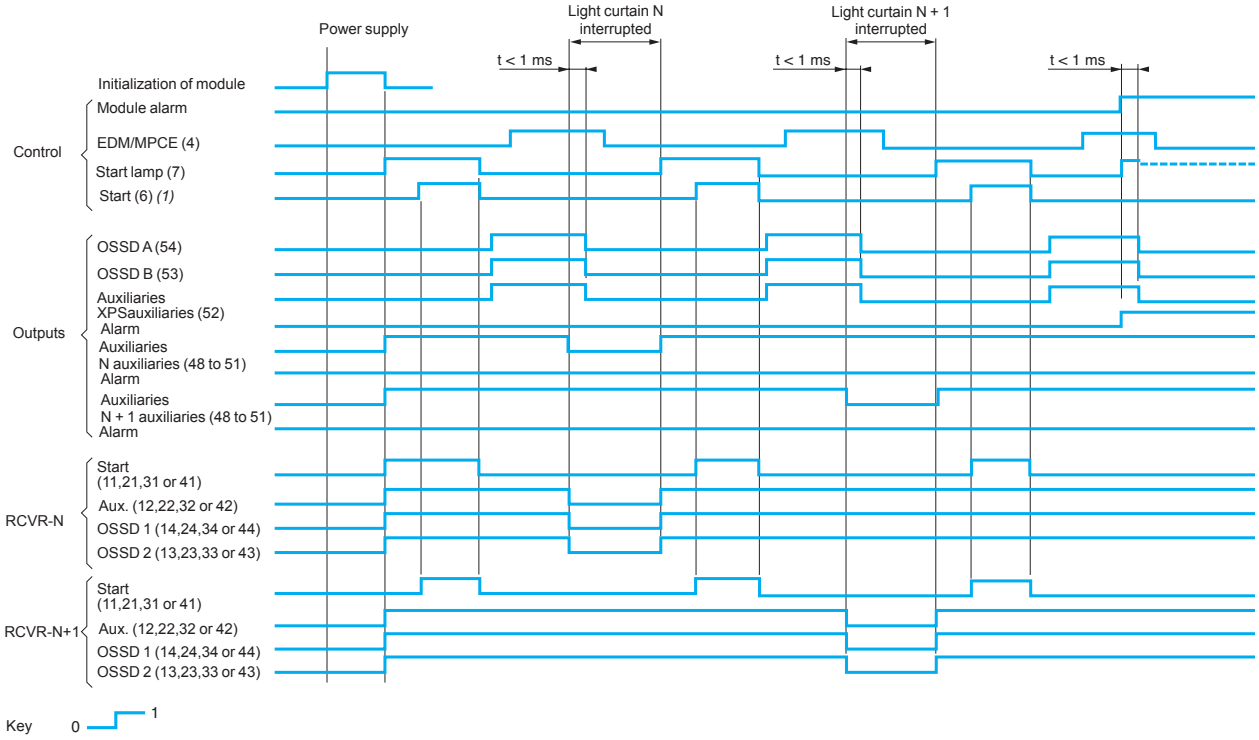
Functional diagram of module XPSLCD1141

Automatic start and restart mode



Manual start and restart mode



(1) Start button.

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Safety automation system solutions

Safety monitoring module
Preventa™ XPSLCM
For the “muting” function of type 2
and type 4 light curtains

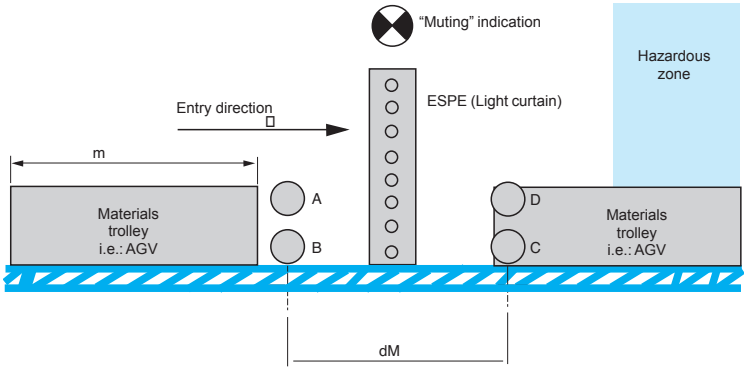
Operating principle

Safety modules XPSLCM are used with type 4 light curtains conforming to EN/IEC 61496-1 to provide a system inhibiting the light curtain protection, i.e. “muting”. This function enables the automatic passage of parts for machining or loaded pallets, without interrupting the transportation movement within the zone protected by the electro-sensitive protection equipment (ESPE) system. In addition to the electro-sensitive protection and safety relay modules XPSLCM, the system consists of 4 to 8 inhibition sensors, 2 indicator lights and a key switch to reset the system to the initial state in the event of a sequence error.

When the system is switched on by the start command and the light curtain protection not interrupted, the main circuit is closed by the safety outputs of the XPSLCM modules (solid-state safety outputs). In addition to safety outputs, the modules incorporate signalling outputs for sending system status information to the PLC. Either 5 or 14 LEDs and a 2-digit display, mounted on the front cover of the module, provide information on the safety circuit status.

An interruption of the protection field monitored by the electro-sensitive protection equipment causes instantaneous opening of the safety outputs; the process PLC receives a stop command and the LED display mounted on the front cover indicates the change of state of the safety circuits. The “open” state is maintained until the module is restarted using the Start button.

The “muting” function cannot be activated by supplying the inhibition sensors unless the safety outputs have been switched on beforehand. To trigger the “muting” function, the inhibition devices must be activated within the 3 second time interval. During the activated “muting” phase, materials can be transported through the protection field without deactivating the safety outputs. In the event of intrusion into the hazardous zone, a person cannot activate the inhibition sensors in the same way and the system stops.
While the “muting” function is activated, a “muting” status indicator light is controlled by the XPSLCM module. An anomaly at indicator light level (short-circuit, open circuit) is immediately recognized and deactivates the “muting” function. The indicator light only illuminates when a “muting” signal is generated and indicates the inhibition of the protection function.



ESPE: electro-sensitive protection equipment (light curtain).
A, B, D, C: “muting” sensors.
m: trolley length and dM = distance between A, B and D, C.

Conditions to be observed for the “muting” function

- The “muting” sensors must either be thru-beam type XUB 0BPSNL2 + XUB 0BKSNL2T, polarized reflex type XUB 0BPSNL2 + XUC Z50 or mechanical limit switches with contacts.
- dM ≤ m to obtain continuous validation of the “muting” function.
- Avoid the intrusion of persons during the “muting” phase. This phase is indicated by the indicator light connected to the “muting” indicator output of the XPSLCM module.
- A materials trolley must provide the “muting” signal before entering the protection field and cease it once it has cleared all the sensors of the protection field on exiting.

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Safety automation system solutions

Safety monitoring module
Preventa™ XPSLCM
For the “muting” function of type 2 and type 4 light curtains

Characteristics

Module type			XPSLCM1150
Certifications			CE, TÜV, CSA, UL
Products designed for max. use in safety related parts of control systems	Conforming to EN 954-1/ ISO 13849-1		Category 4
Ambient air temperature	For operation	**°F (°C)**	0…+ 55
	For storage	**°F (°C)**	- 25…+ 75
Degree of protection conforming to IEC 529	Terminals		IP 20
	Enclosure		IP 20
Power supply	Voltage	**V**	⎓ 24
	Voltage limits		- 10…+ 10%
Maximum power consumption		**W**	< 150
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)
Rated impulse withstand voltage (Uimp)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 and 2)
Number of light curtains monitored			1 or 2 transmitter-receiver pairs
Inputs for “muting” sensors			
- number of inputs to be monitored			2 to 4 per “muting” function
- supply voltage of sensors		**V**	24
- output current of each sensor		**mA**	< 20
Type of “muting” sensors			Thru-beam, polarised reflex or sensors with relay hard contacts
Synchronization time of “muting” sensors		**s**	3 or unlimited
Maximum “muting” time		**min**	2 or unlimited
Safety outputs			
- number and type			2 PNP (terminals 1 and 2), 0.625 A at 24 V
- max. thermal current (Ithe)	1 output	**A**	–
	2 outputs	**A**	2 x 0.108
	3 outputs	**A**	–
	3 contacts	**A**	–
Auxiliary outputs			1 PNP (terminal 5) + 1 NPN (terminal 6)
- breaking capacity of solid-state PNP outputs		**mA**	24 V/500
- breaking capacity of solid-state NPN outputs		**mA**	24 V/100
“Muting” indicator light power		**W**	1 to 7 max.
Response time on input change of state		**ms**	1
Signalling			14 LEDs plus 2-digit display
Connection	Type		Captive screw clamp terminals, removable terminal block
1-wire connection	Without cable end		Solid cable: 14 AWG (1.63 mm²)
	Without cable end		Flexible cable: 26-16 AWG (0.14...1.5 mm²)
	With cable end		Without bezel, flexible cable: 26-16 AWG (0.14…1.5 mm²)
2-wire connection	Without cable end		Solid cable: 26-16 AWG (0.14...1.5 mm²)
	Without cable end		Flexible cable: 26-16 AWG (0.14...1.5 mm²)

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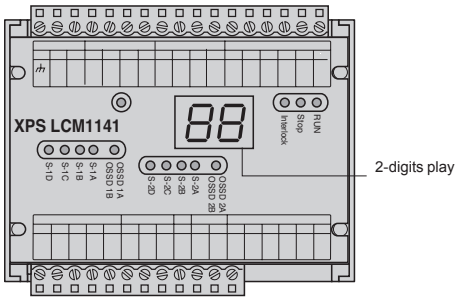
Safety automation system solutions

Safety monitoring module Preventa™ XPSLCM

For the “muting” function of type 2 and type 4 light curtains

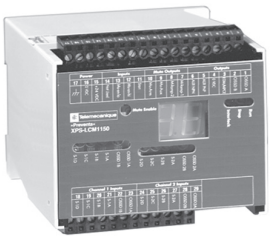


Description

XPSLCM1150

To aid diagnostics, the safety monitoring module has 14 LEDs and a 2-digit display on the front cover which provide information on the monitoring circuit status.

108001-38-M



XPSLCM1150

References

Safety module

Description	Type of terminal block connection	Number of safety circuits	Auxiliary outputs	Supply	Reference	Weight
						oz (kg)
Safety module for “muting” function	Removable from module	2 PNP	1 PNP + 1 NPN	⎓ 24 V	**XPSLCM1150**	23.281 (0.660)

Spare parts

Description	Power	Reference	Weight
	W		oz (kg)
“Muting” indicator light kit	5	**XSZ CM01**	0.423 (0.012)
Replacement bulbs for “muting” indicator light kit consisting of one lot of 10 replacement bulbs and 1 removal/insertion tool XBF-X13	1 to 7	**XSZ CM02**	0.564 (0.016)

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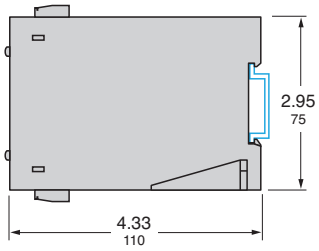
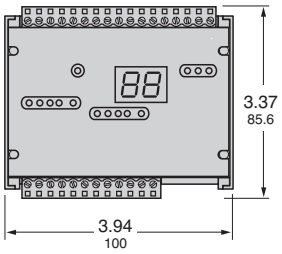
Dimensions

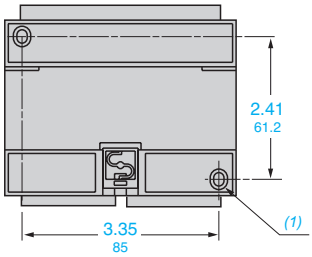
XPSLCM1150

Mounting on 35 mm rail



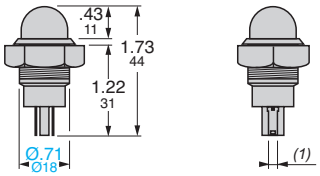


Rear view



(1) 2 elongated holes Ø 4 x 5.7

“Muting” indicator light kit XSZ CM01



(1) Faston connector 4.7.

Dual Dimensions: INCHES / Millimieters

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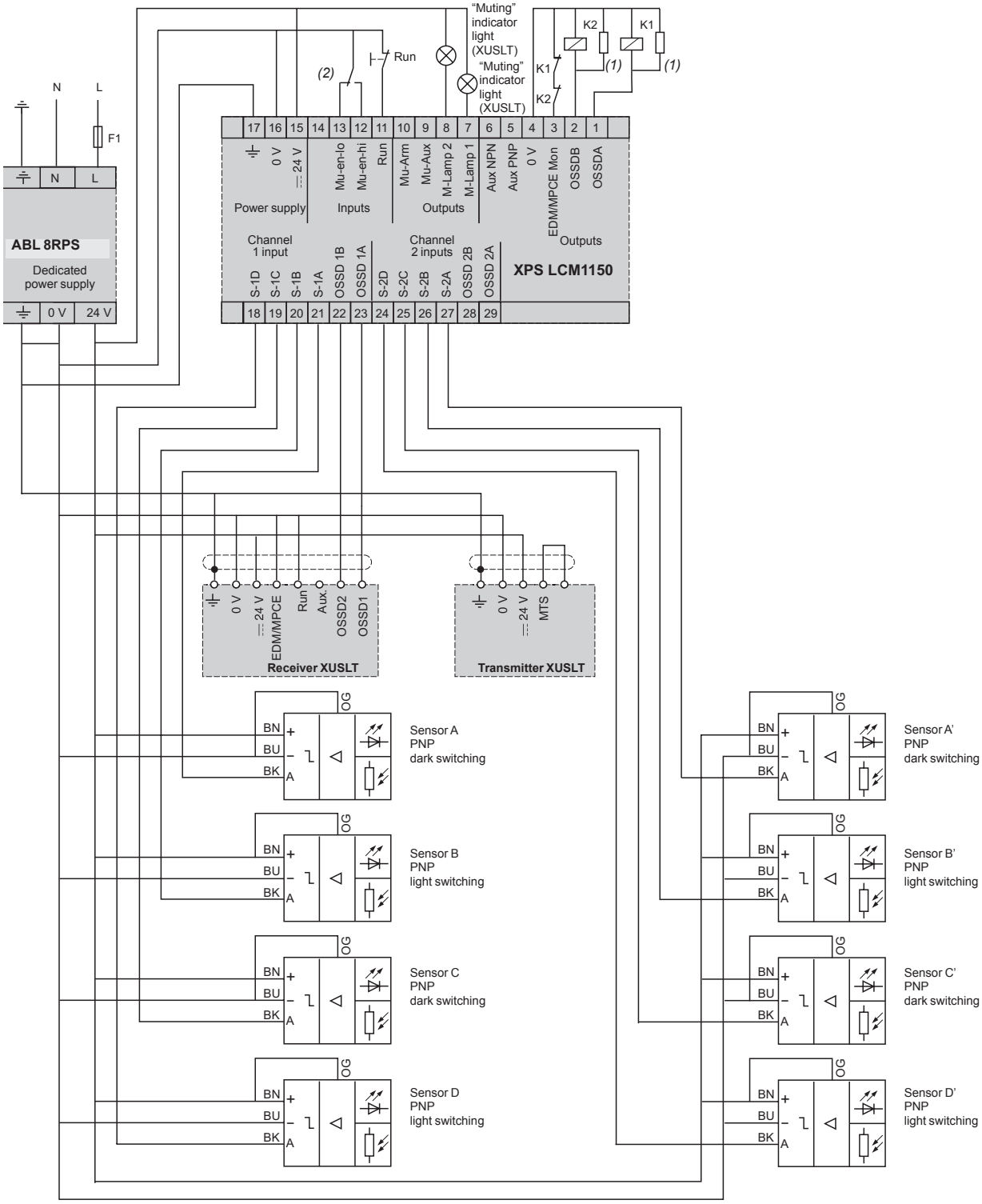
2

Connection via the safety monitoring module XPSLCM1150

Example: configuration with light curtains XUSLT



(1) Arc suppressor.
(2) Inhibition activation/deactivation key switch.

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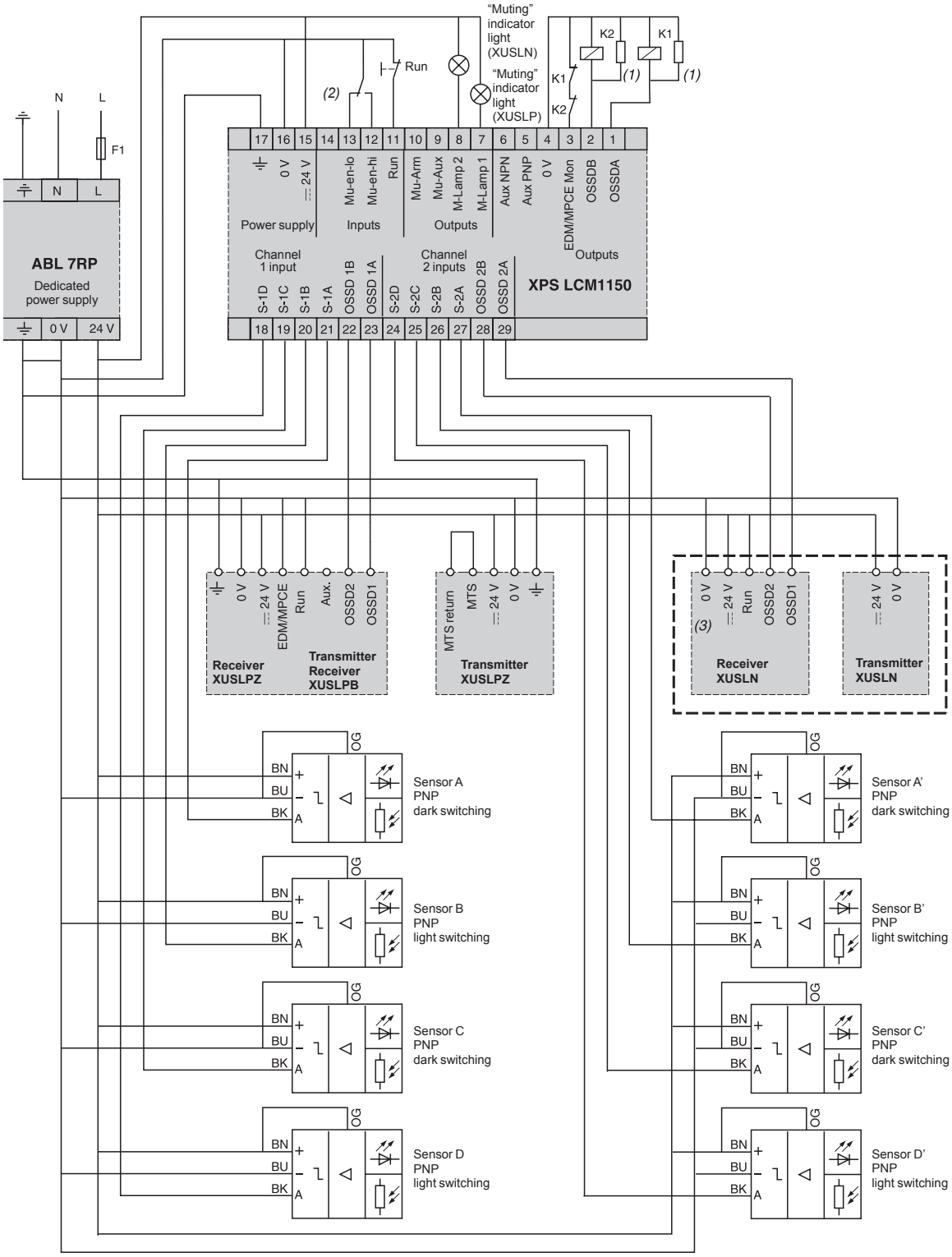
Safety automation system solutions

Safety monitoring module
Preventa™ XPSLCM
For the "muting" function of type 2
and type 4 light curtains

Connection via the safety monitoring module XPSLCM1150

Example: configuration with 2 light curtains XUSLP and XUSLN



(1) Arc suppressor.
(2) Inhibition activation/deactivation key switch.
(3) When module XPSLCM1150 is used with a type 2 light curtain (example: XUSLN), the entire protection system is downgraded to category 2.

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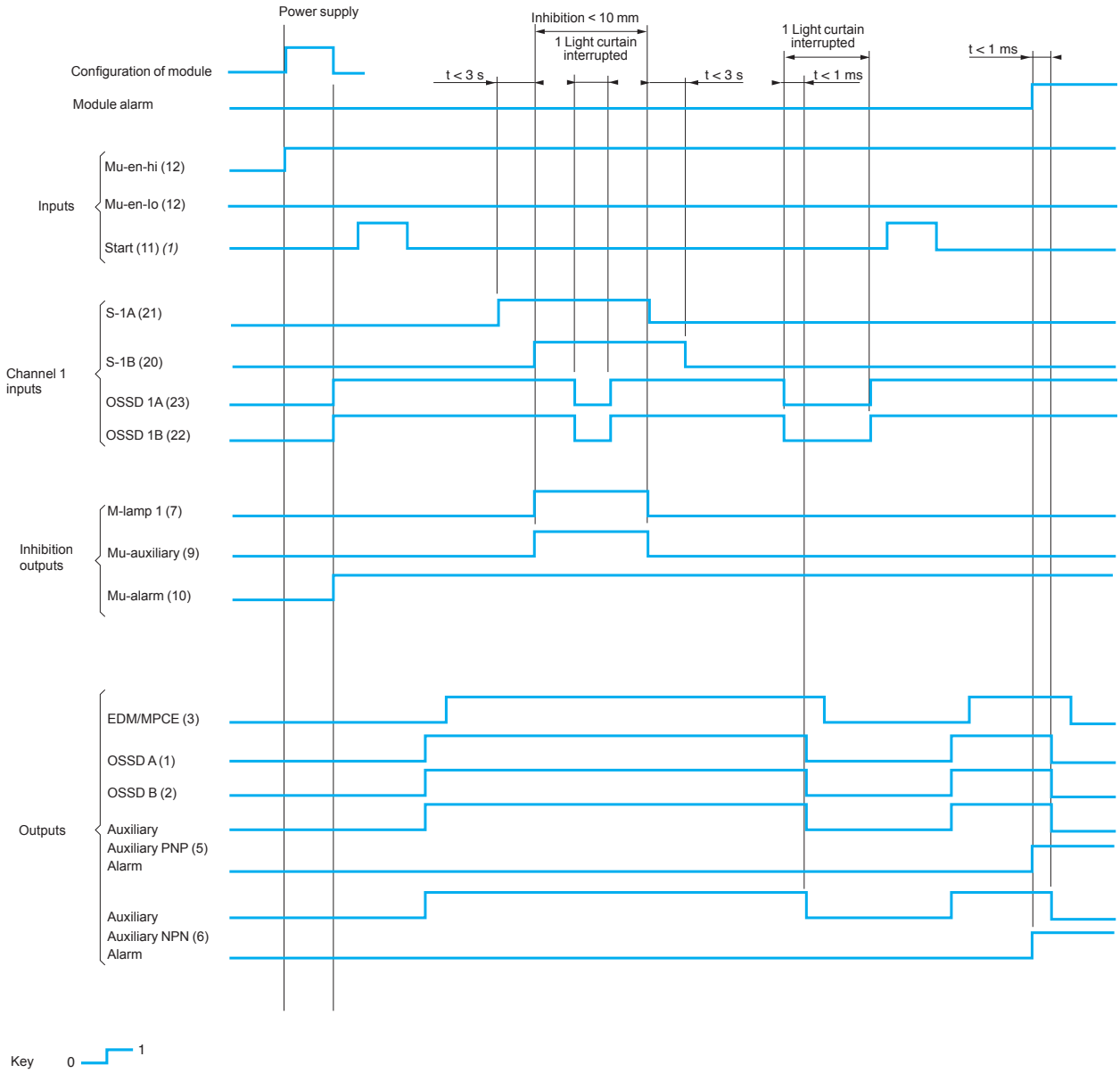
2

Functional diagram of safety monitoring module XPSLCM1150

"Start/restart interlock" mode with 2 sensors



(1) Press Start button.

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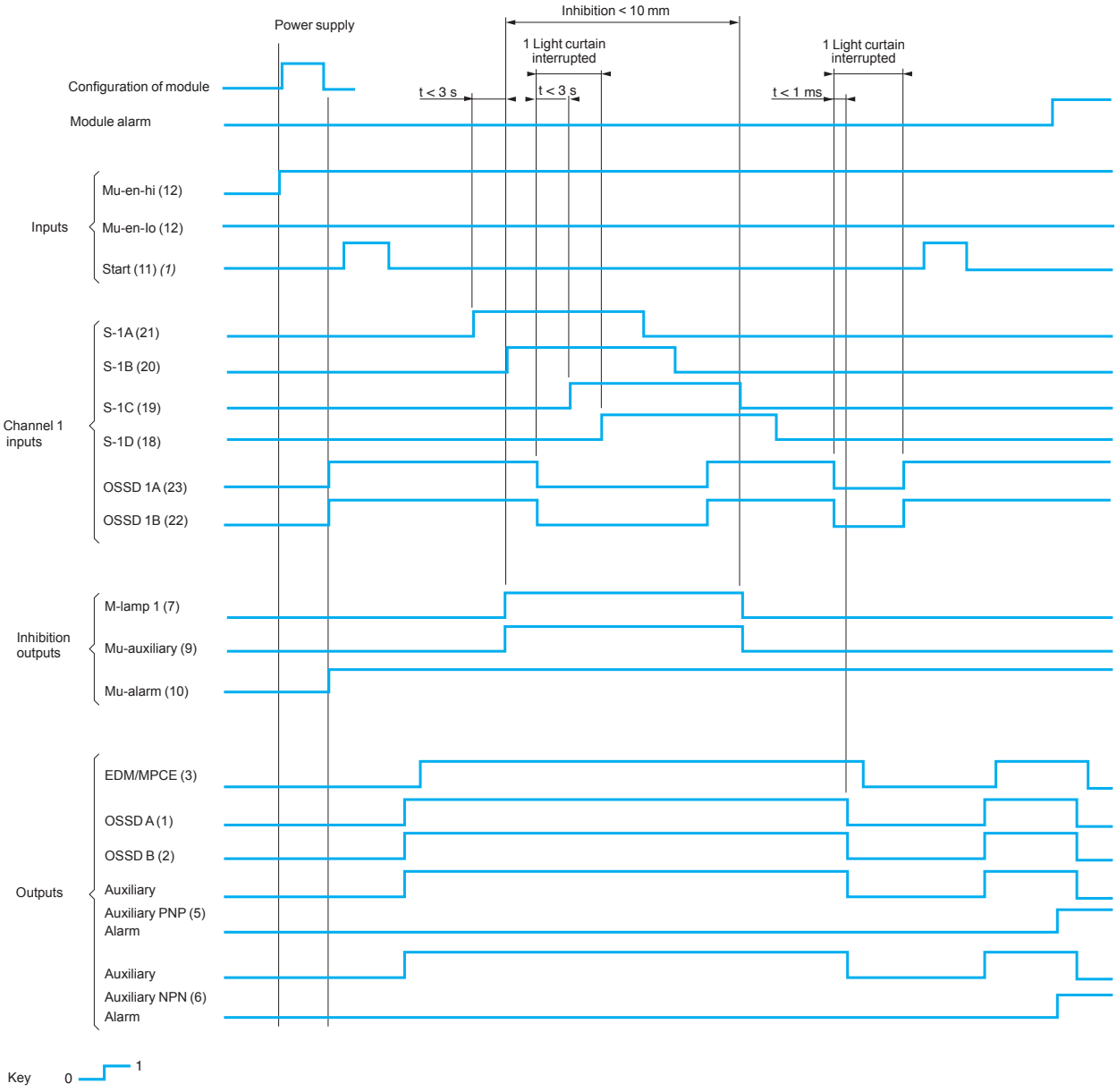
Functional diagram of safety monitoring module XPSLCM1150

"Start/restart interlock" mode with 4 sensors



(1) Press Start button.

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Safety automation system solutions

Preventa™ safety relay modules types XPSECM, XPSECP

For increasing the number of safety contacts

Operating principle

Safety modules XPSEC●, for increasing the number of safety contacts, are available as additions to Preventa™ XPS based modules (Emergency stop, limit switch, two-hand control, etc.).
They are used to increase the number of safety output contacts of the base modules.

Characteristics

Module type			XPSECM	XPSECP
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 4 max. (when connected to the appropriate module)	
Conformity to standards			EN 60204-1, EN/IEC 60947-5-1	
Product certifications			UL, CSA	
Supply	Voltage	**V**	∼ and ⎓ 24, ∼ 115, ∼ 230	
	Voltage limits		- 20…+ 10% (∼ 24 V), - 20…+ 20% (⎓ 24 V), - 15…+ 15% (∼ 115 V), - 15…+ 10% (∼ 230 V)	
	Frequency	**Hz**	50/60	
Power consumption	24 V	**VA**	< 5	
	115 V/230 V	**VA**	< 6	
Module inputs fuse protection			Internal, electronic	
Outputs	Voltage reference		Relay hard contacts	
	Number and type of safety circuits		4 N.O. (13-14, 23-24, 33-34, 43-44)	8 N.O. (13-14, 23-24, 33-34, 43-44, 53-54, 63-64, 73-74, 83-84)
	Number and type of additional circuits		1 N.C. (41-42) + 1 solid-state	1 N.C. (91-92) + 1 solid-state
	Breaking capacity in AC-15	**VA**	B300: inrush 3600, maintained 360	
	Breaking capacity in DC-13		24 V/1.5 A - L/R = 50 ms	
	Breaking capacity of solid-state outputs		24 V/20 mA, 48 V/10 mA	
	Max. thermal current (Ithe)	**A**	6	
	Max. total thermal current	**A**	24	30
	Output fuse protection	**A**	6 gG	
	Minimum current (relay hard contact)	**mA**	10 (conforming to EN/IEC 60947-5-1, VDE 0660 part 200)	
	Minimum voltage (relay hard contact)	**V**	17	
Electrical life			See page 2/172	
Response time on input opening		**ms**	< 20	
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN//IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-1, DIN VDE 0110 parts 1 & 2)	
LED display			3	
Operating temperature		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)	
Storage temperature		**°F (°C)**	- 13…+ 185 (- 25…+ 85)	
Degree of protection conforming to IEC 60529	Terminals		IP 20	
	Enclosure		IP 40	
Connection	Type		Captive screw clamp terminals: without cable end 1 x 12 AWG (1 x 4 mm²), with cable end 2 x 14 AWG (2 x 2.5 mm²)	

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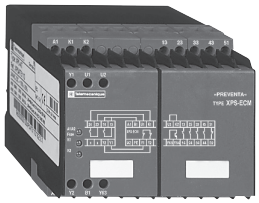
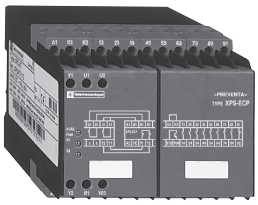
Safety automation system solutions

Preventa™ safety relay modules types XPSECM, XPSECP

For increasing the number of safety contacts



XPSECM



XPSECP

References

Description	Number of safety circuits	Additional outputs	Solid-state outputs for PLC	Supply	Reference	Weight oz (kg)
Safety modules for increasing the number of safety contacts, for use with XPS based modules	4	1	1	∼ and ⎓ 24 V	**XPSECM5131**	19.401 (0.550)
				∼ 115 V	**XPSECM3431**	22.928 (0.650)
				∼ 230 V	**XPSECM3731**	22.928 (0.650)
	8	1	1	∼ and ⎓ 24 V	**XPSECP5131**	19.401 (0.550)
				∼ 115 V	**XPSECP3431**	22.928 (0.650)
				∼ 230 V	**XPSECP3731**	22.928 (0.650)

2

Principle: page 2/226
Characteristics: page 2/226
References: page 2/227
Wiring Diagrams: page 2/228
Dimensions: page 2/260

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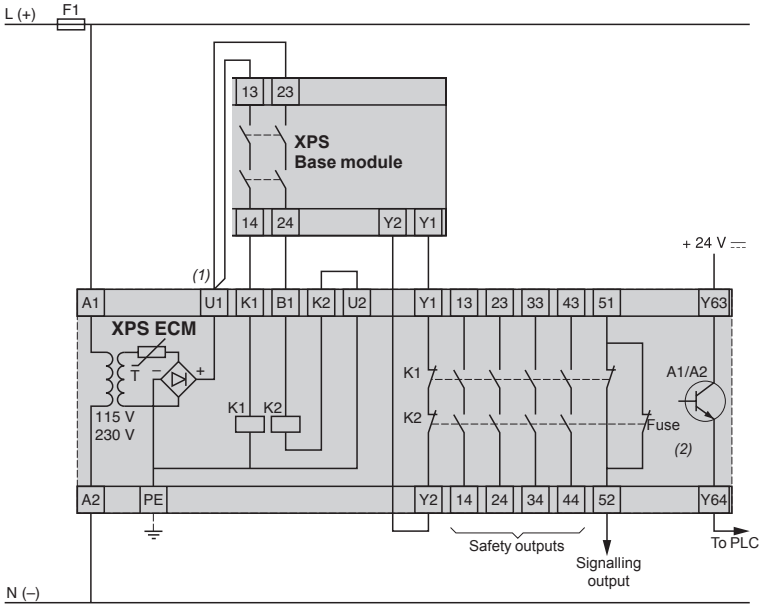
2

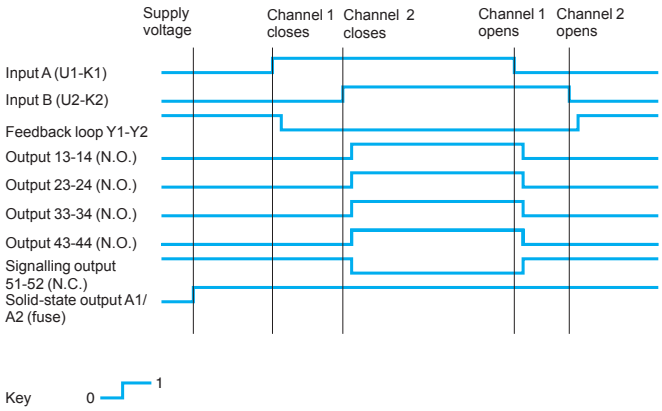
XPSECM

Wiring diagram



(1) When installing base modules and modules for increasing the number of safety contacts into different electrical enclosures, run separate cables for terminals U1-13 and U1-23.
(2) Operating status of internal electronic fuse.

Functional diagram



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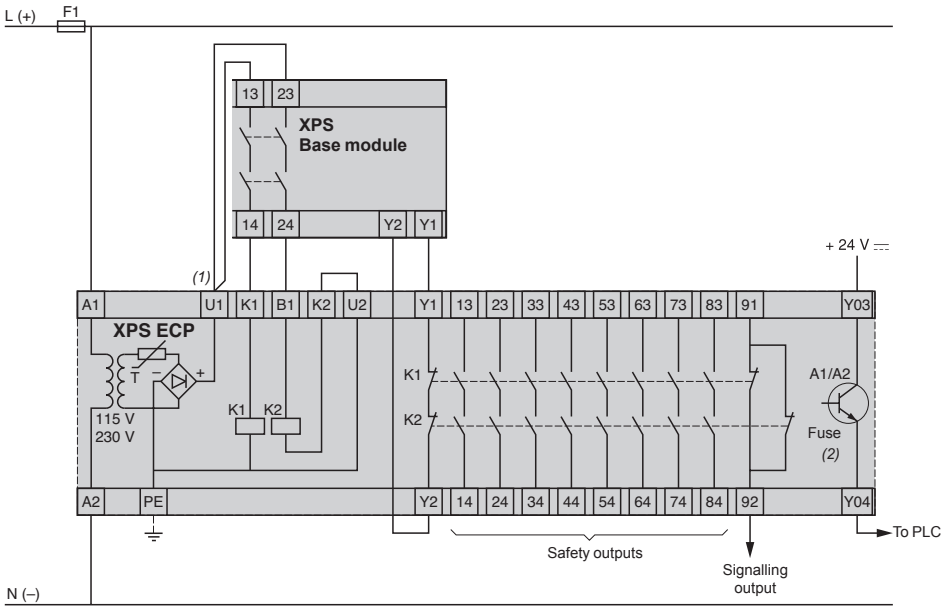
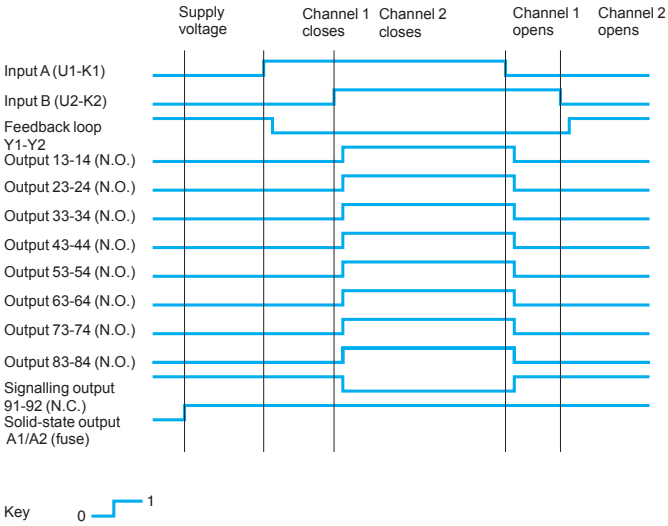
XPSECP

Wiring diagram



(1) When installing base modules and modules for increasing the number of safety contacts into different electrical enclosures, run separate cables for terminals U1-13 and U1-23.
(2) Operating status of internal electronic fuse.

Functional diagram



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Safety automation system solutions

Preventa™ safety relay modules types XPSTSA, XPSTSW

For safety time delays

Operating principle

Safety modules XPSTSA and XPSTSW are used in applications requiring safety time delays:
■ modules XPSTSA in applications with interlocking on high inertia machines with long rundown time (guards unlocked after safety time delay has elapsed),
■ modules XPSTSW in applications with a safety switchover contact (jumpering contact in association with XPSVN modules for zero speed detection, solenoid valve monitoring, etc.).
The time delay of safety circuits can be set to 16 preset values, using 2 selectors located on the front cover of the modules.

To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status and 2 solid-state outputs for signalling to the process PLC.

In addition, their removable terminal blocks optimize machine maintenance.

Characteristics

Module type				XPSTSA	XPSTSW
Product designed for max. use in safety related parts of control systems (conforming to EN 60954-1/ISO 13849-1)				Category 3 max.	
Conformity to standards				EN/IEC 60204-1, EN/IEC 60947-5-1	
Product certifications				UL, CSA, BG	
Supply	Voltage		V	∼ and ⎓ 24, ∼ 115, ∼ 230	
	Voltage limits			- 15…+ 15% (⎓ 24 V) - 20…+ 10% (∼ 24 V) - 15…+ 15% (115 V) - 15…+ 10% (230 V)	
	Frequency		Hz	50/60	
Power consumption	⎓ 24		VA	< 2.3	
	∼ 24 V			< 4.3	
	∼ 115			< 6.5	
	∼ 230 V			< 5.5	
Module inputs fuse protection				Internal, electronic	
Time delay			s	1…31 (16 positions)	–
Pulse time			s	–	0.1…3.1 (16 positions)
Outputs	Voltage reference			Relay hard contacts	
	Number and type of safety circuits			1 N.O. (17-18) + 2 N.C. (25-26, 35-36)	
	Number and type of additional circuits			2 solid-state (Y53-Y54, Y63-Y64)	
	Breaking capacity in AC-15		VA	C300: inrush 1800, maintained 180	
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms	
	Breaking capacity of solid-state outputs			24 V/20 mA, 48 V/10 mA	
	Max. thermal current (Ithe)		A	6	
	Output fuse protection		A	4 gG (gl) or 6 fast acting, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200	
	Minimum current		mA	10	
	Minimum voltage		V	17	
Electrical life				See page 2/172	
Rated insulation voltage (Ui)			V	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
Rated impulse withstand voltage (Uimp.)			kV	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)	
LED display				4	
Operating temperature			°F (°C)	+ 14…+ 131 (- 10…+ 55)	
Storage temperature			°F (°C)	- 13…+ 185 (- 25…+ 85)	
Degree of protection conforming to IEC 60529		Terminals		IP 20	
		Enclosure		IP 40	
Connection		Type		Captive screw clamp terminals, removable terminal block	
	1-wire connection	Without cable end		Solid or flexible cable: 24-14 AWG (0.2…2.5 mm²)	
		With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
		With cable end		With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
	2-wire connection	Without cable end		Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)	
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)	
		With cable end		Double, with bezel, flexible cable: 20-16 AWG (0.5…1.5 mm²)	

Principle: page 2/230 | Characteristics: page 2/230 | References: page 2/231 | Wiring Diagrams: page 2/231 | Dimensions: page 2/260

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Safety automation system solutions

Preventa™ safety relay modules types XPSTSA, XPSTSW

For safety time delays

References

560076

XPSTSA●●●●P

Description	Number of safety circuits	Number of additional outputs	Supply	Reference	Weight oz (kg)
Safety modules for applications with interlocking on high inertia machines	1 delayed	2 N.C. + 2 solid-state to PLC	∼ and ⎓ 24 V	**XPSTSA5142P**	8.818 (0.250)
			∼ 115 V	**XPSTSA3442P**	12.699 (0.360)
			∼ 230 V	**XPSTSA3742P**	12.699 (0.360)

560077

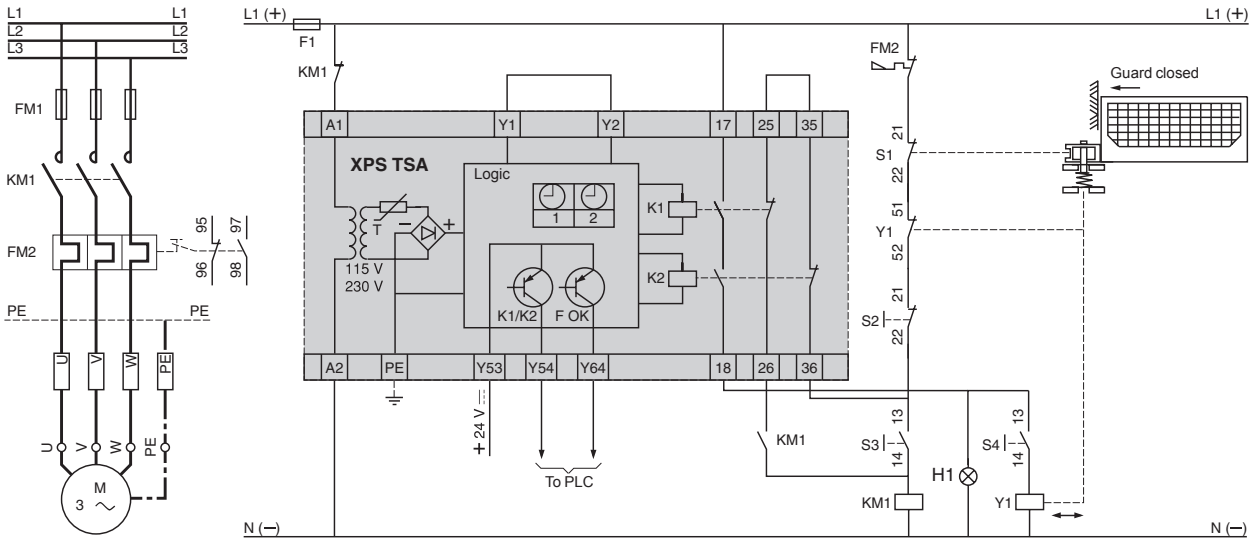
XPSTSW●●●●P

Description	Number of safety circuits	Number of additional outputs	Supply	Reference	Weight oz (kg)
Safety modules for applications with safety switchover contact	1 pulse type	2 N.C. + 2 solid-state to PLC	∼ and ⎓ 24 V	**XPSTSW5142P**	8.818 (0.250)
			∼ 115 V	**XPSTSW3442P**	12.699 (0.360)
			∼ 230 V	**XPSTSW3742P**	12.699 (0.360)

Wiring diagrams

XPSTSA

Delayed unlocking of a guard application



Contacts 95/96 and 97/98 are trip contacts for an overload relay.
S1 is one of the N.C. safety contacts in an XCSE switch
Y1 is the N.C. solenoid contact in the XCSE switch (wired in series with the S1)
S2 is the motor stop push button
S3 is the motor start push button, in parallel of KM1 contact
S4 is the push button to energize the XCSE solenoid to unlock the guard

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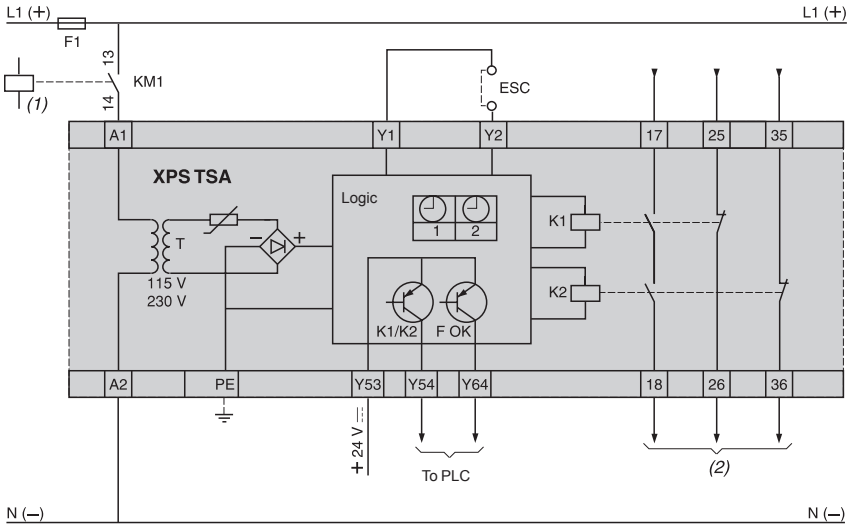
2

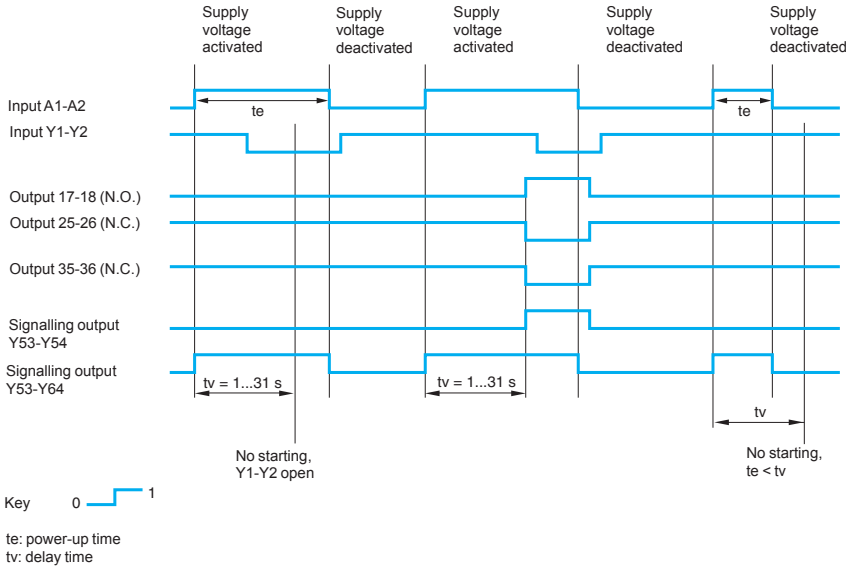
XPSTSA

Wiring diagram



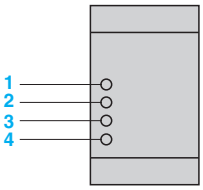
(1) Signal to be delayed.
(2) Relay hard contact outputs with on-delay.
ESC: External start conditions.

Functional diagram of module XPSTSA



te: power-up time
tv: delay time

LED details (XPSTSA, XPA TSW)



1 Supply voltage A1-A2 (fuse status).
2 Safety output closed.
3 Feedback loop Y1-Y2 status.
4 Time function active.

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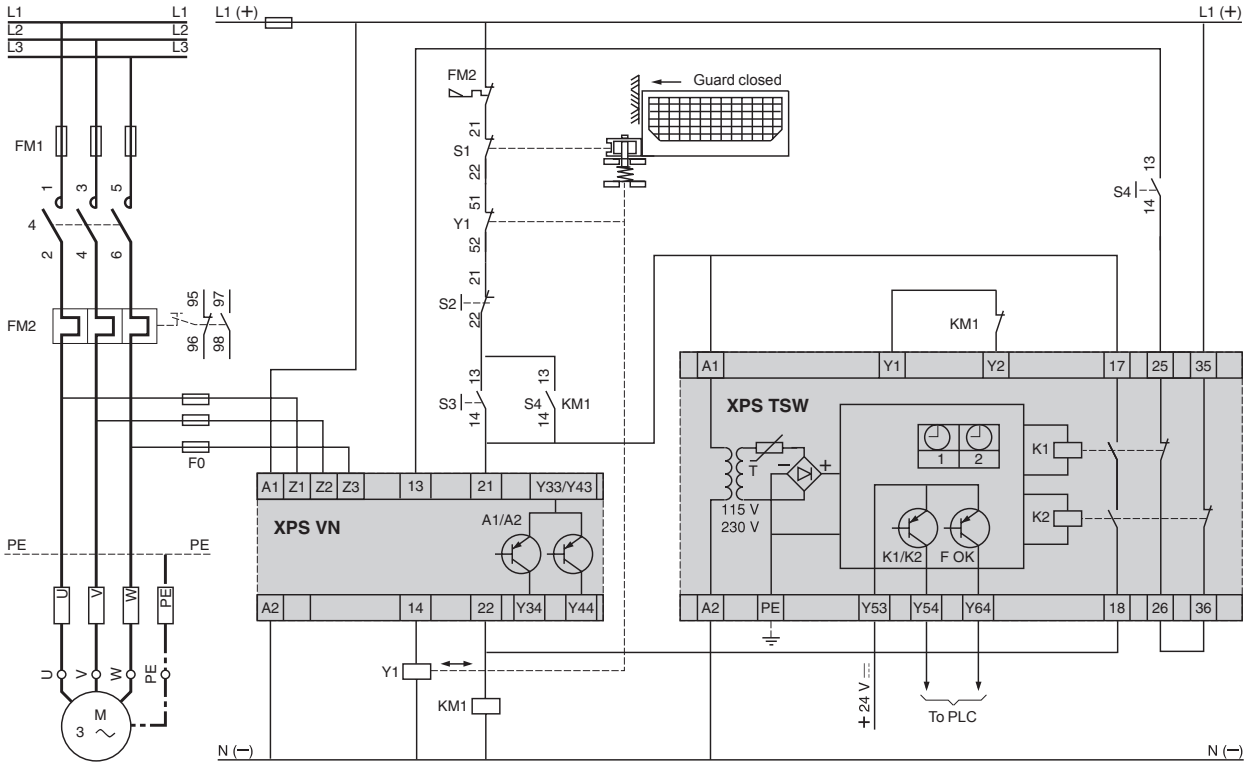
XPSTSW

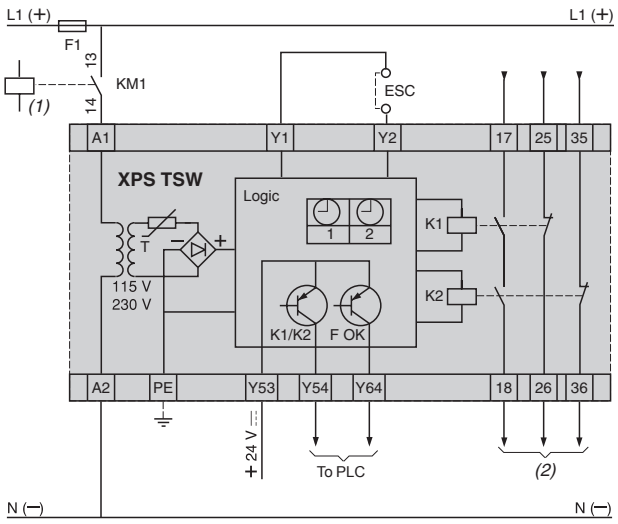
Guard unlocking application using zero speed detection



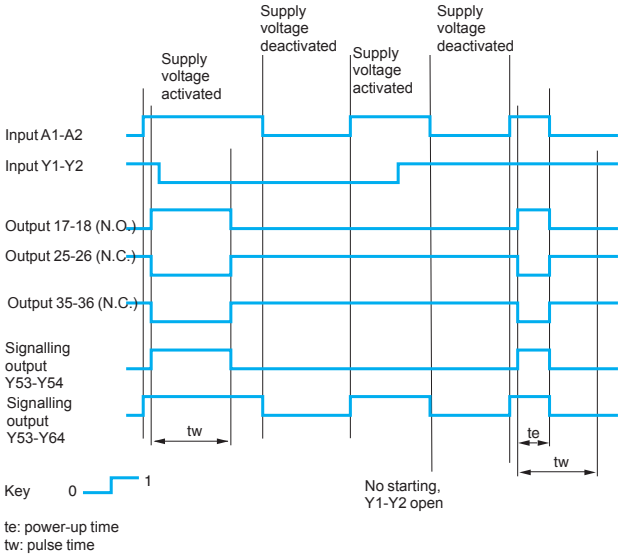
Contacts 95/96 and 97/98 are trip contacts for an overload relay.
S1 is one of the N.C. safety contacts in an XCSE switch
Y1 is the N.C. solenoid contact in the XCSE switch (wired in series with the S1)

S2 is the motor stop push button
S3 is the motor start push button, in parallel of KM1 contact
S4 is the push button to energize the XCSE solenoid to unlock the guard

Wiring diagram



Functional diagram of module XPSTSW



(1) Control signal.
(2) Relay hard contact outputs with pulse time delay.
ESC: External start conditions.
LED details: see page 2/232.

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Safety automation system solutions

Preventa™ safety relay modules types XPSDMB, XPSDME

For non-contact safety interlock (coded magnetic) switch monitoring

Operating principle

Safety modules XPSDMB and XPSDME are specifically designed for monitoring coded magnetic safety switches. They incorporate two safety outputs and two solid-state outputs for signalling to the process PLC.
Conforming to category 4 of EN 954-1/ISO 13849-1, modules XPSDMB can monitor two independent sensors and modules XPSDME can monitor up to six independent sensors.
To monitor a higher number of magnetic switches using these safety modules, the magnetic switches can be connected in series, while meeting the requirements of category 3 of EN 954-1/ISO 13849-1.

Safety modules XPSDM●●●●●P incorporate removable terminal blocks, thus optimizing machine maintenance.

To aid diagnostics, the modules have LEDs on the front cover which provide information on the monitoring circuit status.

Characteristics

Module type			XPSDMB1132	XPSDME1132	XPSDMB1132P	XPSDME1132P
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 4 max.			
Conformity to standards			EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-5-1, EN/IEC 60947-5-3, DIN V VDE 0801 (1990), DIN V VDE 0801 A1 (1994)			
Product certifications			UL, CSA, BIA			
Supply (Ue) conforming to IEC 38	Voltage	V	⎓ 24			
	Voltage limits ⎓ 24 V		- 20…+ 20%			
Power consumption		W	< 2.5	< 3.5	< 2.5	< 3.5
Module inputs fuse protection			Internal, electronic			
Maximum wiring resistance RL between the module and the coded magnetic switches		Ω	100			
Control unit voltage and current			28 V/8 mA			
Synchronization time between magnetic switch inputs		s	< 0.5			
Safety outputs	Voltage reference		Relay hard contacts			
	Number and type of safety circuits		2 N.O.			
	Number and type of solid-state outputs		2			
	Breaking capacity in AC-15	VA	C300: inrush 1800, sealed: 180			
	Breaking capacity in DC-13		24 V/1.5 A, L/R = 50 ms			
	Max. thermal current (Ithe)	A	6			
	Max. total thermal current	A	12			
	Output fuse protection	A	4 gG or 6 fast acting			
	Minimum current	mA	10			
	Minimum voltage	V	17			
Electrical life			See page 2/172			
Response time on input opening		ms	< 20			
Rated insulation voltage (Ui)		V	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)			
Rated impulse withstand voltage (Uimp.)		kV	4 (overvoltage category III, conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)			
LED display			3	15	3	15
Ambient air temperature		°F (°C)	For operation: + 14…+ 131 (- 10…+ 55), for storage: - 13…+ 185 (- 25…+ 85)			
Degree of protection conforming to IEC 60529			Terminals: IP 20, enclosure: IP 40			
Connection	Type		Captive screw clamp terminals		Captive screw clamp terminals, removable terminal block	
	1-wire connection Without cable end		Solid or flexible cable: 26-14 AWG (0.14… 2.5 mm²)		Solid or flexible cable: 24-14 AWG (0.2…2.5 mm²)	
	With cable end		Without bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)			
	With cable end		With bezel, flexible cable: 24-16 AWG (0.25…1.5 mm²)		With bezel, flexible cable: 24-14 AWG (0.25…2.5 mm²)	
	2-wire connection Without cable end		Solid or flexible cable: 26-18 AWG (0.14…0.75 mm²)		Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)	
	With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)			
	With cable end		With bezel, flexible cable: 20-16 AWG (0.5… 1.5 mm²)			

Principle: page 2/234 | Characteristics: page 2/234 | References: page 2/235 | Wiring Diagrams: page 2/236 | Dimensions: page 2/260

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Safety automation system solutions

Preventa™ safety relay modules types XPSDMB, XPSDME

For non-contact safety interlock (coded magnetic) switch monitoring

XPSDMB1132●

XPSDME1132

References

Description	Type of terminal block connection	Number of safety circuits	Solid-state outputs for PLC	Supply V	Reference	Weight oz (kg)
Safety module for monitoring 2 coded magnetic switches	Integrated in module	2 N.O.	2	⎓ 24	**XPSDMB1132**	8.818 (0.250)
Safety module for monitoring 6 coded magnetic switches	Integrated in module	2 N.O.	2	⎓ 24	**XPSDME1132**	10.582 (0.300)
Safety module for monitoring 2 coded magnetic switches	Removable from module	2 N.O.	2	⎓ 24	**XPSDMB1132P**	8.818 (0.250)
Safety module for monitoring 6 coded magnetic switches	Removable from module	2 N.O.	2	⎓ 24	**XPSDME1132P**	10.582 (0.300)

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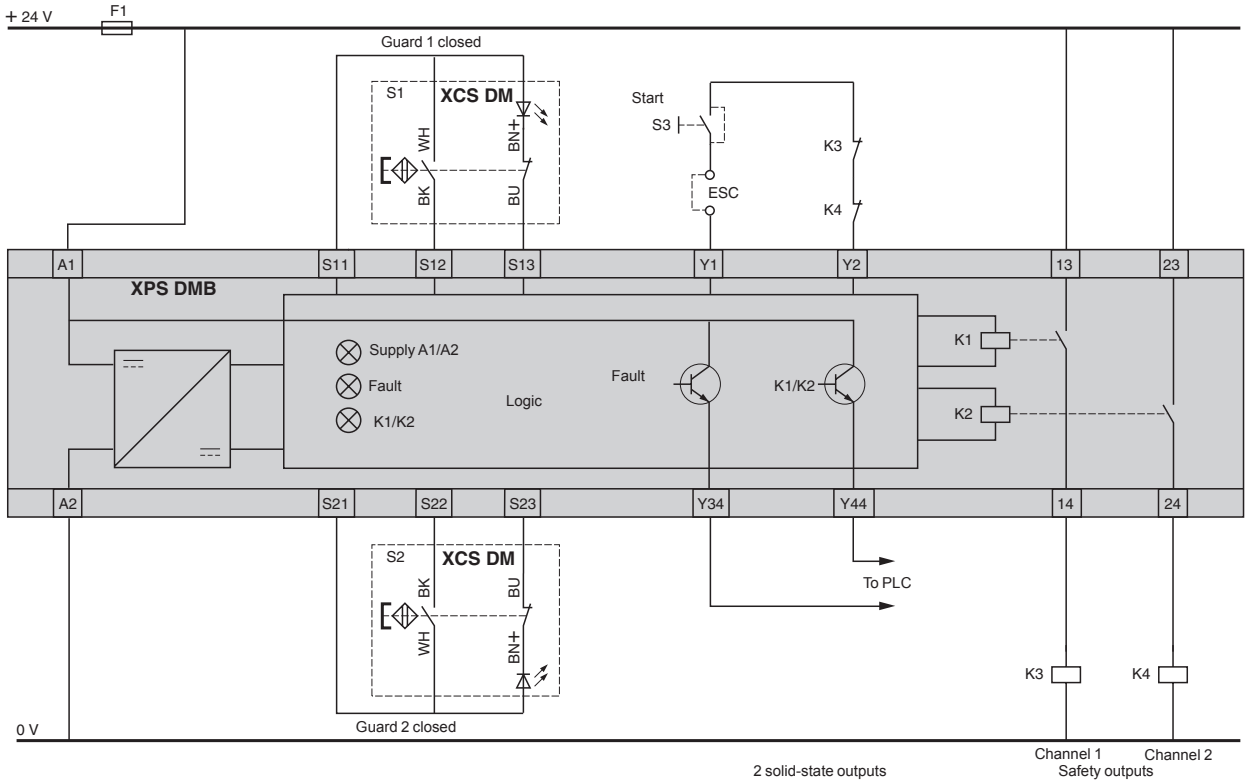
2

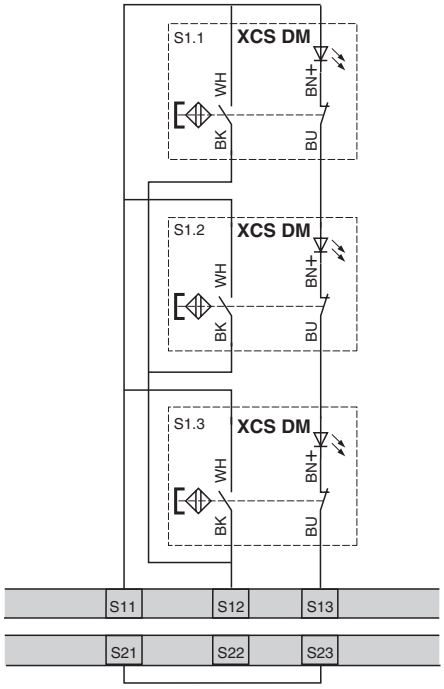
XPSDMB

Wiring to category 4 conforming to EN 954-1/ISO 13849-1. Example with 2-pole N.C. + N.O. (N.C. staggered) contact.
For example with 3-pole N.C. + N.C. + N.O. contact see page 3/58



ESC: External start conditions.

Wiring to category 3 conforming to EN 954-1/ISO 13849-1. Example with 3 switches with 2-pole N.C. + N.O. (N.C. staggered) contacts.



Input: S11, S12, S13 or S21, S22, S23.
Unused inputs must be jumpered: i.e.: if only input S11, S12, S13 is used, then terminals S21 and S23 must be jumpered.
The order in which the inputs are wired or jumpered will not affect operation.

Principle: page 2/234 | Characteristics: page 2/234 | References: page 2/235 | Wiring Diagrams: page 2/236 | Dimensions: page 2/260

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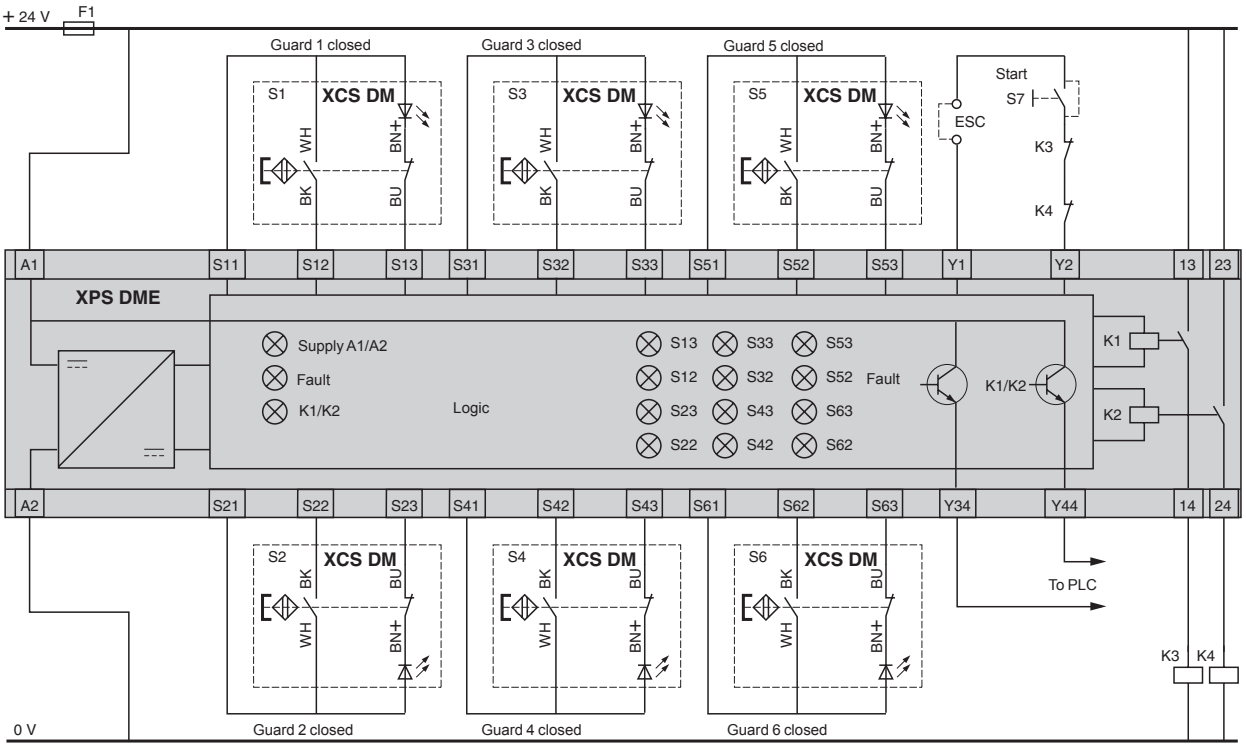
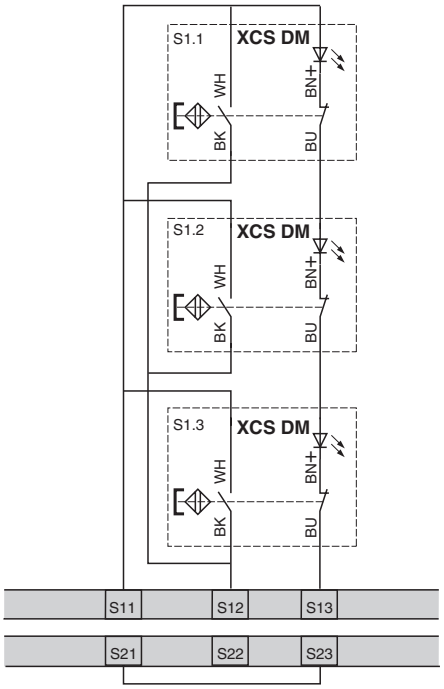
XPSDME

Wiring to category 4 conforming to EN 954-1/ISO 13849-1. Example with 2-pole N.C. + N.O. (N.C. staggered) contact



ESC: External start conditions.

Wiring to category 3 conforming to EN 954-1/ISO 13849-1. Example with 3 switches with 2-pole N.C. + N.O. (N.C. staggered) contacts.



Input: S11, S12, S13 or S21, S22, S23 or S31, S32, S33 or S41, S42, S43 or S51, S52, S53 or S61, S62, S63.
Unused inputs must be jumpered i.e.: if input S61, S62, S63 is not used, then terminals S61 and S63 must be jumpered.
Terminals to be jumpered if the input is not used are: S11 and S13, S21 and S23, S31 and S33, S41 and S43, S51 and S53, S61 and S63.

The order in which the inputs are wired will not affect device operation.

Principle: page 2/234 | Characteristics: page 2/234 | References: page 2/235 | Wiring Diagrams: page 2/236 | Dimensions: page 2/260

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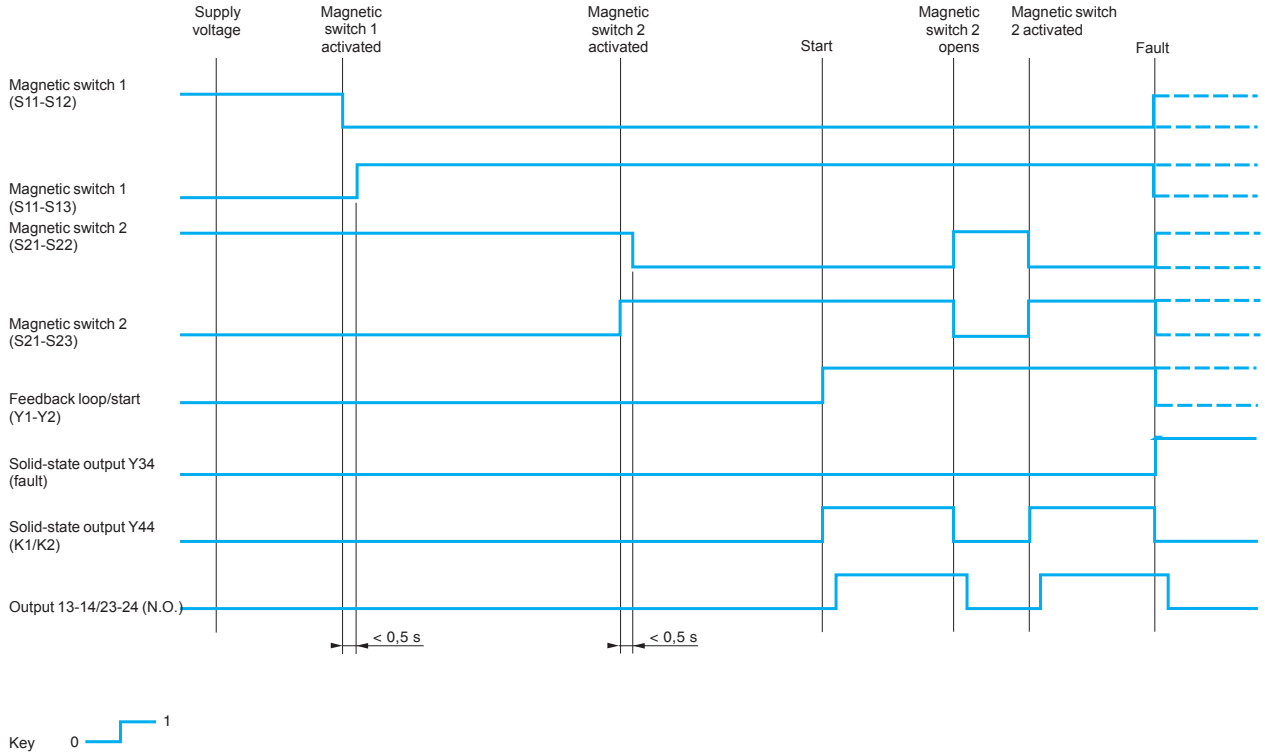
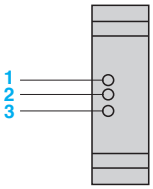
2

XPSDMB

Functional diagram



LED details



1 Supply voltage A1-A2, internal electronic fuse status.
2 Fault signalling.
3 Safety outputs closed.

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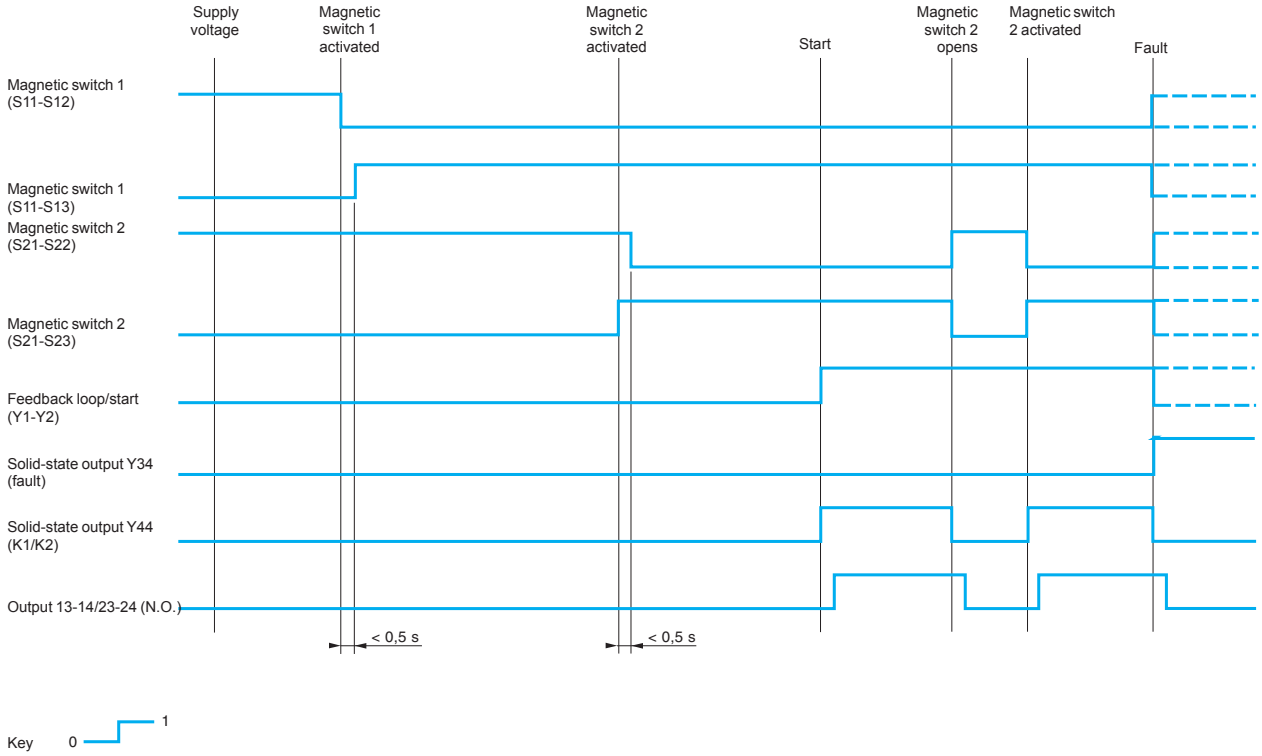
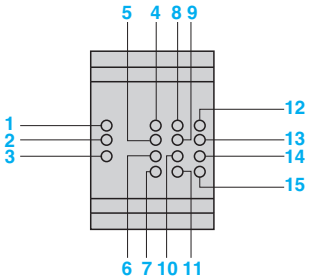
XPSDME

Functional diagram



LED details



1 Supply voltage A1-A2, internal electronic fuse status.
2 Fault signalling.
3 Safety outputs closed.
4 Magnetic switch 1 activated.
5 Magnetic switch 1 deactivated.
6 Magnetic switch 2 activated.
7 Magnetic switch 2 deactivated.
8 Magnetic switch 3 activated.
9 Magnetic switch 3 deactivated.
10 Magnetic switch 4 activated.
11 Magnetic switch 4 deactivated.
12 Magnetic switch 5 activated.
13 Magnetic switch 5 deactivated.
14 Magnetic switch 6 activated.
15 Magnetic switch 6 deactivated.

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2

Operating principle

Preventa™ safety relay modules type XPSVNE for zero speed detection are used to detect the stop condition of electric motors. Their most common applications include: providing the unlock signal for electrically interlocked sliding or removable machine guards, controlling rotation direction signals for reversing motors and engaging locking brakes after a motor has come to a standstill.

As electric motors run down, a remanent voltage is produced in the windings of the motor due to residual magnetism. This voltage is proportional to the speed of the motor and, therefore, decreases as the motor comes to a standstill.
This remanent voltage is measured in a redundant manner so as to detect the stop condition of the motor. The cabling between the motor windings and the inputs of the XPSVNE module is also monitored to prevent a cabling breakage or anomaly being seen as a stopped motor.
A transformer should not be used to connect the motor to terminals Z1, Z2 and Z3 since there is no monitoring of the connection with the motor winding via the resistance monitoring.

Modules XPSVNE are suitable for detecting the stop condition of all types of a.c. or d.c. motor driven machines which, when the motor runs down, produce a remanent voltage in the windings due to residual magnetism. These machines can be controlled by electronic devices, such as variable speed drives or d.c. injection brakes.
The input filters for standard XPSVNE modules are designed for a frequency of up to 60 Hz.
For motors operating at a frequency higher than 60 Hz, which therefore produce a high frequency remanent voltage, special modules XPSVNE●●●●HS should be used.

The XPSVN is not compatible with Wound Rotor Motors. These motors are typically used in high HP (1000+) low speed applications, where the additional windings (required for these types of motors) pay for themselves. If power is removed from stator, but rotor is left energized, then transformer coupling between the two could create a small voltage across the stator. This could make the XPSVN think the motor is still turning, which means the safety outputs would never energize or change state. These motors do not have residual magnetism in the rotor that can act as a source of flux for generator effect, in which case the XPSVN may think the motor is at zero speed, and could energize the safety outputs while the motor is still running. Wound Rotor motors are not in common use today, and very rare.

The XPVN is not designed to detect locked rotor conditions. Here the motor still has voltage applied to it, but in essence has zero speed. Generally, a locked rotor condition is not a safe state for machinery nor the operators. The XPSVN will sense voltage applied to the windings, and will not indicate the motor's "apparent" zero speed. The outputs of the XPSVN will not change state, the gates or guards will not be unlocked, and operators will not be allowed access to the unsafe area.

Modules XPSVNE have 2 potentiometers mounted on the front cover of the module which allow independent adjustment of the switching threshold for each input circuit. This allows adjustment for different types of motors and application requirements.

To aid diagnostics, modules XPSVNE have 4 LEDs and 2 solid-state outputs to provide information on the status of the zero speed detection circuit.

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Safety automation system solutions

Preventa™ safety relay modules type XPSVNE

For zero speed detection

Characteristics

Module type				XPSVNE
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)				Category 3 max.
Conformity to standards				EN 60204-1, EN/IEC 60947-5-1, EN 50082-2
Product certifications				UL, CSA, BG
Supply	Voltage		**V**	⎓ 24 ∼ 115 ∼ 230
	Voltage limits			- 15…+ 10% (⎓ 24 V) - 15…+ 15% (∼ 115 V) - 15…+ 10% (∼ 230 V)
	Frequency		**Hz**	50/60 (115 V, 230 V)
Power consumption			**W**	≤ 3.5 (⎓ 24 V)
			VA	≤ 7.5 (∼115 V), ≤ 7 (∼ 230 V)
Frequency of motor power supply			**Hz**	≤ 60 Hz (XPSVN●●42), > 60 Hz (XPSVN●●42HS)
Inputs	Maximum voltage between terminals Z1 - Z2 - Z3		**V**	500 rms
	Detection threshold		**V**	0.01 - 0.1 (adjustable)
Outputs	Voltage reference			Hard contacts
	Number and type of safety circuits			1 N.O. (13-14), 1 N.C. (21-22)
	Number and type of additional circuits			2 solid-state
	Breaking capacity in AC-15			C300 (inrush: 1800 VA/maintained: 180 VA)
	Breaking capacity in DC-13			24 V/1.5 A - L/R = 50 ms (contact 13-14) 24 V/1.2 A - L/R = 50 ms (contact 21-22)
	Breaking capacity of solid-state outputs			24 V/20 mA, 48 V/10 mA
	Max. thermal current (Ithe)		**A**	2.5
	Output fuse protection		**A**	4 gG, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200
	Minimum current (volt-free contact)		**mA**	10
	Minimum voltage (volt-free contact)		**V**	17
Electrical life				See page 2
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp)			**kV**	4 (overvoltage category III, conforming to EN//IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
LED display				4
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
Storage temperature			**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection Conforming to IEC 60529		Terminals		IP 20
		Enclosure		IP 40
Connection		Type		Captive screw clamp terminals, removable terminal block
	1-wire connection	Without cable end		Solid or flexible cable: 24-14 AWG (0.2…2.5 mm²)
		With cable end		Without bezel, solid or flexible cable: 24-14 AWG (0.25…2.5 mm²)
				With bezel, solid or flexible cable: 24-14 AWG (0.25…2.5 mm²)
	2-wire connection	Without cable end		Solid cable: 24-18 AWG (0.2…1 mm²), flexible cable: 24-16 AWG (0.2…1.5 mm²)
		With cable end		Without bezel, flexible cable: 24-18 AWG (0.25…1 mm²)
				With bezel, flexible cable: 22-14 AWG (0.5…1.5 mm²)

References

XPSVNE

Description	Number of safety circuits	Solid-state outputs for PLC	Supply	Frequency of motor power supply	Reference	Weight oz (kg)
Safety modules for zero speed detection	2	2	⎓ 24 V	≤ 60 Hz	**XPSVNE1142P**	17.637 (0.500)
				> 60 Hz	**XPSVNE1142HSP**	17.637 (0.500)
			∼ 115 V	≤ 60 Hz	**XPSVNE3442P**	21.164 (0.600)
				> 60 Hz	**XPSVNE3442HSP**	21.164 (0.600)
			∼ 230 V	≤ 60 Hz	**XPSVNE3742P**	21.164 (0.600)
				> 60 Hz	**XPSVNE3742HSP**	21.164 (0.600)

Principle: page 2/240 | Characteristics: page 2/241 | References: page 2/241 | Wiring Diagrams: page 2/242 | Dimensions: page 2/260

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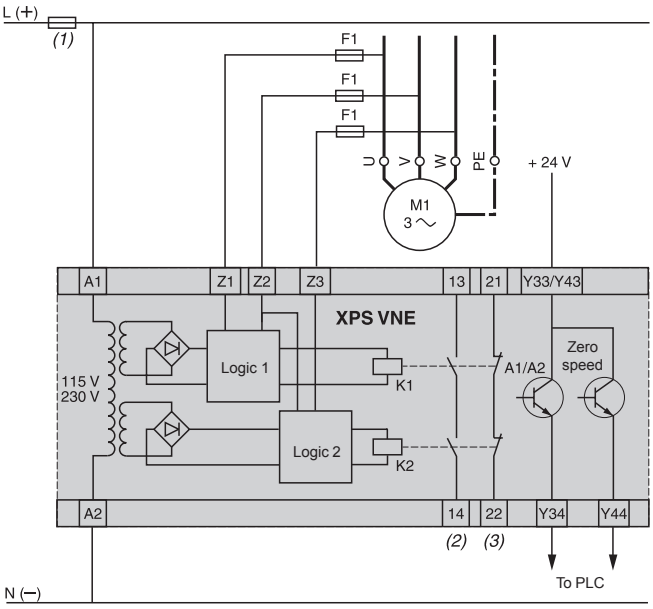
2

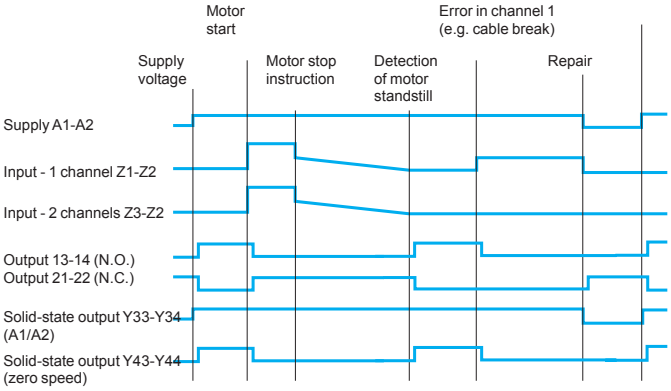
XPSVNE

Wiring diagram



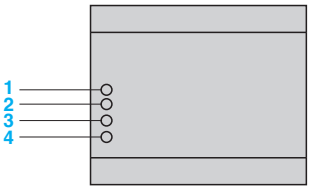
(1) Technical characteristics for establishing maximum rating of fuses, see page 12.
(2) Contacts are open when motor is running, closed when motor is stopped.
(3) Contacts are closed when motor is running, open when motor is stopped.
F1 = 2 A

Functional diagram of module XPSVNE



Key 0 1
The voltages at terminals Z1, Z2 and Z3 are indicated solely for the purposes of schematic diagram representation.

LED details



1 Supply voltage A1-A2.
2 Stop detected by channel 1.
3 Stop detected by channel 2.
4 Motor stop condition detected by both channels within time window.

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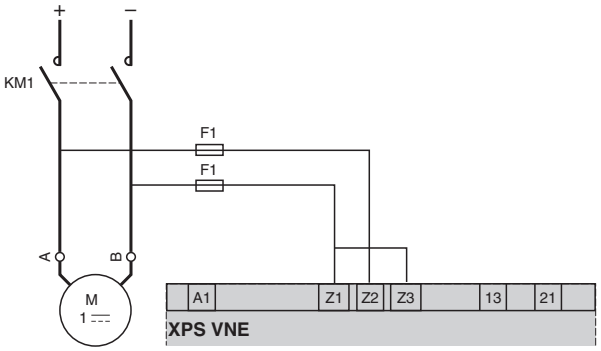
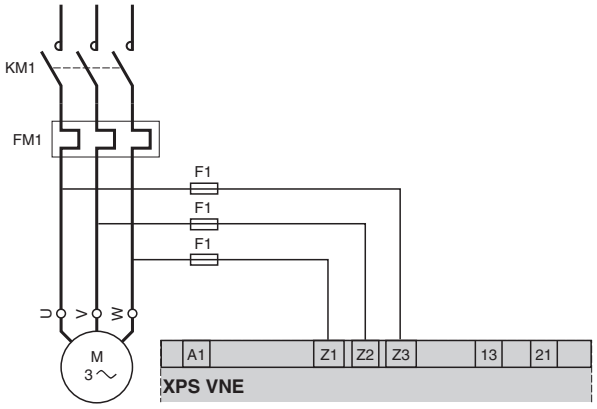
Module XPSVNE associated with a d.c. motor



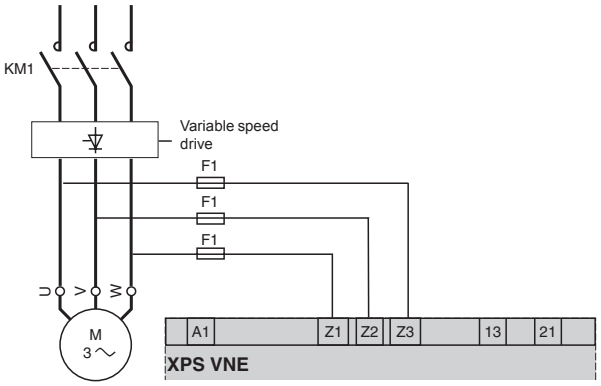
F1 = 2 A

Module XPSVNE associated with a 3-phase motor



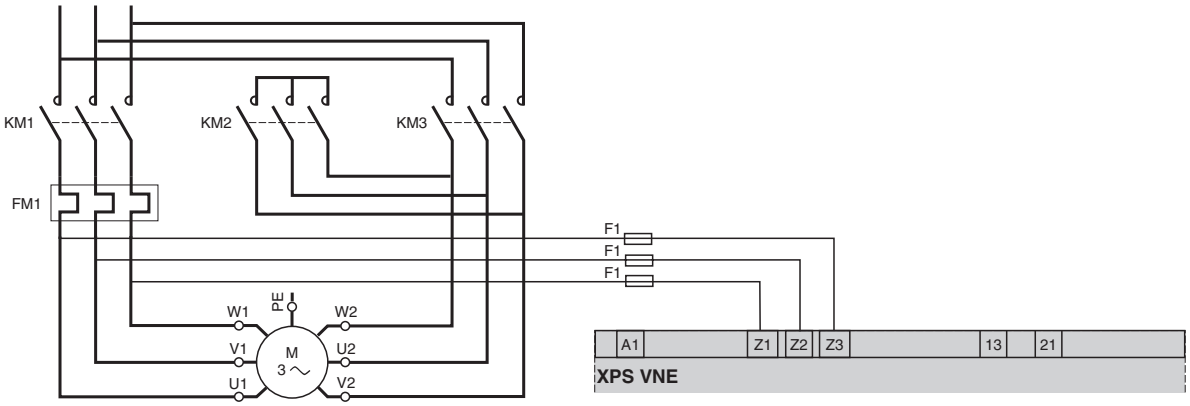
F1 = 2 A

Module XPSVNE associated with a 3-phase motor + variable speed drive



F1 = 2 A

Module XPSVNE associated with a 3-phase motor with start-delta starting



F1 = 2 A
KM1: Fast rotation speed
KM2: Slow rotation speed
KM3: Star
The “Star” contactor (KM3) must be closed after the motor is de-energized, in order to allow detection of zero speed.

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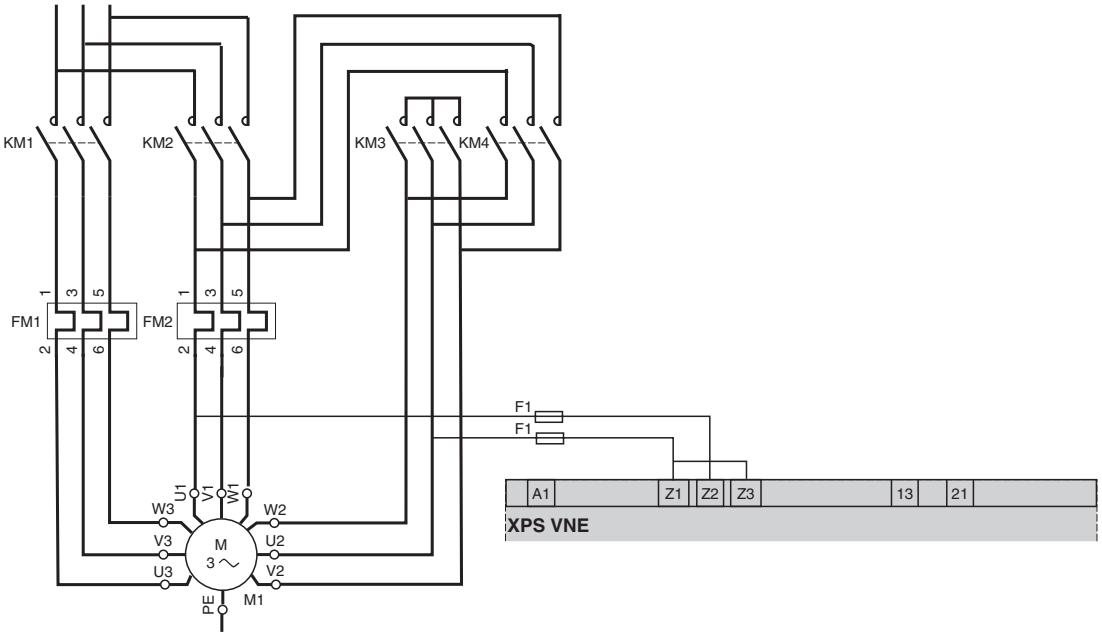
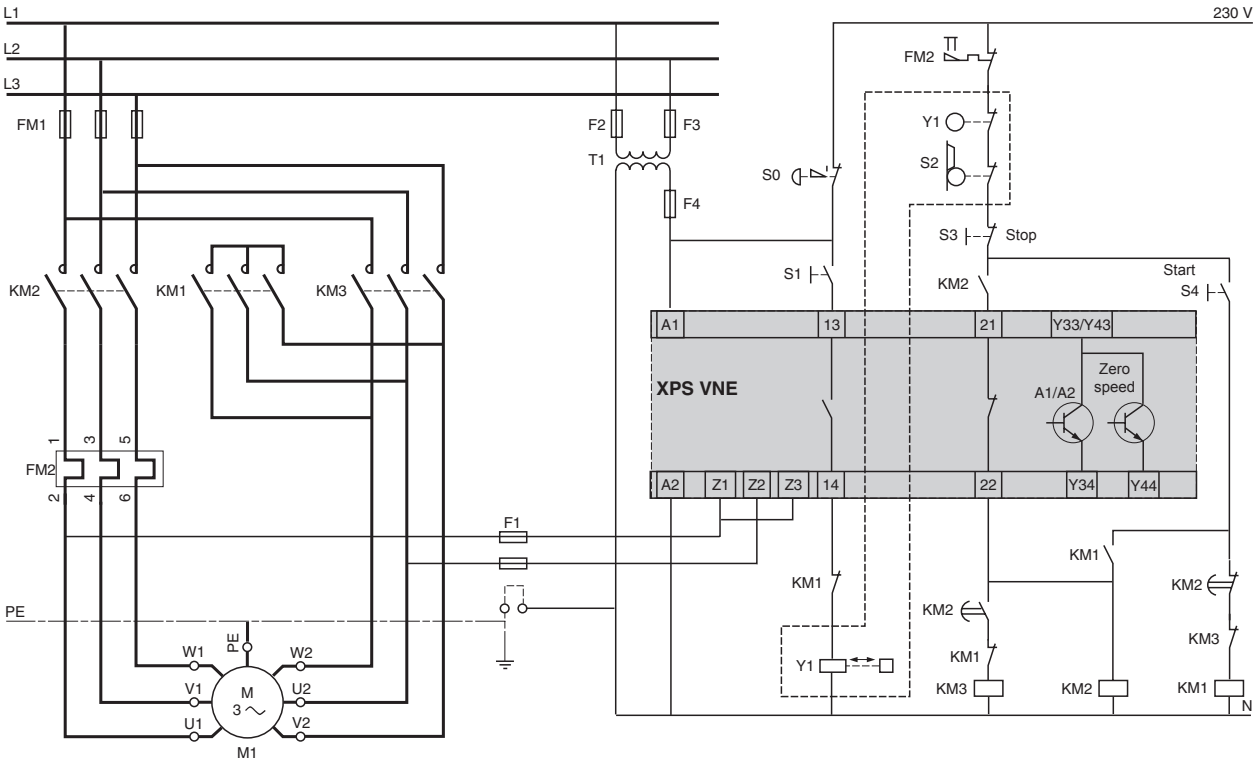
Module XPSVNE associated with a 3-phase motor with variable number of poles and star-delta starting



F1 = 2 A
KM1: Fast rotation speed
KM2: Slow rotation speed
KM3: Star
KM4: Delta

Module XPSVNE associated with a star-delta motor starter and guard switch type XCS E



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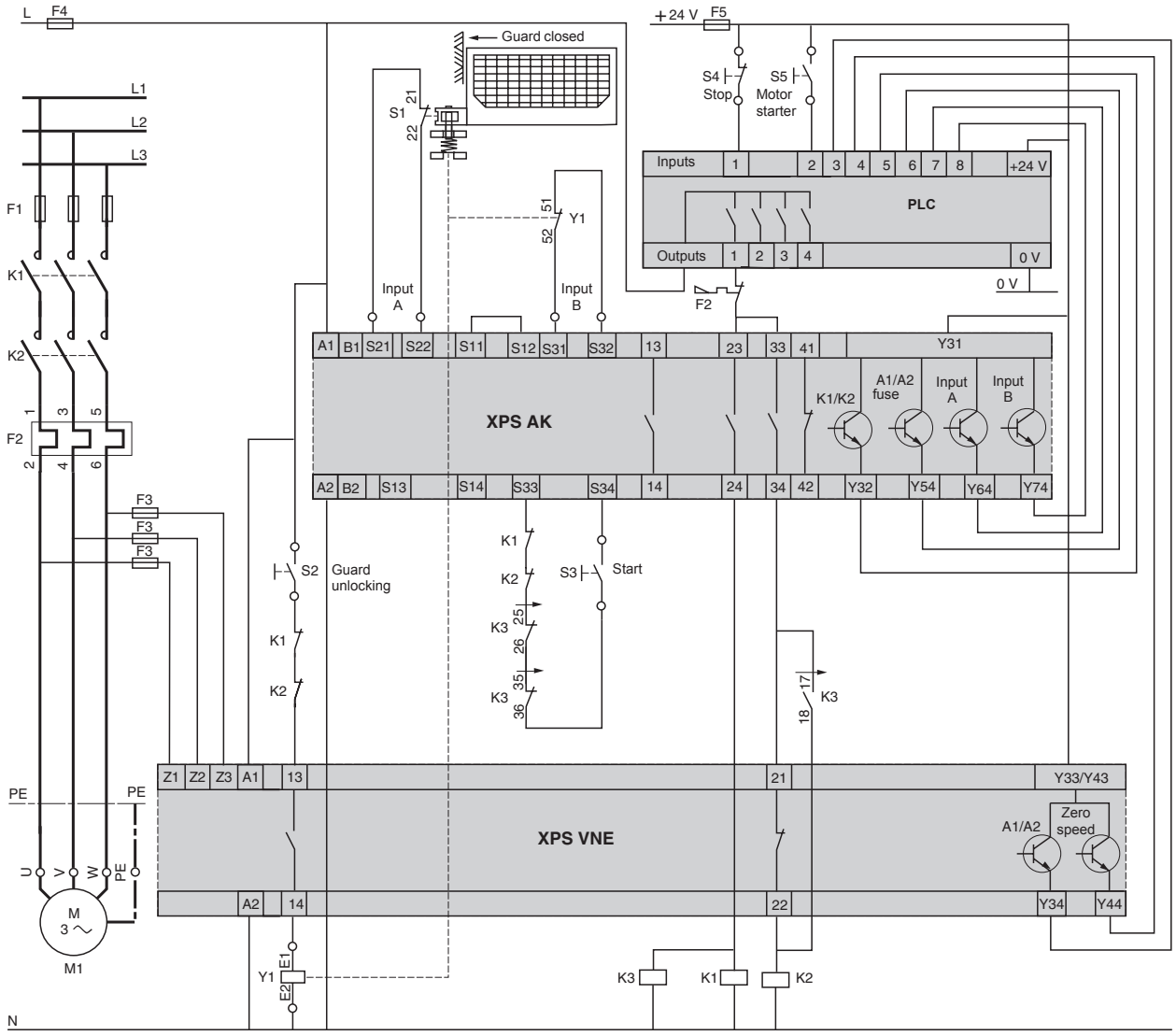
Association of safety modules XPSVNE and XPSAK



S1 + Y1: Guard switch with solenoid locking without power, type XCSE or XCSL

Pulse on de-energization relay XPSTSW

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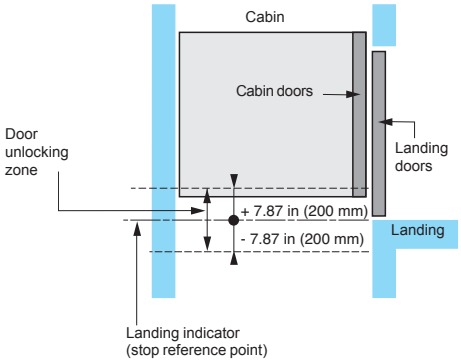
2

Operating principle



When the cabin is parked at a landing, with the doors open, some elevators automatically correct their level (isolevelling) in relation to the landing in order to compensate for any differences generated by changes in the load in the cabin. During this operation, European standard EN-81 recommends that the presence of the cabin be checked within a zone of +/- 7.87 in (200 mm) around the landing (door unlocking zone), by means of a safety circuit which will cause the cabin to stop if it moves out of the specified zone.

The use of a safety module XPSDA, which checks the presence of the cabin in the specified zone at two points, meets this requirement.
The module incorporates two safety outputs and two solid-state outputs for signalling functions. Four LEDs on the front cover of the module provide visual indication of the status of the safety circuit.
The position of the cabin in relation to the landing is detected by two limit switches in the elevator shaft. It is also possible to use non-contact sensors (magnetic sensors with reed contact).
When the cabin reaches the preset position and when it is within the permissible tolerances in relation to the landing, the two safety circuits in safety module XPSDA close and allow isolevelling of the cabin with the doors open. Any change in one of the input signals (cabin outside the specified zone) or detection of an anomaly (break in the wiring, short-circuit, etc.) causes immediate opening of the safety outputs in the XPSDA module and subsequent stopping of the cabin.

Characteristics

Module type			XPSDA
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 4 max.
Conformity to standards			EN 81-1, EN 81-2, EN/IEC 60947-5-1, EN 50082-2, EN 12015, EN 12016
Product certifications			UL, CSA, TÜV
Supply	Voltage	**V**	∿ and ⎓ 24, ∿ 115, ∿ 230
	Voltage limits		- 20…+ 10% (∿ 24 V), - 20…+ 20% (⎓ 24 V), - 15…+ 15% (∿ 115 V), - 15…+ 10% (∿ 230 V)
	Frequency	**Hz**	50/60
Maximum power consumption	24 V	**VA**	< 9
	115 V/230 V	**VA**	< 10
Module inputs fuse protection			Internal, electronic
Control unit voltage between S11-S12, S21-S22		**V**	24 (24 V version), 48 (115 V, 230 V versions)
Protection of the control unit contacts			By limitation of the maximum current in the event of short-circuit (< 185 mA)
Minimum voltage and current between terminals S11-S12, S21-S22 (inputs A and B)	U min./I min. - 24 V version 68 °F (20 °C)		16 V/70 mA
	U min./I min. - 115 V/230 V version 68 °F (20 °C)		41 V/25 mA
Calculation of wiring resistance RL between terminals S11-S12, S21-S22 as a function of the internal supply voltage U int (terminals S11-S21)		Ω	RL max. = (U int - U min.) / (I min.) Ue = true voltage applied to terminals A1-A2 U int = supply voltage Ue - 3 V (24 V version) U int between 42 V and 45 V, with typical value = 45 V (115 V, 230 V version) RL max. must not exceed 50 Ω
Synchronization time between inputs A and B, automatic start, linked terminals S33-S34 and Y3-Y4		**ms**	Approx. 300
Outputs	Voltage reference		Relay hard contacts
	Number and type of safety circuits		2 N.O. (13-14, 23-24)
	No. and type of additional circuits		2 solid-state
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180
	Breaking capacity in DC-13		24 V/1.5 A - L/R = 50 ms
	Breaking capacity of solid-state outputs		24 V/20 mA
	Max. thermal current (Ithe)	**A**	2.5
	Output fuse protection		6 A fast acting, 4 gG, conforming to EN/IEC 60947-5-1, DIN VDE 0660 part 200
	Minimum current (relay hard contact)	**mA**	10
	Minimum voltage (relay hard contact)	**V**	17
	Max. total thermal current		5
Electrical life			See page 2/172
Response time on input opening		**ms**	< 40
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-1, DIN VDE 0110 parts 1 & 2)
LED display			4
Operating temperature		**°F (°C)**	+ 14 …+ 149 (- 10…+ 65)
Storage temperature		**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection conforming to IEC 60529			Terminals: IP 20. Enclosure: IP 50
Connection	Type		Captive screw clamp terminals: without cable end 1 x 12 AWG (1 x 4 mm²), with cable end 2 x 14 AWG (2 x 2.5 mm²)

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Safety automation system solutions

Preventa™ safety relay modules type XPSDA

For elevator control

References

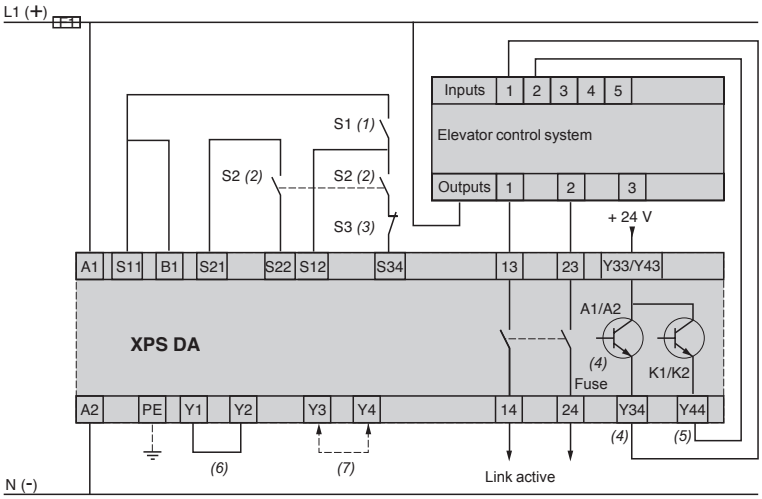
XPSDA

Description	Number of safety circuits	Solid-state outputs for PLC	Supply	Reference	Weight kg
Safety modules for elevator control	2	2	∼ and ⎓ 24 V	**XPSDA5142**	12.346 (0.350)
			∼ 115 V	**XPSDA3442**	15.874 (0.450)
			∼ 230 V	**XPSDA3742**	15.874 (0.450)

Wiring diagrams

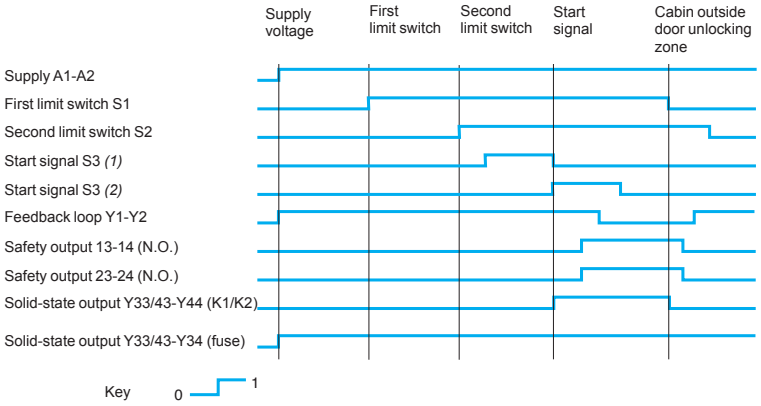
XPSDA

Module XPSDA associated with an elevator control system



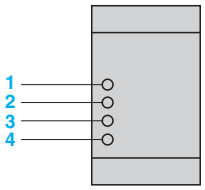
(1) Limit switch S1 (cabin position).
(2) Limit switch S2 (cabin position).
(3) Enable instruction given by the elevator control system.
(4) Operating status of internal electronic fuse.
(5) Output status (only permissible for functions not relating to safety).
(6) Feedback loop.
(7) Without start signalling monitoring (Y3-Y4 linked).

Functional diagram of module XPSDA



(1) With start signal monitoring, Y3-Y4 open.
(2) Without start signalling monitoring, Y3-Y4 jumpered.

LED details



1 Supply voltage A1-A2.
Fuse status.
2 Input S12 (A).
3 Input S22 (B).
4 K1/K2 status (N.O. safety outputs closed).

Principle: page 2/246
Characteristics: page 2/246
References: page 2/247
Wiring Diagrams: page 2/247
Dimensions: page 2/260

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Safety automation system solutions

Preventa™ safety relay modules type XPSPVT

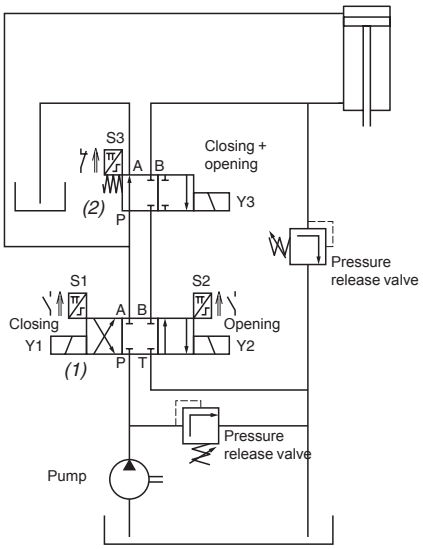
For dynamic monitoring of hydraulic valves on linear presses

Operating principle

Safety module XPSPVT is specifically designed for monitoring hydraulic safety system valves which control the movements of potentially hazardous machines. The operating principle of this module is explained in the circuit diagram of a hydraulic safety system for linear presses (see below).

This hydraulic safety system features a 3 position piston which controls the up and down stroke of the operating cylinder. The circuit is equipped with a safety valve, to complete the redundant system. This circuit must be activated to enable the up and down stroke of the cylinder.
If either of the 2 pistons becomes defective (for example, due to a broken spring or to oil contamination), and the valve piston shifts from its normal position towards the open position, the XPSPVT module will detect it and prevent resumption of the piston stroke.
Proximity sensors integrated in the valve to detect the piston positions and connected to the XPSPVT module must be damped when the valve coils are in the de-energized state (zero position).
The sensor circuits of the XPSPVT module are designed to allow connection of NPN and PNP proximity sensors or sensing components. Either 2-wire or 3-wire types can be used.
The wiring diagram on page 2/228 shows how to connect proximity sensors.

Hydraulic safety system circuit operating on a linear press.
Monitoring of valves in position 0.



(1) 3 position hydraulic valve.
(2) 2 position hydraulic valve.

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Safety automation system solutions

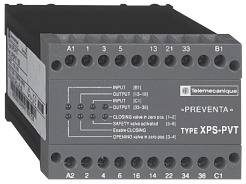
Preventa™ safety relay modules type XPSPVT

For dynamic monitoring of hydraulic valves on linear presses

Characteristics

Module type				XPSPVT
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)				Category 4 max.
Conformity to standards				EN 60204-1, EN/IEC 60947-5-1, EN 693, EN 50082-2
Product certifications				UL, CSA
Supply	Voltage		**V**	⎓ 24
	Voltage limits			- 10…+ 10%
Power consumption			**W**	< 6
Outputs	Voltage reference			Relay hard contacts
	Number and type of safety circuits			2 N.O. (13-14, 33-34) + 1 N.C. (21-22)
	Number and type of additional circuits			–
	Wiping time		**ms**	100 (minimum value)
	Breaking capacity	AC-15	**VA**	C300: inrush 1800, maintained 180
		DC-13	**VA**	24 V/1.5 A - L/R = 50 ms
	Max. thermal current (Ithe)		**A**	2.5
	Output fuse protection, using fuses conforming to EN/IEC 60947-5-1, VDE 0660 part 200		**A**	4 gG
	Minimum current		**mA**	10
	Minimum voltage		**V**	17
Electrical life				See page 2/172
Response time			**ms**	< 15
Rated insulation voltage (Ui)			**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp.)			**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-1, DIN VDE 0110 parts 1 & 2)
LED display				8
Operating temperature			**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
Storage temperature			**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection conforming to IEC 60529		Terminals		IP 20
		Enclosure		IP 40
Polycarbonate enclosure		Type		Removable
		Number of terminals		20
Connection		Type		Captive screw clamp terminals: without cable end 2 x 14 AWG (2 x 2.5 mm²), with cable end 2 x 16 AWG (2 x 1.5 mm²), min. Ø 0.5 mm

Reference



XPSPVT

Description	Display	Supply	Reference	Weight oz (kg)
Safety module for dynamic monitoring of hydraulic valves on linear presses	8 LEDs	⎓ 24 V	**XPSPVT1180**	19.048 (0.540)

Principle: page 2/248 | Characteristics: page 2/249 | References: page 2/249 | Wiring Diagrams: page 2/250 | Dimensions: page 2/260

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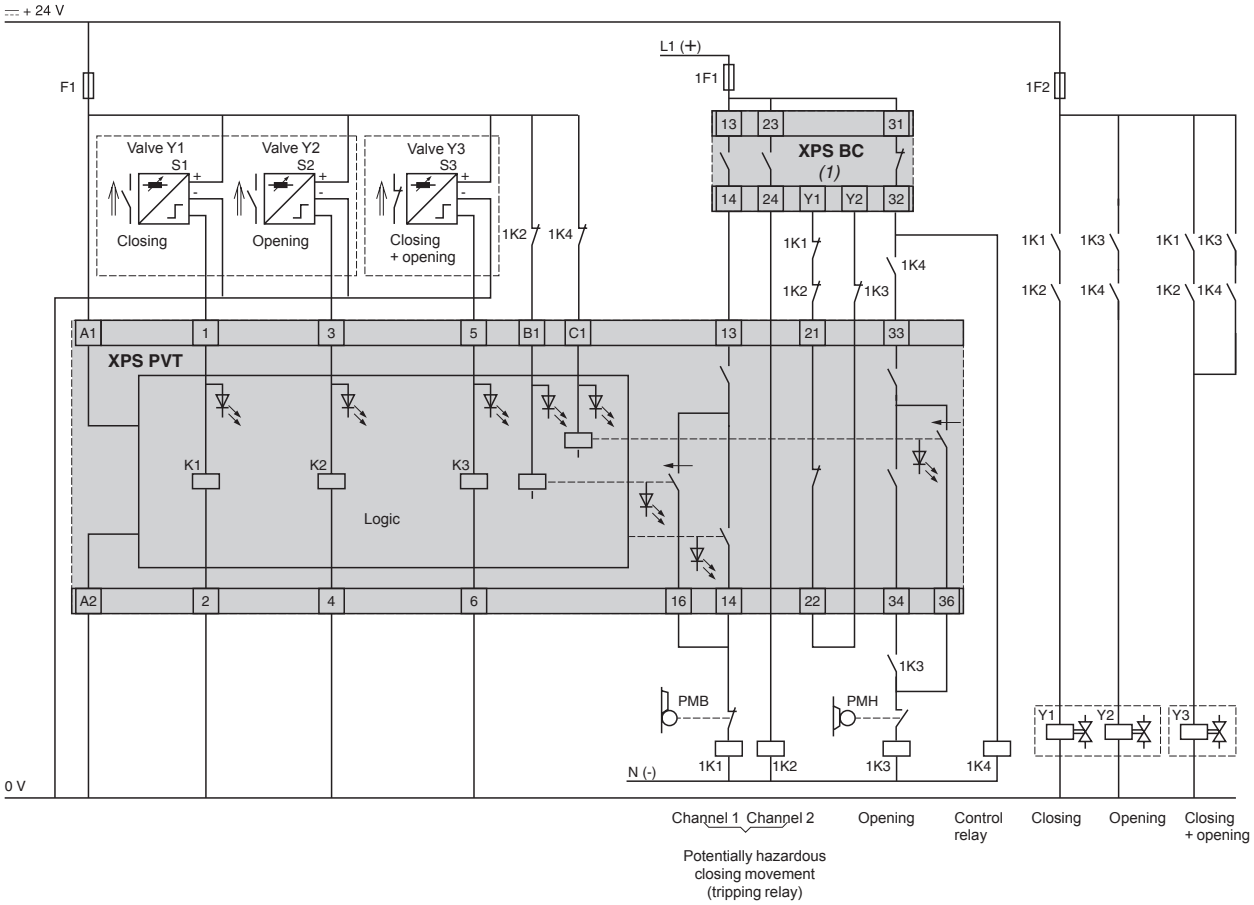
2

XPSPVT

Wiring diagram for module XPSPVT



(1) Two-hand control or presence sensor outputs.

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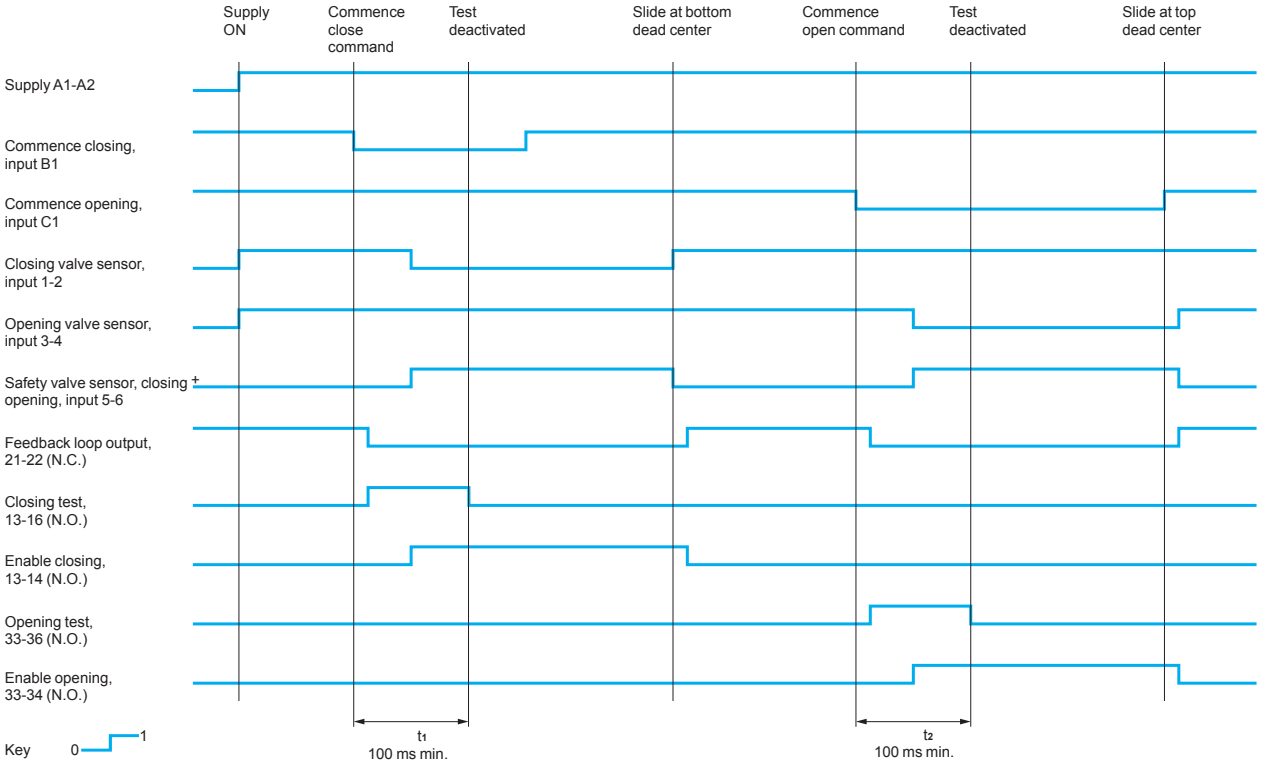
XPSPVT

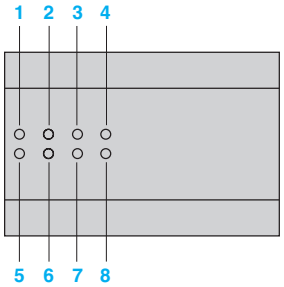
Functional diagram of module XPSPVT



Sensor Status During Press Cycle

Description	Valve Y1 Sensor S1 (N.O.)	Valve Y2 Sensor S2 (N.O.)	Valve Y3 Sensor S3 (N.C.)
Press Ram Stopped	**Contact closed**	**Contact closed**	**Contact open**
Press Ram Moving	**Contact open**	**Contact closed**	**Contact closed**
Press Ram Closing	**Contact closed**	**Contact open**	**Contact closed**

LED details



1 Closing command.
2 Closing test.
3 Opening command.
4 Opening test.
5 Opening valve (Y2) in position 0.
6 Closing enabled.
7 Safety valve (Y3) activated.
8 Closing valve (Y2) in position 0.

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Operating principle

Safety module XPSPVK is specially designed for dynamic monitoring of the safety valves in eccentric presses, conforming to European standard EN 692.
This standard establishes the specifications related to safety control systems for presses equipped with friction clutches.
To meet the requirements of this standard, the clutch/brake control must be monitored dynamically.

This function is provided by a double-bodied solenoid valve (safety valve for presses) which performs the functions of two valves mounted in one body.
The position of the two valve pistons can be monitored by proximity sensors, mechanical limit switches or pressure switches.
Module XPSPVK checks for the correct operation of the double-bodied safety valves at 3 points in the cycle.
■ Start at top dead center: checks the rest position of the two valves.
■ Take-on point (transfer function): checks that the two valves are in the “activated” (energized) position.
■ Press stop trigger point: checks that the two valves return to the rest position.
Return must be simultaneous for both valves within a defined time period.
To set up an automatic disconnect of the XPSPVK module at the first machine stroke, a N.C. auxiliary contact mounted on the main control contactor or on another contactor/relay, activated at the same time, can be wired to terminals 7 and 8 in parallel with the RESET button.
If an anomaly is detected during the cycle, the XPSPVK module will stop the slide stroke and will also inhibit the start of another cycle.

Characteristics

Module type			XPSPVK
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 4 max.
Conformity to standards			EN 60204-1, EN/IEC 60947-5-1, EN 692, EN 50082-2
Product certifications			UL, CSA
Supply	Voltage	**V**	⎓ 24, ∼115, ∼ 230
	Voltage limits		- 10…+ 10% (⎓ 24 V) - 15…+ 15% (∼ 115 V) - 15…+ 10% (∼ 230 V)
	Frequency	**Hz**	50/60
Power consumption	⎓ 24 V	**W**	< 9
	∼ 115 V/230 V	**VA**	< 16
Outputs	Voltage reference		Relay hard contacts
	Number and type of safety circuits		1 N.O. (13-14) transfer function + 1 N.C. (21-22) feedback loop
	Number and type of additional circuits		4 solid-state outputs
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180
	Breaking capacity in DC-13		24 V/1.5 A - L/R = 50 ms
	Max. thermal current (Ithe)	**A**	2.5
	Breaking capacity of solid-state outputs		24 V/20 mA, 48 V/10 mA
	Output fuse protection	**A**	4 gG, conforming to EN/IEC 60947-5-1, VDE 0660 part 200
	Minimum current (relay hard contacts)	**mA**	10
	Minimum voltage (relay hard contacts)	**V**	17
Response time		**ms**	< 40
Electrical life			See page 2/172
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-1, DIN VDE 0110 parts 1 & 2)
LED display			8
Operating temperature		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
Storage temperature		**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection Conforming to IEC 60529	Terminals		IP 20
	Enclosure		IP 40
Polycarbonate enclosure	Type		Removable
	Number of terminals		32
Connection	Type		Captive screw clamp terminals: without cable end 2 x14 AWG (2 x 2.5 mm²), with cable end 2 x16 AWG (2 x 1.5 mm²), min. Ø 0.5 mm

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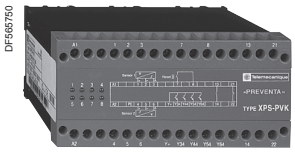
Safety automation system solutions

Preventa™ safety relay modules type XPSPVK

For dynamic monitoring of double-bodied solenoid valves

References



XPSPVK

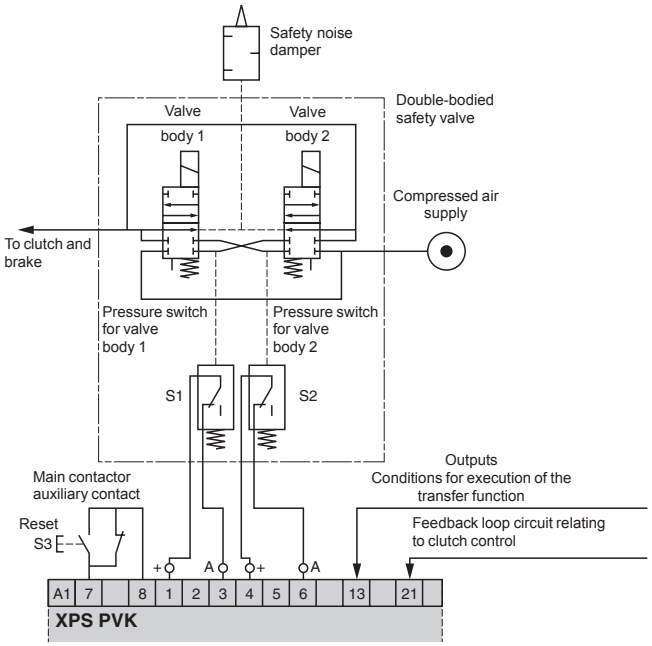
Description	Display	Supply	Reference	Weight oz (kg)
Safety modules for dynamic monitoring of double-bodied solenoid valves	8 LEDs	⎓ 24 V	**XPSPVK1184**	24.692 (0.700)
		∿ 115 V	**XPSPVK3484**	31.747 (0.900)
		∿ 230 V	**XPSPVK3784**	31.747 (0.900)

2

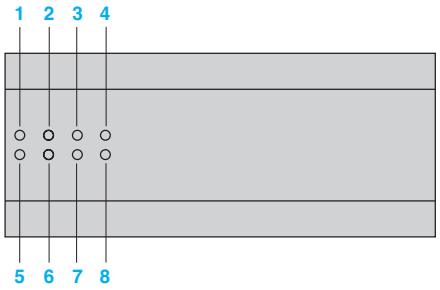
Wiring diagrams

XPSPVK

Monitoring of a press safety valve by an XPSPVK module



LED details



1 DC internal supply n° 1.
2 DC internal supply n° 2.
3 Valve n° 1 blocked.
4 Valve n° 2 blocked.
5 Ready for monitoring
6 Disconnect synchronised.
7 Reset.
8 Valves 1 and 2 energized.

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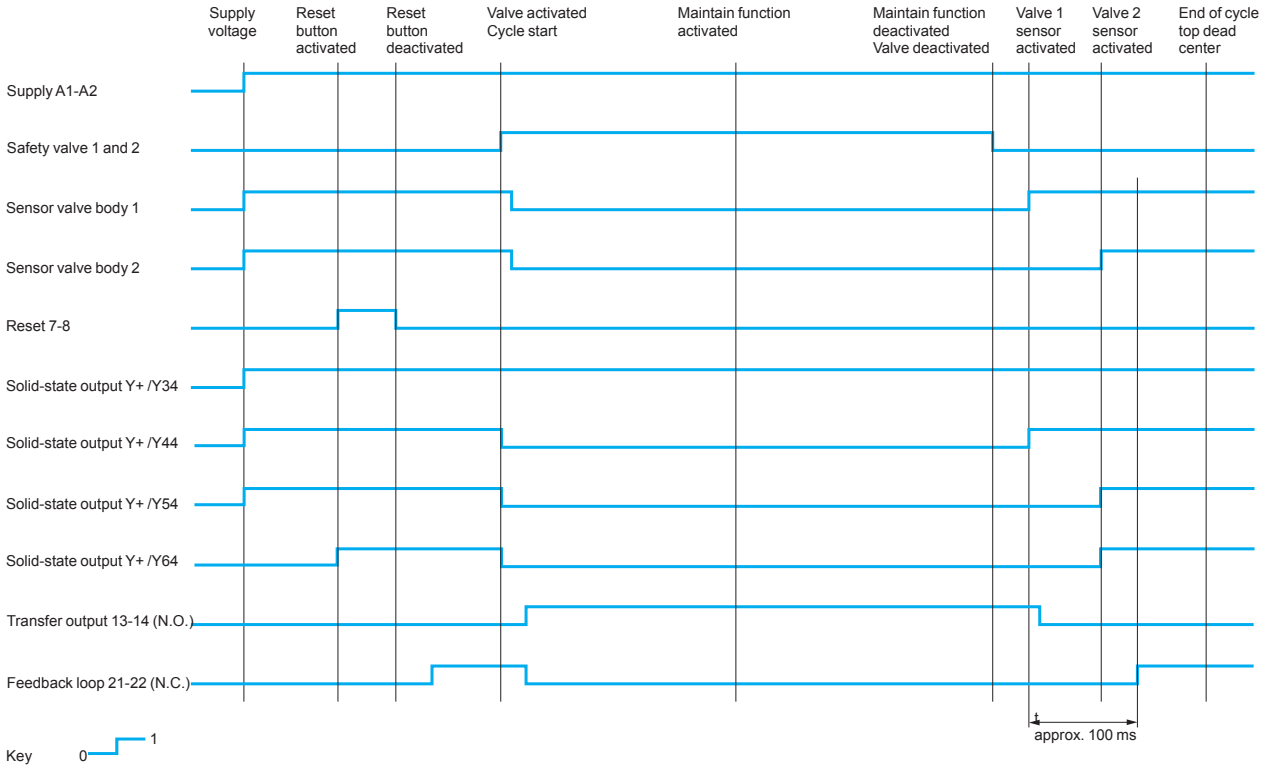
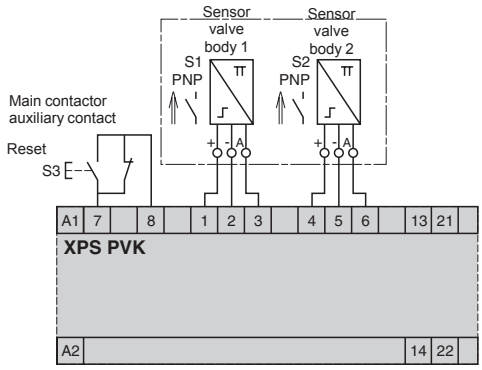
XPSPVK

Functional diagram of module XPSPVK

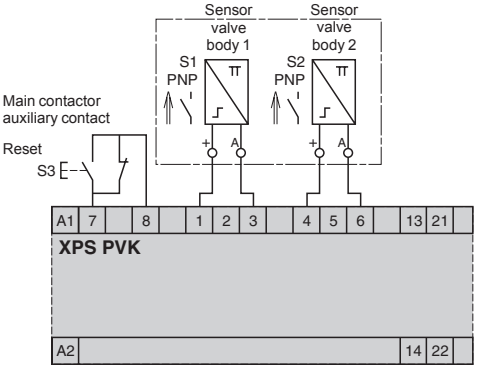


Connection of module XPSPVK with 3-wire (or 2-wire) proximity sensors

3-wire sensors



2-wire sensors



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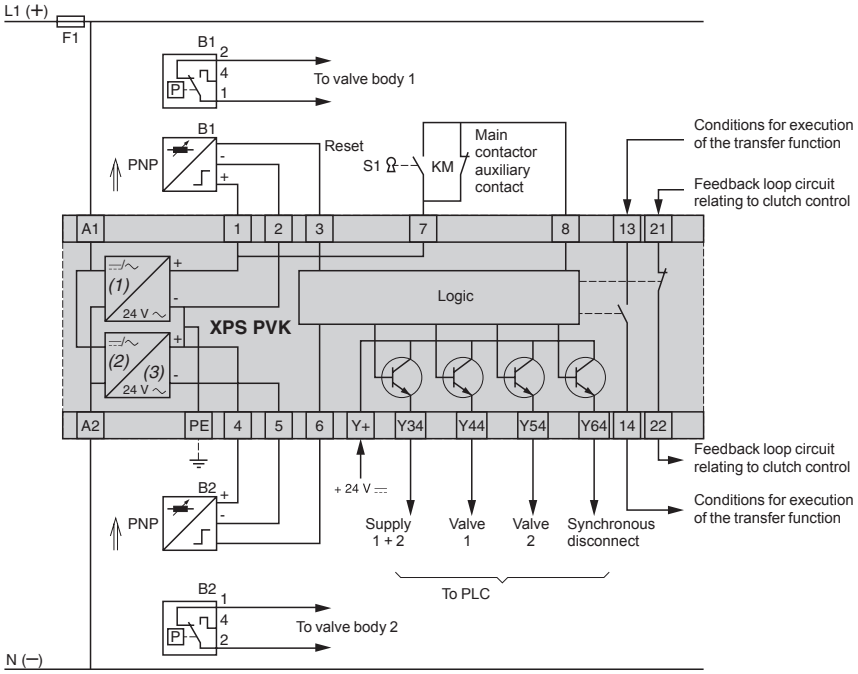
XPSPVK

Connection of module XPSPVK with an eccentric press safety valve



(1) Internal supply n° 1.
(2) Internal supply n° 2.
(3) For a ⎓ 24 V version: integrated ⎓/⎓ adaptor.

2

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Safety automation system solutions

Preventa™ safety relay modules type XPSOT

For safety stop with automatic overtravel monitoring and control

Operating principle

Safety module XPSOT is used on eccentric presses to monitor overtravel and ensure that the press slide stops in a non-hazardous position, that is, top dead center (TDC) during normal (non-emergency) operation. Use of this module, designed in accordance with standard EN 692 relating to mechanical press safety, makes it possible to create a redundant, self-monitoring control system.

The two essential functions of this safety module are to:

■ **Trigger the end of cycle stop sequences slightly before top dead center (at point A) so as to come to complete stop at TDC.**

After TDC, the permissible overtravel is approximately 10°. The safety module immediately detects any overtravel. Overtravel is indicative of braking device deterioration and, in this case, jog mode must be used to move the slide back to TDC. The next cycle will be inhibited to allow maintenance to be performed on the braking device (cam 1).

■ Take over control monitoring during the dangerous part of the cycle (slide downstroke). Any stop instruction issued between TDC (0°) and point C (approximately 150° after TDC) causes an immediate stop of the press. **This approximate value of 150° corresponds to the 0.315" (8mm) tool closure dimension (safety point)**.

When a stop instruction is issued after this safety point, the press completes the cycle and comes to a complete stop at TDC (cam 2).

Control of the hazardous part of the cycle (generally the slide downstroke) is usually activated from a two-hand control station associated with a safety module (type XPSBC) monitoring this station to qualify as a category 4 control system according to standard EN 954-1/ISO 13849-1.

Overtravel monitoring is performed **on each cycle** by safety module XPSOT.

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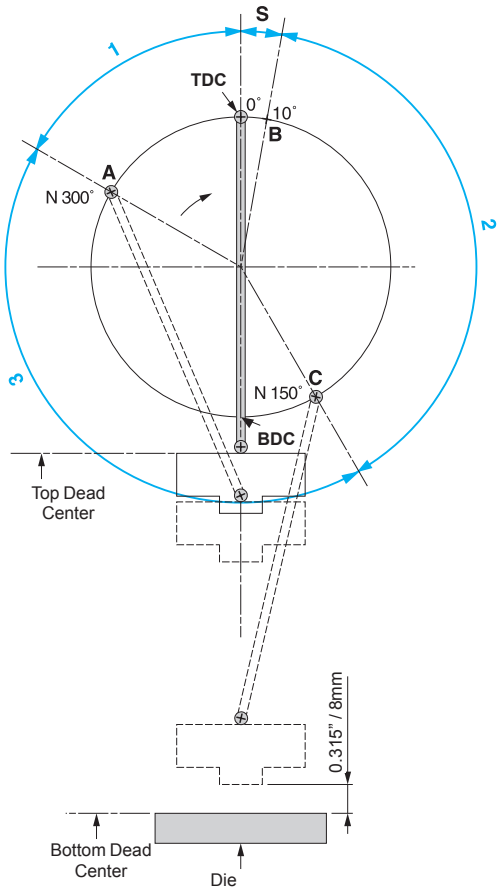
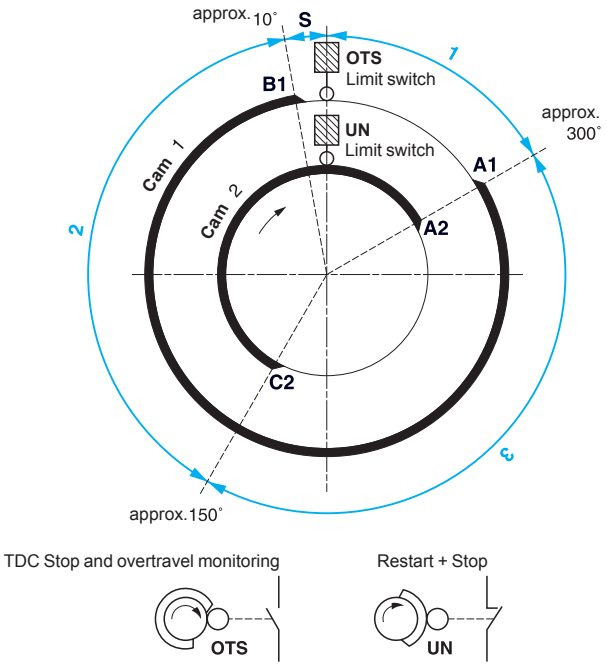
Operating principle (continued)

Press diagram



Control cams diagram



1 Permissible overtravel zone.
2 Dangerous zone (usually slide downstroke).
3 Non-dangerous zone (usually slide upstroke).

S Permissible overtravel.
A Stop instruction trip point.
B Point at which permissible overtravel is exceeded (a stop instruction issued after point **B** will lock up the press).
C Takeover point, beyond which the press will complete its cycle up to **TDC**.
TDC Top dead center, actual stopping zone of the press.
BDC Bottom dead center.

Cam operation
Cam 1 is associated with the **OTS** limit switch (LS), cam 2 with the **UN** limit switch (the limit switches must be located on different cams for safety reasons).
The **OTS** limit switch is deactivated at TDC, at which point the **UN** limit switch is activated.
Point A1 of **cam 1** is located approximately 300° after TDC and, when reached, the press stops and comes to a standstill: **A1 is the press stop trigger point.**
Point B1, located approximately 10° after TDC, constitutes the end of cam 1: **If B1 is exceeded during stopping**, the overtravel is abnormally long, **the press locks up** and the next cycle is inhibited.
Point A2 of cam 2 functions like point A1 on cam 1 (contact state of the **UN** limit switch reversed in relation to the state of the **OTS** limit switch).
Point C2, located approximately 150° after TDC, corresponds to the 8 mm tool closing dimension. Stop instructions issued after C2 is reached are not executed until point A2 is reached.

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Safety automation system solutions

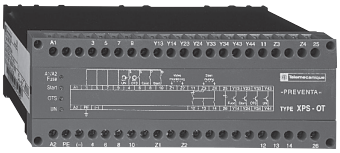
Preventa™ safety relay modules type XPSOT

For safety stop with automatic overtravel monitoring and control

Characteristics

Module type			XPSOT
Product designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 4 max.
Conformity to standards			EN 60204-1, EN/IEC 60947-5-1, EN 692, EN 50082-2
Product certifications			UL, CSA
Supply	Voltage	**V**	∼ 115, ∼ 230
	Voltage limits		- 15…+ 15% (115 V) - 15…+ 10% (230 V)
	Frequency	**Hz**	50/60
Power consumption		**VA**	< 12
Module inputs fuse protection			Internal, electronic
Outputs	Voltage reference		Relay hard contacts
	Number and type of safety circuits		3 N.O. (11-12, 11-13, 11-14)
	Number and type of additional circuits		4 solid-state outputs
	Breaking capacity in AC-15	**VA**	C300: inrush 1800, maintained 180
	Breaking capacity in DC-13		24 V/1.5 A - L/R = 50 ms
	Breaking capacity of solid-state outputs		24 V/20 mA, 48 V/10 mA
	Max. thermal current (Ithe)	**A**	2.5
	Output fuse protection	**A**	4 gG, conforming to EN/IEC 60947-5-1, VDE 0660 part 200
	Minimum current (relay hard contacts)	**mA**	10
	Minimum voltage (relay hard contacts)	**V**	17
Electrical life			See page 2/172
Response time		**ms**	< 20
Rated insulation voltage (Ui)		**V**	300 (degree of pollution 2 conforming to EN/IEC 60947-5-1, DIN VDE 0110 parts 1 & 2)
Rated impulse withstand voltage (Uimp.)		**kV**	4 (overvoltage category III, conforming to EN/IEC 60947-1, DIN VDE 0110 parts 1 & 2)
LED display			4
Operating temperature		**°F (°C)**	+ 14…+ 131 (- 10…+ 55)
Storage temperature		**°F (°C)**	- 13…+ 185 (- 25…+ 85)
Degree of protection conforming to IEC 60529	Terminals		IP 20
	Enclosure		IP 40
Polycarbonate enclosure	Type		Removable
	Number of terminals		42
Connection	Type		Captive screw clamp terminals: - without cable end 2 x 14 AWG (2 x 2.5 mm²), - with cable end 2 x 16 AWG (2 x 1.5 mm²), - min. Ø 0.5 mm

References



XPSOT

Description	Display	Supply	Reference	Weight oz (kg)
Safety modules for safety stop with automatic overtravel monitoring and control	4 LEDs	∼ 115 V	**XPSOT3444**	38.801 (1.100)
		∼ 230 V	**XPSOT3744**	38.801 (1.100)

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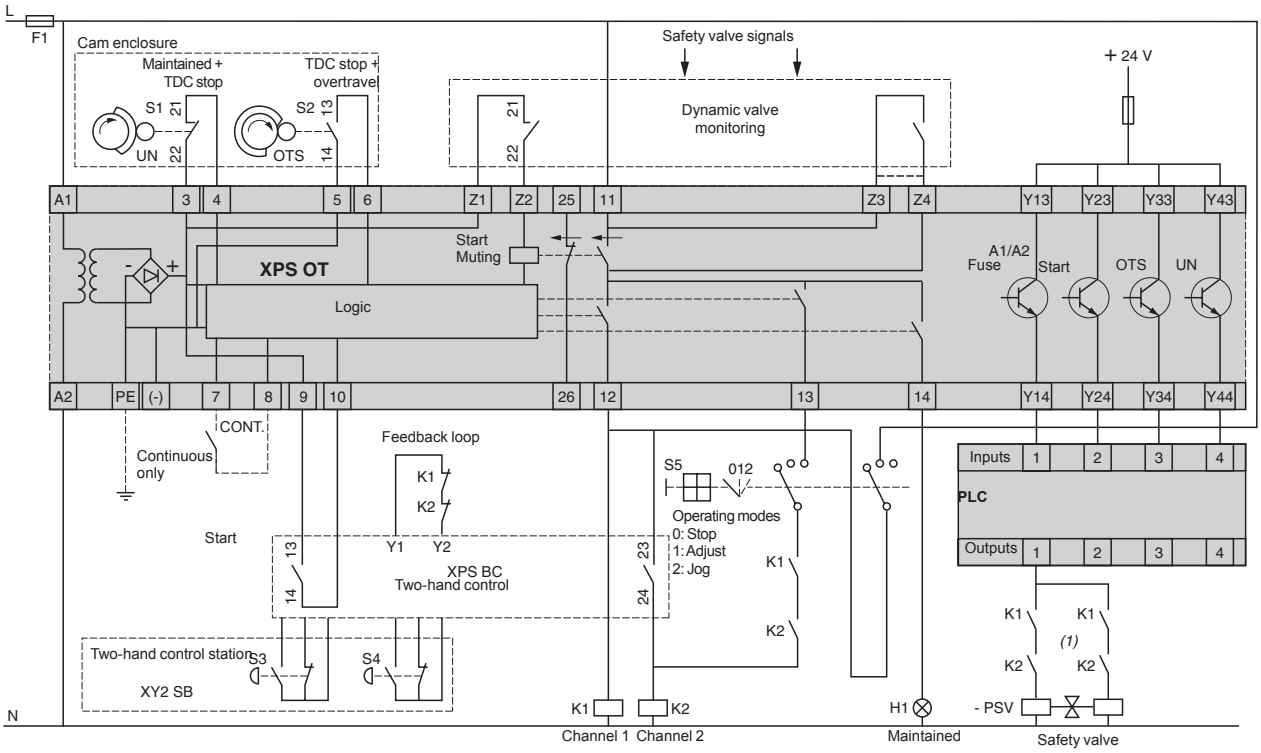
Safety automation system solutions

Preventa™ safety relay modules type XPSOT

For safety stop with automatic overtravel monitoring and control

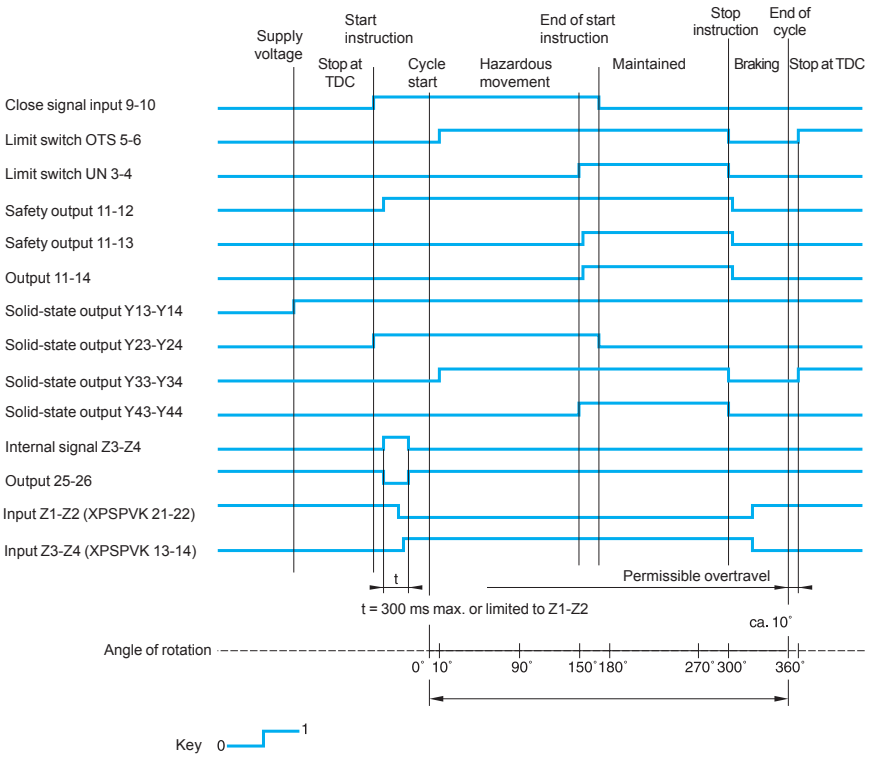
XPSOT

Wiring diagram

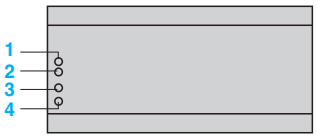


(1) The 2 coils of the safety valve must be wired separately.

Functional diagram



LED details



1 Voltage present on terminals A1/A2.
2 Close instruction.
3 **OTS** limit switch activated.
4 **UN** limit switch activated.

Principle: page 2/256
Characteristics: page 2/258
References: page 2/258
Wiring Diagrams: page 2/259
Dimensions: page 2/260

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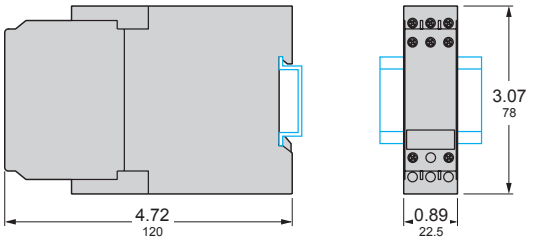
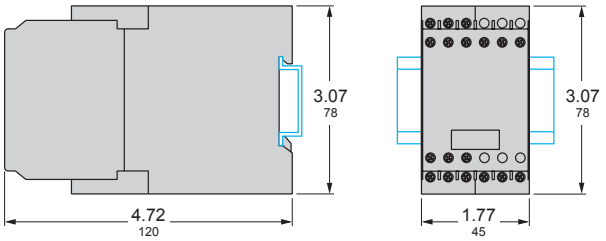
2

Dimensions

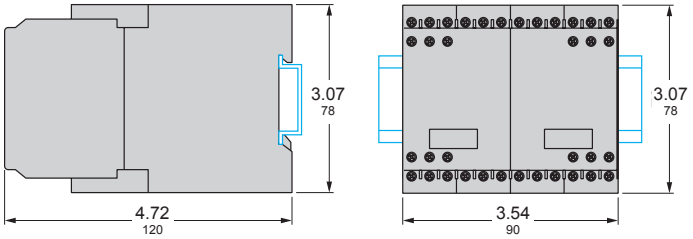
XPSBA



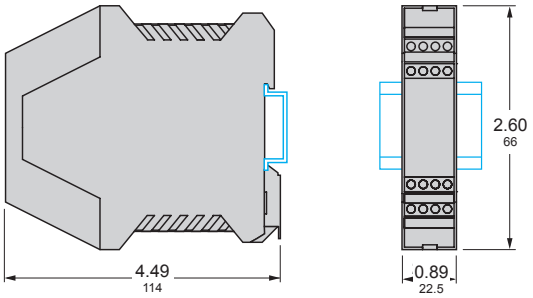
XPSBC, XPSDA



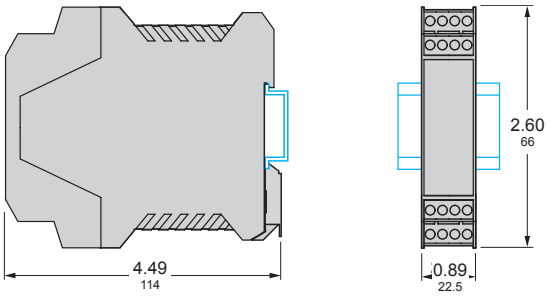
XPSECM, XPSECP



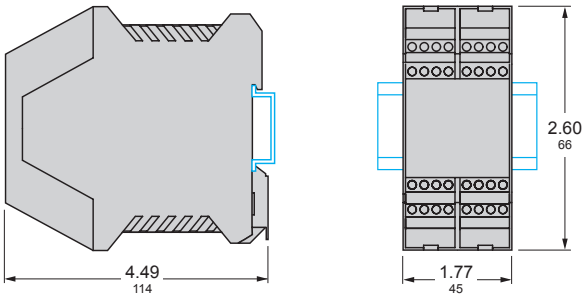
XPSAC●●●●, XPSAF●●●●, XPSAFL●●●●, XPSDMB●●●●, XPSVC●●●●, XPSBF●●●●



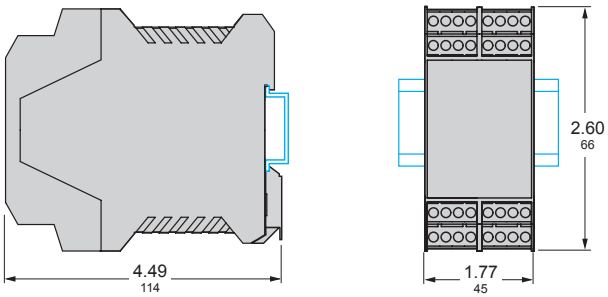
XPSAC●●●●P, XPSAF●●●P●, XPSAFL●●●●P, XPSDMB●●●●P, XPSVC●●●●P, XPSBF●●●●P



XPSAK●●●●, XPSAV●●●●, XPSCM●●●●, XPSDME●●●● XPSATE●●●●



XPSAK●●●●P, XPSAV●●●●P, XPSCM●●●●P, XPSTSA●●●P, XPSTSW●●●●P, XPSDME●●●●P, XPSATE●●●●P, XPSVNE●●●●P



Dual Dimensions: INCHES
Millimieters

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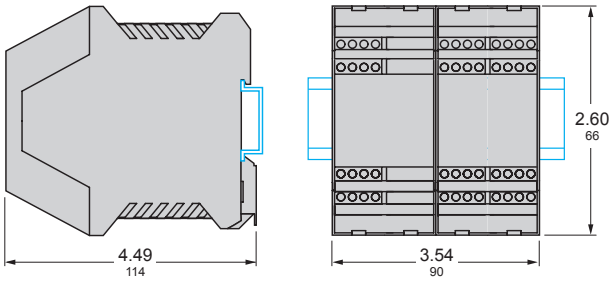
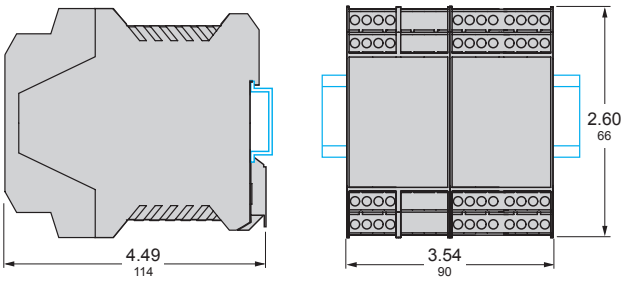
Dimensions

XPSAR●●●●●●

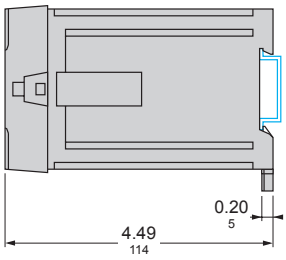


XPSAR●●●●●●P

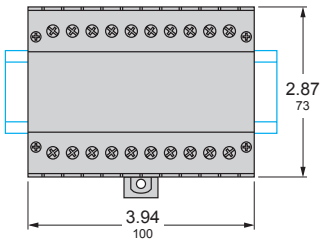


XPSPVT, XPSPVK

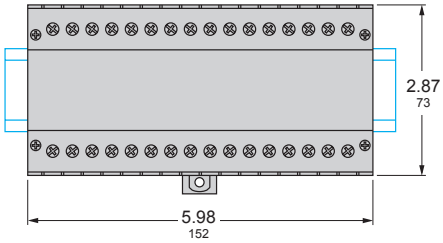
Common side view



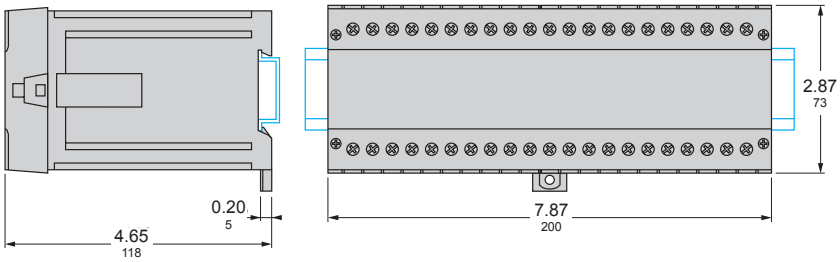
XPSPVT



XPSPVK



XPSOT



Dual Dimensions: INCHES / Millimieters

Mounting

All safety modules: 1.38 in (35 mm) ⊔ rail mounting.

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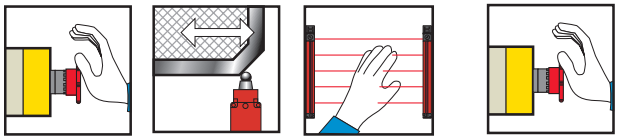
Safety automation system solutions
Safety solutions on AS-Interface® cabling system
Safety monitors and interfaces

2

Applications	Safety monitors on AS-Interface ® cabling system		Safety interfaces on AS-Interface ® cabling system	
				
AS-Interface ® "Safety at work"	Safety is incorporated into the AS-Interface ® cabling system by adding a monitor and a safety interface connected together with other standard AS-Interface ® components on the AS-Interface ® line			
Functions	Safety applications integrated on the AS-Interface ® line. Emergency stop, safety switches and light curtain monitoring		Emergency stop interfaces	
			Metal	Plastic
AS-Interface ® profile	7.F		0.B.F.F	0.B.F.F
Addressing	Using configuration software ASISWIN2		Using adjustment terminal ASITERV2 and adaptor ASISAD1	
Conformity to standards	IEC 61508 (2000), EN 954-1 (1997) - category 4/ISO 13849-1, EN/IEC 60204-1 (1998), EN 50295 (1999), EN 61000-6-2 (2000), EN 50081-2 (1993), EN/IEC 61496-1 (1997), EN/IEC 60947-5-1 (1997), EN 574 (1996)/ISO 13851		EN 954-1 - category 4/ISO 13849-1, EN/IEC 60947-5-1, EN/IEC 60204-1, EN/ISO 13850 (pending), EN/IEC 60947-5-5 (pending)	
Product certifications	UL, CSA, TÜV		UL, CSA, TÜV	
Number of safety circuits	2 N.O.	2 x 2 N.O.	–	
Number of additional circuits	1 solid-state output for signalling to PLC	2 solid-state outputs	–	
Display	5 LEDs	8 LEDs	2 LEDs	
Supply	⎓ 24 V		By AS-Interface ® line	
Type	ASISAFEMON1●	ASISAFEMON2●	ASISSLB●	
Page	2/266	2/266	2/270	

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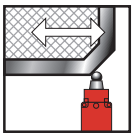
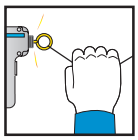
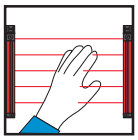
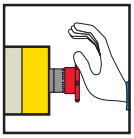
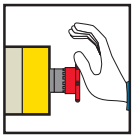

Interfaces for safety products			Interfaces premounted in Emergency stop mushroom head pushbutton stations XAL K	Interfaces for mounting in enclosure for Harmony® Ø 22 mm Emergency stop mushroom head pushbuttons
1 x M12 entry	2 x M12 entries	1 x ISO M16 entry	1 x M12 entry	Connector
0.B.F.F	0.B.F.F	0.B.F.F	0.B.F.F	
Using adjustment terminal ASITERV2 and adaptor ASISAD1			Using adjustment terminal ASITERV2	
EN 954-1 - category 4/ISO 13849-1, EN/IEC 60947-5-1, EN/IEC 60204-1			EN 1088/ISO 14119, EN/IEC 61496-1, EN/IEC 60947-5-3, EN 574/ISO 13851 IEC/EN 60204-1, EN/ISO 12100, EN/ISO 13850	
UL, CSA, TÜV			UL, CSA, TÜV	
–			–	
–			–	
2 LEDs			–	
By AS-Interface ® line			By AS-Interface ® line	
ASISSLC●		**ASISSLLS**	**ASISE●1C**	**ASISSLE●**
2/270			2/270	

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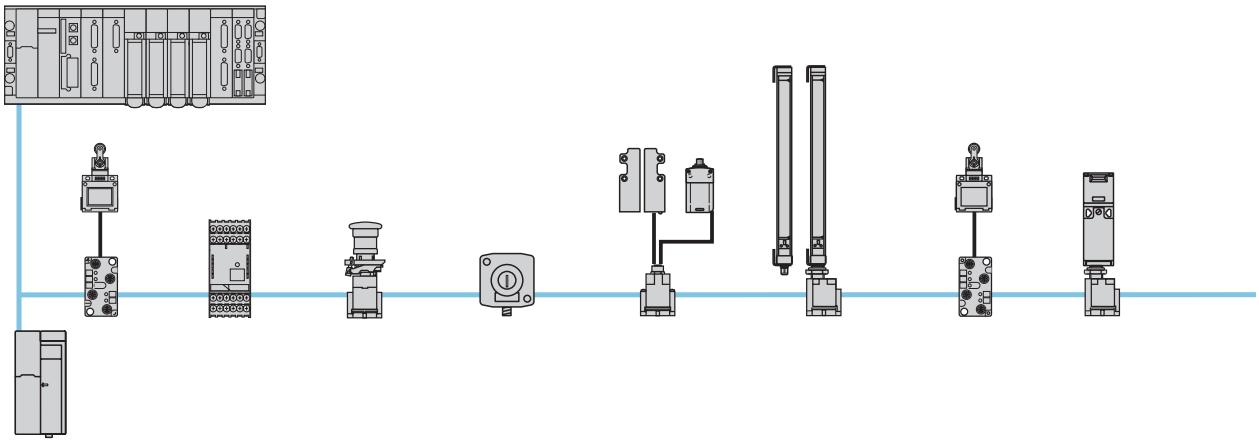
2

Operating principle



AS-Interface ®, the recognized cabling system for sensors and actuators, has evolved. Standard process information and information relating to safety can now be transmitted over the same cable. Capable of managing safety functions up to level 4 of standard EN-954-1/ISO 13849-1 and conforming to standard IEC 61508 (2000), the AS-Interface ® “Safety at work” system meets the needs of the most common safety applications, such as:
- monitoring of Emergency stops with instantaneous break contacts (stop category 0),
- monitoring of Emergency stops with delayed break contacts (stop category 1),
- monitoring of switches with and without interlocking,
- monitoring of light curtains, etc.

Parameters for options relative to the selected safety function (for example, start button monitoring) may be set for all pre-defined, certified functions.
Safety is incorporated into the AS-Interface ® cabling system by adding a safety monitor and safety interfaces connected together with other standard AS-Interface ® components on the yellow cable.
Safety information is exchanged only between the safety monitor, the AS-Interface ® line master and the safety interfaces. This is transparent for the other standard AS-Interface ® components.
Based on this principle, AS-Interface ® cabling systems that are already installed can be updated with safety functions without having to replace the existing components (masters, I/O interfaces, power supplies, etc.). Safety circuits are diagnosed readily, and with no additional wiring, by the standard AS-Interface ® cabling system master communicating with the safety monitor(s) via the yellow cable.

The AS-Interface ® “Safety at work” system is configured using software ASISWIN2 running on Windows®. A library of pre-defined and certified safety functions is made available by the software and the user can graphically select the desired safety functions, even at the last minute, by using the “Drag and drop” method in the configuration software. Knowledge of a programming language or specific tools is not necessary to parameter the system. The configuration is loaded into the safety monitor(s) by means of a PC by carrying out a secure serial transmission and using the parameter setting connector on the front cover of the monitor.

The AS-Interface ® “Safety and work” enhanced monitor is available with:
- 1 safety output with 2 contacts, or
- 2 independent safety outputs with 2 x 2 contacts.

In addition to safety outputs with relay hard contacts, AS-Interface ® “Safety at work” safety monitors are equipped, depending on the model, with one or two solid-state signalling outputs and LEDs on the front cover to indicate the status of the system and of the monitoring circuits. To monitor more safety functions simultaneously or to stop several safety circuits at different locations, an increased number of safety monitors can be used in an AS-Interface ® cabling system.
The safety interfaces are connected directly on the yellow cable via an insulation displacement connector (IDC). Their addressing is carried out using self-addressing via the AS-Interface ® cabling system master or manually, using addressing terminal ASISTERV2.
The compactness of the safety interfaces enables their direct attachment to control devices such as Emergency stop buttons or switches. In addition to interfaces that can be attached to products, versions with 1 or 2 M12 connectors are also available.

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Monitoring functions

	AS-Interface ® "Safety at work" monitors
	For enhanced monitoring of safety devices ASISAFEMON1B, ASISAFEMON2B
Monitoring of safety devices	■ Emergency stops ■ Safety switches ■ Light curtains ■ Button for validation of linked devices ■ Conditionally dependent devices ■ Devices with bouncing contacts
Logic functions	■ "OR" (up to 6 devices) ■ "AND" ■ "FLIP FLOP" ■ On-delay ■ Off-delay ■ "PULSE" on positive edge
External devices monitoring (EDM)	■ Feedback loop ■ Feedback loop monitoring over the AS-Interface ® cabling system
Start devices	■ Automatic start ■ Start monitored by the AS-Interface ® cabling system slave ■ Start monitored by connection to monitor ■ Start monitored by the safety interface
Output devices	■ Stop category 1 ■ Stop category 0

Characteristics

AS-Interface ® "Safety at work" monitor type			**ASISAFEMON1B** **ASISAFEMON2B**
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 4 conforming to EN 954-1/ISO 13849-1
Conformity to standards			IEC 61508 (2000), EN/IEC 60204-1 (1998), EN 50295 (1999), EN 61000-6-2 (2000), EN 50081-2 (1993), EN/IEC 61496-1 (1997), EN/IEC 60947-5-1 (1997), EN 574 (1996)/ISO 13851
Product certifications			UL, CSA, TÜV
AS-Interface ® profile			7.F
Power consumption on AS-Interface ® line		**mA**	44
Type of protection (suitable only for use in electronic rooms/ electrical enclosures with a minimum IP 54 degree of protection)			IP 20
Operating voltage Ub		**V**	⎓ 24 ± 15%
Rated operating current		**mA**	150: **ASISAFEMON1B** 200: **ASISAFEMON2B**
Response duration		**ms**	< 40
Pick-up delay		**s**	< 10
Inputs	"Start"		Opto-electronic coupler input (active when High), input current approximately 10 mA à ⎓ 24 V
	"Protection control (EDM)"		Opto-electronic coupler input (active when High), input current approximately 10 mA at ⎓ 24 V
Outputs	"Safety on" indication		PNP transistor output, 200 mA
	Safety		Relay hard contacts N.O. contacts, max. contact load
Fuse protection			External, with max. of 4 A MT
Operating temperature		**°F (°C)**	- 4…+ 140 (- 20…+ 60)
Storage temperature		**°F (°C)**	- 22…+ 158 (- 30…+ 70)
Enclosure	Material		Polyamide PA66
	Mounting		Clip-on mounting on ⊥ rail conforming to EN 50022

Note: The impedance of a safety monitor must be taken into account when selecting the number of interfaces on the AS-Interface ® cabling system, even if it is used in "watchdog" mode.

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2

References

AS-Interface ® “Safety at work” monitors

Type	Number of safety circuits	Solid-state outputs for PLC	Supply	Reference	Weight oz (kg)
For enhanced monitoring of safety devices	2 N.O.	1	⎓ 24 V	**ASISAFEMON1B**	12.346 (0.350)
	2 x 2 N.O.	2	⎓ 24 V	**ASISAFEMON2B**	15.874 (0.450)

Configuration software

Description	For use with	Operating system	Languages	Reference	Weight oz (kg)
AS-Interface ® “Safety at work” configuration software CD-ROM + user manual	□ Safety monitors ASISAFEMON●B for enhanced monitoring of safety devices	Windows® 95, Windows® 98, Windows® ME, Windows® NT®, Windows® 2000, Windows® XP	EN, FR, DE, IT, ES, PT	**ASISWIN2**	18.342 (0.520)

ASITERV2

Setting-up and diagnostic tools

Description	Application	Reference	
Adjustment terminal	Addressing and diagnostics of AS-Interface ® V2.1 interfaces AS-Interface ® I/O test while powered-up AS-Interface ® interface diagnostics	**ASITERV2**	17.637 (0.500)
AS-Interface ® line analyzer	Identification of transmission errors on the AS-Interface ® line	**ASISA01**	5.644 (0.160)

ASISA01

Accessories

Description	Function	Reference	Weight oz (kg)
Cables	For configuring AS-Interface ® “Safety at work” monitors, RS 232	**ASISCPC**	3.527 (0.100)
	Transfer between 2 monitors	**ASISCM**	17.637 (0.500)

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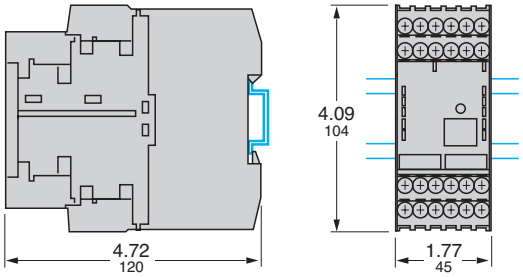
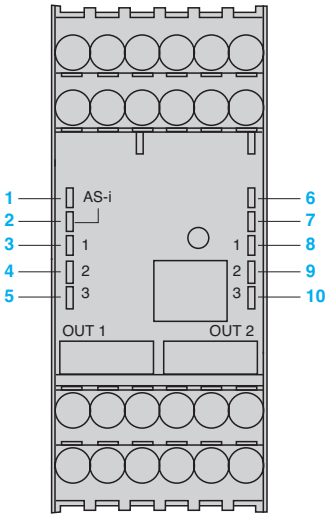
Dimensions

ASISAFEMON●, ASISAFEMON●B



Dual Dimensions: INCHES / Millimieters

LED details



ASISAFEMON1B

1 AS-Interface ® line supply (green)
2 AS-Interface ® line fault (red)
3 Restart signal (yellow)
4 Safety outputs closed (green)
5 Safety outputs open (red) or output error (flashing red)

ASISAFEMON2B

Output 1

1 AS-Interface ® line supply (green)
2 AS-Interface ® line fault (red)
3 Restart signal (yellow)
4 Safety outputs closed (green)
5 Safety outputs open (red) or output error (flashing red)

Output 2

6 AS-Interface ® line supply (green)
7 AS-Interface ® line fault (red)
8 Restart signal (yellow)
9 Safety outputs closed (green)
10 Safety outputs open (red) or output error (flashing red)

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2

Operating principle

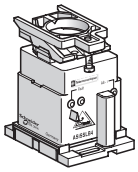
Safety is incorporated into the AS-Interface ® cabling system by adding a safety monitor and safety interfaces connected together with other standard AS-Interface ® components on the yellow cable.

Safety information is exchanged only between the safety monitor, the AS-Interface ® line master and the safety interfaces. This is transparent for the other standard AS-Interface ® components. Based on this principle, AS-Interface ® cabling systems that are already installed can be updated with safety functions without having to replace the existing components (master, I/O interfaces, power supplies, etc.).

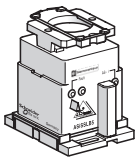
Safety circuits are diagnosed readily, and with no additional wiring, by the standard AS-Interface ® cabling system master communicating with the safety monitor via the yellow cable.

Presentation

Interfaces for Harmony® Ø 22 mm Emergency stop

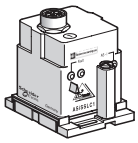


Metal

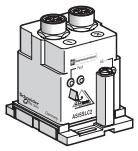


Plastic

Interfaces for products with M12 connector

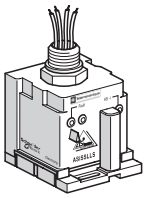


1 x M12 entry



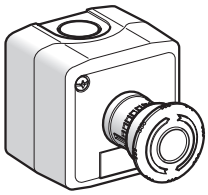
2 x M12 entries

Interfaces for products with ISO entry

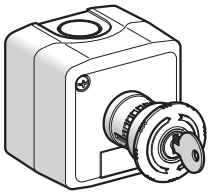


ISO M16 or M20 entry

Interfaces premounted in Emergency stop mushroom head pushbutton stations XAL K, with M12 entry

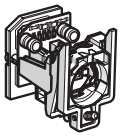


"Turn to release"



Key release (n° 455)

Interfaces for mounting in enclosure for Harmony® Ø 22 mm Emergency stop mushroom head pushbuttons



Metal

Plastic

Principle: page 2/268
Characteristics: page 2/269
References : page 2/270
Dimensions, connections: page 2/271

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Safety interface type			ASI SSLB4	ASI SSLB5	ASI SSLC1	ASI SSLC2	ASI SSLLS	ASI SEA1C	ASI SEK1C	ASI SSLE4	ASI SSLE5
Environment											
Products designed for max. use in safety related parts of control systems (conforming to EN 954-1/ISO 13849-1)			Category 4 max.								
Conformity to standards			EN/IEC 60947-5-1, EN/IEC 60204-1, EN/ISO 13850 (pending), EN/IEC 60947-5-5 (pending)		EN/IEC 60947-5-1, EN/IEC 60204-1			EN 1088/ISO 14119, EN/IEC 61496-1, EN/IEC 60947-5-3, EN 574/ISO 13851 EN/IEC 60204-1, EN/ISO 12100, EN/ISO 13850			
Product certifications			UL, CSA, TÜV					UL, CSA			
Degree of protection	Conforming to IEC 529		IP 20		IP 67			IP 65		IP 00	
AS-Interface ® profile			0.B.F.F								
Addressing			Using adjustment terminal ASITERV2								
Ambient air temperature	For operation	**°F (°C)**	+ 14…+ 131 (- 10…+ 55)								
	For storage	**°F (°C)**	- 13…+ 185 (- 25…+ 85)								
Mechanical characteristics											
Mechanical life*	In thousands of operating cycles		0.3		–		–	0.3		–	
Shock resistance			10 gn								
Vibration resistance			5 gn								
Electrical characteristics											
Supply by AS-Interface ® line	Voltage	**V**	Via AS-Interface ®, ⎓ 24								
	Voltage limits		- 15…+ 15%								
Power consumption		**W**	1.2								
Power consumption on AS-Interface ® line		**mA**	45								
Connection on AS-Interface ® line	IDC (Insulation Displacement Connector)		■		–		■	–		–	
	Connector (type)		–		■ (M12)		–	■ (M12)		■	

***Mechanical Life**
The product life expressed is based on average usage and normal operating conditions. The above statements are not intended to nor shall they create any express or implied warranties as to product operation or life. For information on the limited warranty offered on this product please refer to the Square D ® terms and conditions of sale found in Square D ® *Digest*.

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Safety automation system solutions

Safety solutions on AS-Interface® cabling system

Safety interfaces

2

580116

ASISSLB4 + ZB4BS844

580117

ASISSLB5 + ZB5AS844

580118

ASISSLC1

580119

ASISSLC2

580120

ASISSLLS

105580

ASISEA1C

105581

ASISEK1C

105582

ASISSLE4

105583

ASISSLE5

105967

ASISAD1

References

Interfaces for Ø 22 Emergency stop

Type	Type of contact	Connection on AS-Interface® line	Reference	Weight oz (kg)
Metal	N.C. + N.C.	IDC	**ASISSLB4**	2.822 (0.080)
Plastic	N.C. + N.C.	IDC	**ASISSLB5**	1.411 (0.040)

Interfaces for products with connector

Type	Number of contacts	Connection on AS-Interface® line	Reference	Weight oz (kg)
1 x M12 entry *(1)*	2	Connector	**ASISSLC1**	1.411 (0.040)
2 x M12 entries *(1) (2)*	2	Connector	**ASISSLC2**	1.764 (0.050)

Interfaces for products with ISO entry

Type	Number of contacts	Connection on AS-Interface® line	Reference	Weight oz (kg)
1 x ISO M16 entry *(1) (3)*	2	IDC	**ASISSLLS**	1.411 (0.040)

Interfaces premounted in Emergency stop mushroom head pushbutton stations XAL K

Type	Number of contacts	Connection on AS-Interface® line	Reference	Weight oz (kg)
"Turn to release"	2	Connector	**ASISEA1C**	5.997 (0.170)
Key release (n° 455)	2	Connector	**ASISEK1C**	6.702 (0.190)

Interfaces for mounting in enclosure for Harmony® Ø 22 mm Emergency stop mushroom head pushbuttons

Type	Number of contacts	Connection on AS-Interface® line	Reference	Weight oz (kg)
Metal	2	Connector	**ASISSLE4**	2.116 (0.060)
Plastic	2	Connector	**ASISSLE5**	0.882 (0.025)

Addressing accessories

Description	Application	Reference	
Adaptor specifically for safety interfaces type ASISSLB●, ASISSLC●, ASISSLLS	Connection to adjustment terminal ASITERV2	**ASISAD1**	2.116 (0.060)

Setting-up and diagnostic tools

Description	Application	Reference	
Adjustment terminal	Addressing and diagnostics of AS-Interface® V2.1 interfaces AS-Interface® I/O test while powered-up AS-Interface® interface diagnostics	**ASITERV2**	17.637 (0.500)
AS-Interface® line analyzer	Identification of transmission errors on the AS-Interface® line	**ASISA01**	5.644 (0.160)

Accessories

Type	Material	Unit reference	Weight oz (kg)
Adaptor for ISO M20 (sold in lots of 5)	Metal	**DE9RI2016**	1.411 (0.040)
Ø 40 red mushroom head Emergency stop buttons, turn to release *(4)*	Metal	**ZB4BS844**	2.116 (0.060)
	Plastic	**ZB5AS844**	1.764 (0.050)
Ø 40 red mushroom head Emergency stop buttons, key release (n° 455) *(4)*	Metal	**ZB4BS944**	3.457 (0.098)
	Plastic	**ZB5AS944**	2.504 (0.071)

*(1) To be used with yellow AS-Interface® "standard" version cable **XZCB●●●●●**.*
*The yellow AS-Interface® "TPE" version cable **XZCB●●●●●H** cannot be used with the safety interfaces **ASISSLC●** and **ASISSLLS**.*

*(2) Only use pre-wired connectors **XZCP1541L●**, refer to our sensors catalog 9006CT0101 R5/04.*

(3) For ISO M20 product, see adaptor - DE9R12016.

Principle: page 2/268
Characteristics: page 2/269
References : page 2/270
Dimensions, connections: page 2/271

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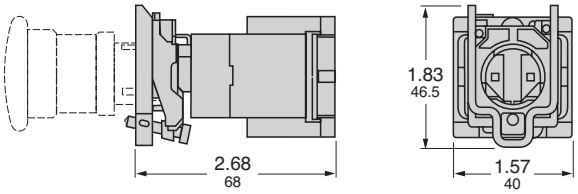
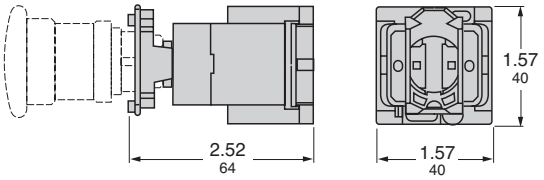
Dimensions

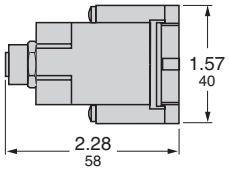
ASISSLB4

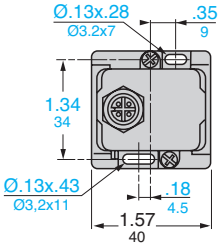


ASISSLB5

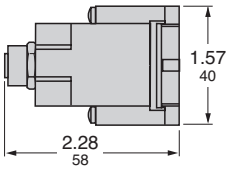


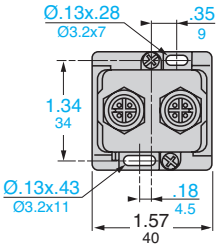
ASISSLC1



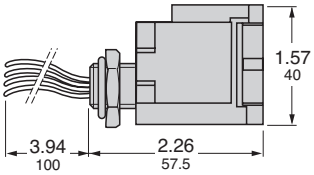


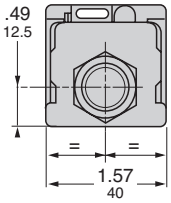
ASISSLC2



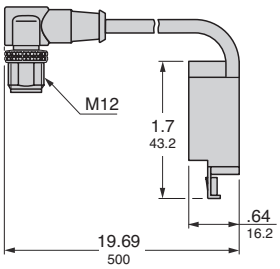


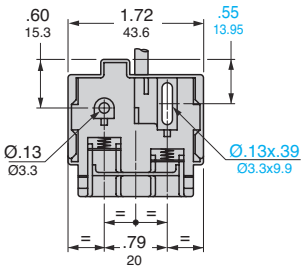
ASISSLLS



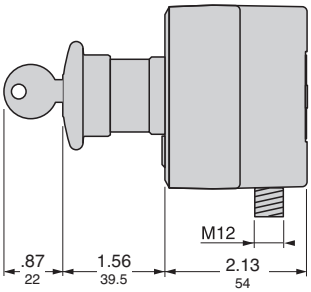


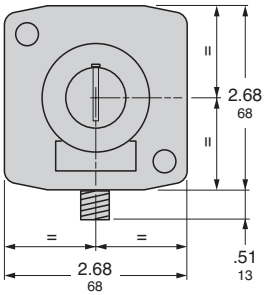
ASISAD1

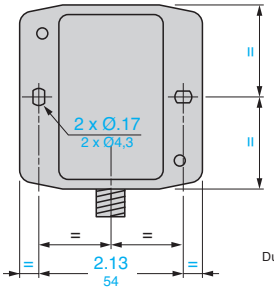




ASISE•1C

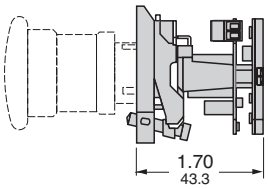


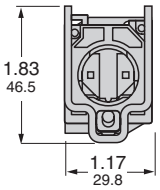




Dual Dimensions: INCHES
Millimeters

ASISSLE4





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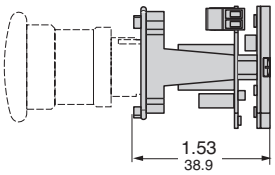
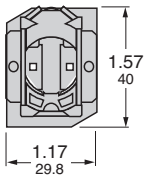
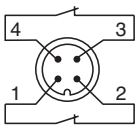




Connections

ASISSLC1



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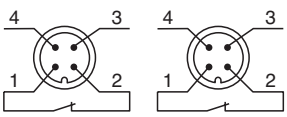
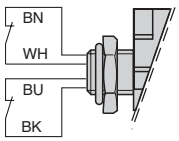
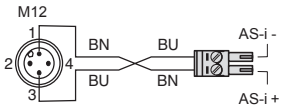


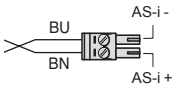
ASISSLLS



ASISE•1C



ASISSLE•



Principle: page 2/268
Characteristics: page 2/269
References : page 2/270
Dimensions, connections: page 2/271

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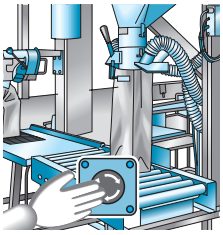
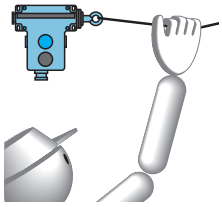
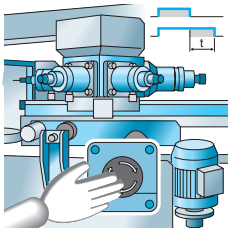
Applications

Modules	For Emergency stop and limit switch monitoring (modules integrated in TSX Micro PLCs)	For Emergency stop and limit switch monitoring (modules integrated in TSX Premium™ PLCs)	
Conforming to standards	EN 954-1 - category 3/ISO 13849-1, pr EN 954-2, EN 1088/ISO 14119, IEC 61508-SIL 2, EN/IEC 60204-1, EN/ISO 12100, EN/ISO 13850	EN 954-1 - category 4/ ISO 13849-1, EN 1088/ISO 14119, pr IEC 61508-SIL 3, EN/IEC 60204-1, EN/ISO 12100, EN/ISO 13850	
Number of safety outputs	2 N.O.	2 N.O.	4 N.O.
Number of dual or single contact safety inputs	4 N.C.	12 N.C.	
PLC diagnostics – Input contacts	10 bit	24 bit	
PLC diagnostics – Reset and feedback loop inputs	1 bit	2 bit	
PLC diagnostics – Reading output control signal	1 bit	1 bit	
PLC diagnostics – Supply monitoring	1 bit	1 bit	
Display	10 LED	28 LED	
Supply voltage	⎓ 24 V	⎓ 24 V	
PLC type	TSXMicro™	TSX Premium™	
Module type	**TSXDPZ 10D2A**	**TSXPAY 262**	**TSXPAY 282**

Safety Relay Modules for Micro and Premium™ PLC's
The safety relay modules listed above perform the same function as the XPS safety relays and plug into the Micro and Premium™ platforms. The safety module operation is independent of the PLC processor. For more information, refer to the Micro Automation Platform Catalog, MKTED204012EN, and the Premium™ Automation Platform catalog, MKTED204072EN. Or, call 800-468-5342.

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