



Preventa compact/Modular Safety PLCs and remote I/O 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 safety PLCs and remote I/O are intended for use in safety related parts of control systems.

They can manage up to category 4 performance level e EN/ISO 13849-1, SIL 3 (safety integrity level) EN/IEC 61508 or EN/IEC 62061.

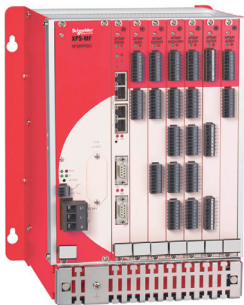


Safety compact PLCs

Safety PLCs

In order to meet safety requirements, the compact/modular safety PLCs incorporate two essential functions (**Redundancy** and **Self-monitoring**).

In addition uses **SafeEthernet** safe communications protocol between the safety PLCs and safe remote I/O modules.



Modular safety PLCs

Redundancy

- > The double or triple (1) processors integrated in the compact and modular safety PLCs analyses 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 processors and compared in real-time.

Self-monitoring (Watchdog)

The safety PLCs and remote I/O continuously monitor the data processing cycle and the execution of tasks, and intervenes if the cycle time does not conform to the predefined values.

Integrated switch

The integrated 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 and remote I/O on the Ethernet network, whilst avoiding signal collisions and excessive amounts of data on the network.



Safety remote input/output modules

Line control for safety PLCs and safety remote I/O modules

Line control is a means of short circuit and line break monitoring. Using line control outputs enables category 4 performance level e EN/ISO 13849-1, SIL 3 (safety integrity level) EN/IEC 61508 or EN/IEC 62061 to be achieved.

The line control outputs provide a high signal with a very short low signal enabling a wiring fault (short-circuit, line break) to be identified on the inputs of the safety PLCs and safety remote I/O.

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) With XPSMF40 PLC only

Preventa safety compact PLCs

Type XPSMF40



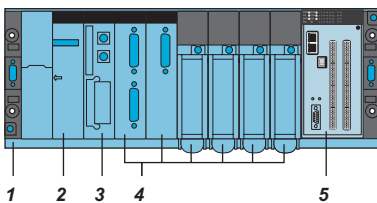
XPSMF4000
XPSMF4002



XPSMF4020
XPSMF4022



XPSMF4040
XPSMF4042



Example of mechanical integration of a safety compact 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 Safety compact PLC XPSMF40

Presentation

The safety compact PLC range XPSMF40●● comprises 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

Digital inputs

Safety compact 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.

Digital outputs

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

Line control outputs

Safety compact PLCs XPSMF40 incorporate 8 line control outputs for short-circuits and line break monitoring.

Remote inputs and outputs

In addition to the inputs/outputs integrated as standard, safety compact 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.

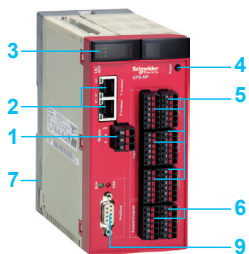
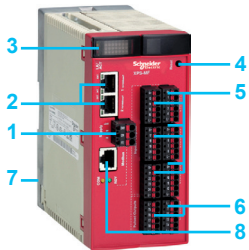
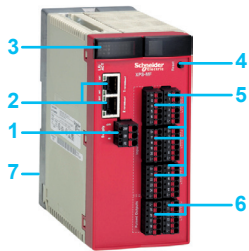
The safety remote input, output and mixed I/O modules can be located within the vicinity of the machines to be monitored, thus reducing cabling.

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 TSXRKY.

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 the software.



XPSMF4000
XPSMF4002



XPSMF4020
XPSMF4022



XPSMF4040
XPSMF4042

Description

Safety PLCs XPS
XPSMF4000/MF4002/ MF4020/MF4022/ MF4040/MF4042

On the front face of the enclosure:

- 1 One terminal block (1) for $\bar{0}$ 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 fixing for mounting on 35 mm \bar{L} rail.

Safety PLCs XPSMF4020/MF4022

On the front face of the enclosure:

- 8 One RJ45 connector for connection on Modbus serial (RTU), with 2 process status LEDs.

Safety PLCs XPSMF4040/MF4042

On the front face of the enclosure:

- 9 One SUB-D (9-pin female) connector for connection on PROFIBUS DP, with 2 process status LEDs.

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

Safety compact PLCs

$\bar{0}$ 24 V supply

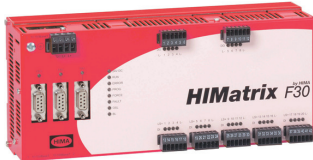
Digital Inputs or Outputs	Line control outputs	Communication on			Reference	Weight kg/lb
		Ethernet network	Modbus serial (RTU)	PROFIBUS DP		
0...24 configurable channels	2 x 4	Yes	–	–	XPSMF4000	1.000/2.205
		Yes, server	–	–	XPSMF4002	1.000/2.205
		–	Yes, slave	–	XPSMF4020	1.000/2.205
		Yes, server	Yes, slave	–	XPSMF4022	1.000/2.205
		–	–	Yes, V0 slave	XPSMF4040	1.000/2.205
		Yes, server	–	Yes, V0 slave	XPSMF4042	1.000/2.205

Preventa safety compact PLCs

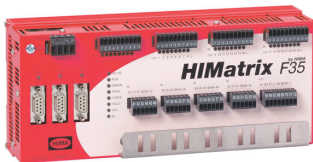
Type XPSMF31/30/35



XPSMF31222



XPSMF3022



XPSMF3502

Products referenced **XPSMF31222**, **XPSMF3022** and **XPSMF3502** are marked **HIMatrix F31**, **HIMatrix F30** and **HIMatrix F35**

Presentation

The safety compact PLC range **XPSMF31/30/35** comprises 5 versions that are differentiated by their characteristics, detailed below. Safety compact PLCs **XPSMF3000** incorporate up to 24 digital inputs for the connection of safety related input devices.

Compact PLCs	Inputs			Outputs Digital	Communication	
	Digital	Analogue	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

Digital inputs

Safety compact PLCs **XPSMF3000** incorporate up to 24 digital inputs for the connection of safety related input devices.

Analogue inputs

Safety compact PLCs **XPSMF3500** incorporate 8 analogue measuring inputs that receive analogue safety related signals from the machines to be monitored (1).

- Closed circuit scanning of input channels,
- Single-pole measuring of 0 to 10 V voltages,
- Measuring 0 to 20 mA currents using shunt

Counter inputs

Safety compact PLCs **XPSMF3502**, **XPSMF3522**, **XPSMF3542** incorporate 2 independent and configurable counting channels:

- Incremental encoders (--- 5 V),
- Sensors, 2/3-wire PNP/NPN (--- 24 V).

Digital outputs

Each safety compact PLC **XPSMF3000** incorporate 8 digital outputs for connection to signalling equipment and machines to be controlled (2).

Remote inputs and outputs

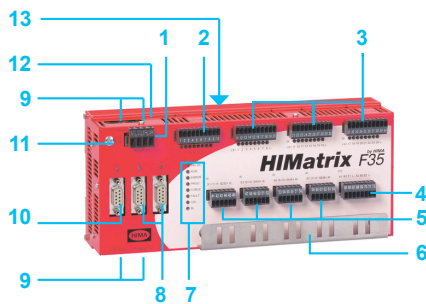
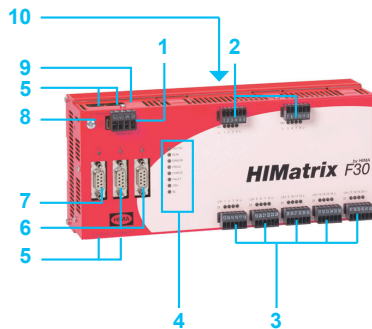
In addition to the inputs/outputs integrated as standard, safety compact PLCs **XPSMF31/30/35** can be connected to safety remote input modules **XPSMF1** and/or safety remote output modules **XPSMF2** and/or safety remote mixed I/O modules **XPSMF3**.

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 safety compact PLCs **XPSMF31/30/35** is performed on an Ethernet network using the SafeEthernet safety protocol, via the Integrated RJ45 switched Ethernet communications ports.

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

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



Description

Safety PLCs XPSMF31222 and XPSMF3022

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{\text{C}}$ 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 earth connection screw.
- 9 On the top: one "Reset" button.
- 10 On the rear face: one spring operated fixing device for mounting on 35 mm U rail.

Safety PLCs XPSMF35●●

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{\text{C}}$ 24 V supply.
- 2 One terminal block (1) for connection of digital outputs, with four digital output status LEDs.
- 3 Three terminal blocks (1) for connection of digital inputs, with input status LED (eight LEDs per terminal block).
- 4 One terminal block (1) for connection of 2 counting input channels.
- 5 Four terminal blocks (1) for connection of analogue inputs.
- 6 One plate for securing shielded analogue input connection cables.
- 7 Eight process status LEDs.
- 8 Two unused 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 earth connection screw.
- 12 On the top: one "Reset" button.
- 13 On the rear face: one spring operated fixing device for mounting on 35 mm U rail.

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

Safety compact PLCs

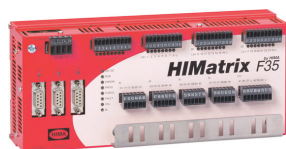
$\bar{\text{C}}$ 24 V supply



XPSMF31222



XPSMF3022



XPSMF35●●

Inputs		Outputs	Communication on			Reference	Weight	
Digital	Analogue	Digital	Ethernet network		Modbus serial (RTU)	PROFIBUS DP	kg/lb	
	Counting		Safe Ethernet protocol	Modbus TCP/IP server protocol	(RTU)			
20	-	-	8	Yes	Yes	-	XPSMF31222	1,000/2.205
					Yes	-	XPSMF3022	1.200/2.646
					Slave	-	XPSMF3022	1.200/2.646
24	8	2	8	Yes	Yes	-	XPSMF3502	1.200/2.646
					Yes	-	XPSMF3522	1.200/2.646
					Slave	-	XPSMF3522	1.200/2.646
					-	Yes	XPSMF3542	1.200/2.646
					-	V0 slave	XPSMF3542	1.200/2.646

Products referenced XPSMF31222, XPSMF3022 and XPSMF35●● are marked HIMatrix F31, HIMatrix F30 and HIMatrix F35.

Preventa safety compact PLCs

Type XPSMF40, XPSMF31/30/35

Communication on network and bus

Presentation

To communicate, Preventa safety compact 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	
	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)

Characteristics			
Protocol		SafeEthernet	
Compatibility with safety compact PLCs		XPSMF4000, XPSMF4002, XPSMF4020, XPSMF4022, XPSMF4040, XPSMF4042	XPSMF31222, XPSMF3022, XPSMF3502, XPSMF3522, XPSMF3542
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	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		
Bus type		Modbus serial (RTU)	
Compatibility with safety compact PLCs		XPSMF3022, XPSMF3522	XPSMF4020, XPSMF4022
Serial link port	Number and type	1 x SUB-D 9-pin female (FB3)	1 x RJ45 (Modbus)
	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	
		01	Modbus slave
		02	Reading n bits of output
		03	Reading n bits of inputs
		04	Reading n words of output
		05	Reading n words of inputs
		23	Reading/writing variables
		15	Writing bit variables
		16	Writing word variables
		06	Writing 1 bit of output
		08	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	
Bus type		PROFIBUS DP	
Compatibility with safety compact 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 (1200 m...100 m)	

Programming software

Type XPSMFWIN

for Preventa compact & 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.

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.

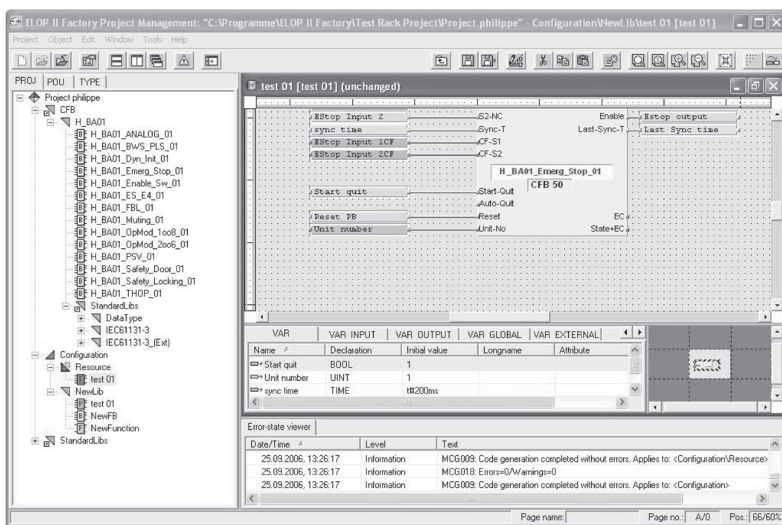
Using the **XPSMFWIN** software, it is possible to program complete systems comprising several safety PLCs and safety remote I/O modules. The conditions detailed in the software manual must be adhered to and a complete report accompanying the certificate should be established.

Reference

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

Description	Operating system	Composition	Language	Reference	Weight kg/ lb
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	0.520/ 1.146

Installation



Software **XPSMFWIN**: project management

Software **XPSMFWIN** uses an electronic key (dongle) for protection against unauthorised 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 colours minimum, 8 Mb XGA, 1280 x 1024 True colour recommended).
- Hard disk (1 Gigabyte minimum).
- Operating system:
 - Windows 2000 Professional with Service Pack 1 or higher.
 - Windows XP with Service pack 1.