XPSMCMCO0000••(G)
Fieldbus Expansion Modules
Instruction Sheet

Original instructions

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About the Book

Document Scope

This information is about the usage and configuration of the following fieldbus expansion modules for the XPSMCMCP0802(G), XPSMCMC10804(G) or XPSMCMC10804E(G) Modular Safety Controller:

Reference	Interface
XPSMCMCO0000CO(G)	CANopen
XPSMCMCO0000E(G)	Industrial Ethernet based (Multi-protocol EtherCat, Ethernet/IP, Modbus TCP and Profinet) **NOTE:** By default, Ethernet/IP protocol is applied.
XPSMCMCO0000EC(G)	EtherCAT
XPSMCMCO0000EI(G)	Ethernet/IP
XPSMCMCO0000MB(G)	Modbus Serial (RTU)
XPSMCMCO0000EM(G)	Modbus TCP
XPSMCMCO0000PB(G)	PROFIBUS DP

Validity Note

This document has been updated for the release of BUS Configurator V5.0.0.

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- English (EAV8283001)
- French (EAV8283002)
- German (EAV8283003)
- Italian (EAV8283004)
- Spanish (EAV8283005)
- Chinese (EAV8283006)
- Portuguese (EAV8283007)
- Turkish (EAV8283008)

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Product Related Information

The XPSMCM• Modular Safety Controller system can reach a maximum Safety Integrity Level (SIL 3) as per IEC 61508, a maximum Safety Integrity Level Claim Limit (SILcl 3) as per IEC 62061, and a maximum Performance Level (PL) e, category 4, as per EN ISO 13849-1. However, the definitive SIL and PL of the application depends on a number of safety-related components, their parameters, and the connections that are made, as per the risk analysis.

The module must be configured in accordance with the application-specific risk analysis and all the applicable standards.

Pay particular attention in conforming to any safety information, different electrical requirements, and normative standards that would apply to your adaptation.

⚠WARNING

UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED MACHINE OPERATION

- Evaluate whether your environment or your machines are connected to your critical infrastructure and, if so, take appropriate steps in terms of prevention, based on Defense-in-Depth, before connecting the automation system to any network.
- Limit the number of devices connected to a network to the minimum necessary.
- Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.
- Monitor activities within your systems.
- Prevent subject devices from direct access or direct link by unauthorized parties or unauthenticated actions.
- Prepare a recovery plan including backup of your system and process information.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For more information on organizational measures and rules covering access to infrastructures, refer to ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security and refer to Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment.

Information on Non-Inclusive or Insensitive Terminology

As a responsible, inclusive company, Schneider Electric is constantly updating its communications and products that contain non-inclusive or insensitive terminology. However, despite these efforts, our content may still contain terms that are deemed inappropriate by some customers.

XPSMCMCO0000••(G) Fieldbus Expansion Modules

Safety-related Information

⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected input devices, contactors, and drives prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Install and use this equipment only in locations known to be non-hazardous.
- Do not use the equipment described herein to supply external equipment.
- Always use properly rated voltage sensing equipment to confirm that the power is removed.
- Avoid contacting terminals with hand or tools until the power has been confirmed removed.
- Follow all electrical safety regulations and standards (for example, lockout/tag-out, phase grounding, barriers) to reduce the possibility of contact with hazardous voltages in the work area.
- Remove locks, tags, barriers, temporary ground straps, and replace and secure all covers, doors, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before reapplying power to the unit.
- Complete thorough hardware tests and system commissioning to verify that line voltages are not present on the control circuits before using your hardware operationally.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not exceed any of the rated operating limits for the equipment specified in the present document.
- Immediately cease using and replace any equipment that has or might have been subjected to conditions in excess of its rated operating limits.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

There are no user-serviceable parts in this equipment. For reasons of safety and compliance, only the manufacturer should perform repairs to this equipment.

⚠WARNING

LOSS OF SAFETY-RELATED FUNCTION

Do not attempt to repair or alter this equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Modules and Functions Description

The XPSMCMCO0000CO(G), XPSMCMCO0000E(G), XPSMCMCO0000EC(G), XPSMCMCO0000EI(G), XPSMCMCO0000MB(G), XPSMCMCO0000EM(G), and XPSMCMCO0000PB(G) are fieldbus expansion modules for the XPSMCM• Modular Safety Controller system offer. The fieldbus expansion modules can only be used in conjunction with the XPSMCMCP0802(G), XPSMCMC10804(G) and XPSMCMC10804E(G) Modular Safety Controller.

The fieldbus expansion modules can be configured using the BUS Configurator software (see Modular Safety Controller, Communication Guide), part of the installation package for SoSafe Configurable software. The software is provided with SoSafe Configurable 1.9.1 installation package or greater.

One fieldbus expansion module can be added to your Modular Safety Controller system using backplane expansion (see Modular Safety Controller, Hardware Guide).

The following fieldbus expansion modules are available:

Module reference	Interface	Type (short name in software and on product)
XPSMCMCO0000CO(G)	CANopen	**CAN**
XPSMCMCO0000E(G)	Industrial Ethernet based (Multi-protocol EtherCAT, Ethernet/IP, Modbus TCP and Profinet)	**ETH**
XPSMCMCO0000EC(G)	EtherCAT	**ECT**
XPSMCMCO0000EI(G)	Ethernet/IP	**EIP**
XPSMCMCO0000MB(G)	Modbus Serial	**MBS**
XPSMCMCO0000EM(G)	Modbus TCP	**MTP**
XPSMCMCO0000PB(G)	Profibus DP	**PDP**

The fieldbus expansion module exports the system status and the states and diagnostics of all I/Os configured on the Modular Safety Controller.

The input and output memory maps are described in the *Modular Safety Controller User Guide*.

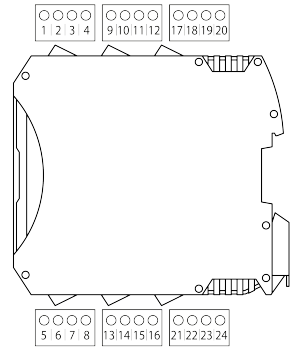
Terminals

Examples with maximum number of terminals. Regarding terminal designation, refer to table below.

Screw terminals example

Spring terminals example

Terminal numbers



XPSMCMCO0000CO(G), XPSMCMCO0000E(G), XPSMCMCO0000EC(G), XPSMCMCO0000EI(G), XPSMCMCO0000MB(G), XPSMCMCO0000EM(G), and XPSMCMCO0000PB(G).

Terminal	Signal	LED	Description
1	24 VDC	PWR	24 Vdc power supply
2	–	–	No Connection (N.C.)
3			
4	0 VDC	PWR	0 Vdc power supply
5 to 8	–	–	No Connection (N.C.)

⚠WARNING

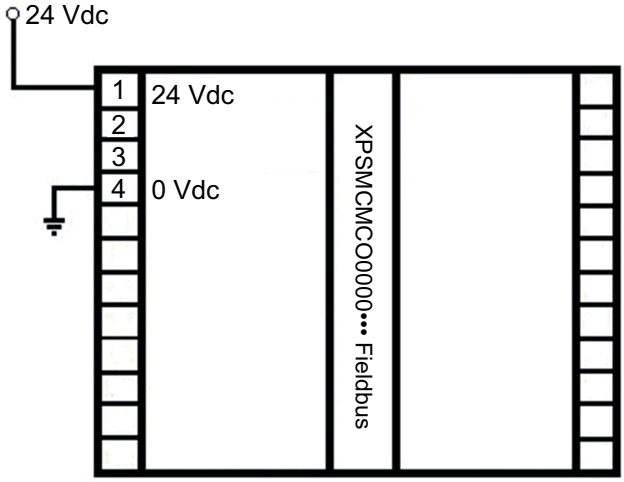
UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as "No Connection (N.C.)" or Not Connected.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Wiring Example

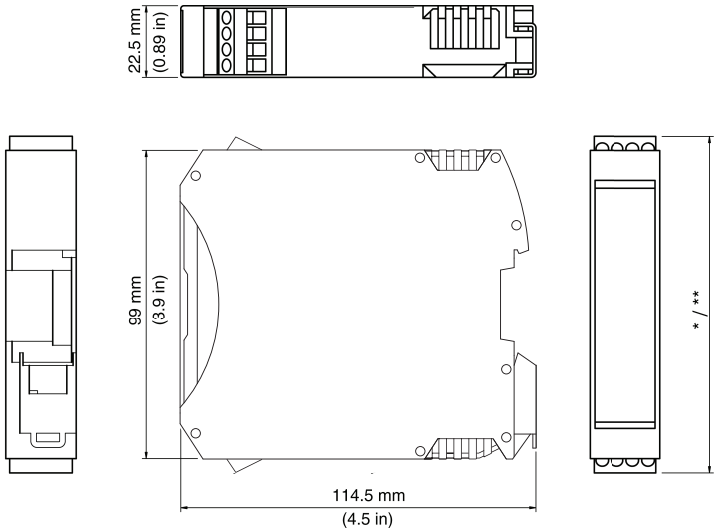
The following drawing shows an example of a fieldbus expansion module:



NOTE: Use a fuse on the incoming 24 Vdc power, sized appropriately for the requirements of the module.

NOTE: For wiring example of the XPSMCMC10804E(G) controller with integrated fieldbus interface, refer to Modular Safety Controller, Hardware Guide.

Dimensions



***** Screw terminals 108 mm (4.25 in)

****** Spring terminals 118 mm (4.67 in)

Mount the modules (Modular Safety Controller and any I/O expansion modules) in an electric cabinet with an IP54 degree of protection. The minimum clearance below and above the controller is 40 mm. Allow at least 100 mm distance between the cabinet door and the front face of the module(s). There are no clearances required on the left or right side of the module(s); however, other equipment in proximity may require larger distances and those clearances must also be taken into account.

Technical Data

Cable types and wire sizes

For a 5.08 pitch removable **screw** terminal block:

mm / in. 7 / 0.28								
mm²	0.2…2.5	0.2…2.5	0.25…2.5	0.25…1.5	2 x 0.2…1	2 x 0.2…1.5	2 x 0.25…1	2 x 0.5…1.5
AWG	*24…14*	*24…14*	*23...14*	*23...16*	*2 x 24…18*	*2 x 24…16*	*2 x 23…18*	*2 x 20...16*

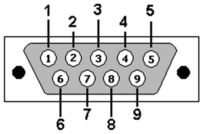
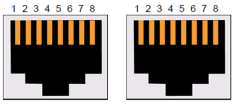
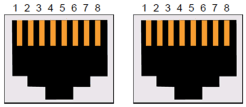
Ø 3,5 mm (*0.14 in.*)	C	N•m	0.5
		lb-in	*4.42*

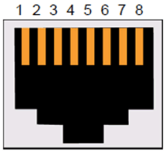
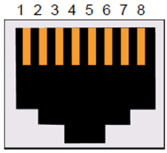
For a 5.08 pitch removable **spring** terminal block (used by XPSMCM•••G):

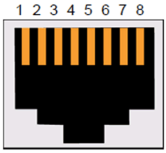
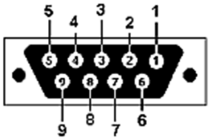
mm / in. 10 / 0.39					
mm²	0.2…2.5	0.2…2.5	0.25…2.5	0.25…2.5	2 x 0.5...1
AWG	*24…14*	*24…14*	*23...14*	*23...14*	*2 x 20...18*

The following instructions concerning connection cables must be observed:

- Use 60/75 °C copper (Cu) conductor only. Maximum cable length 100 m (328 ft).
- Cables used for connections longer than 50 m (164 ft) must have a cross-section of at least 1 mm² (AWG 16).

Module-specific characteristics	**XPSMCMCO0000CO(G)**	**XPSMCMCO0000E(G)**	**XPSMCMCO0000EC(G)**
Reference description	**CAN**: CANopen non-safety-related communication module	**ETH**: Multi protocol module (Ethernet/IP, EtherCAT, Modbus TCP and Profinet)	**ECT**: EtherCAT non-safety-related communication module
Output and PIN number	CAN (CANopen)  DB9 - male	ETH (Ethernet/IP, EtherCat, Modbus TCP and Profinet)  RJ45 - female	ECT (EtherCAT)  RJ45 - female
Wiring	Pin/ Signal 1/ not used 2/ CAN_L 3/ CAN_GND 4/ not used 5/ CAN_SHLD 6/ not used 7/ CAN_H 8/ not used 9/ not used Housing CAN_ SHIELD	PIN/Signal 1/ Tx+ 2/ Tx- 3/ Rx+ 4/ not used 5/ not used 6/ Rx- 7/ not used 8/ not used	
Baud rate	from 10kbit/s to 1Mbit/ s	10/100 Mbit/s (full duplex)	100 Mbit/s (full duplex)

Module-specific characteristics	**XPSMCMCO0000EI(G)**	**XPSMCMCO0000MB(G)**
Reference description	**EIP**: Ethernet/IP non-safety-related communication module	**MBS**: Modbus Serial non-safety-related communication module
Output and PIN number	EIP (Ethernet/IP)  RJ45 - female	MBS (Modbus Serial)  RJ45 - female
Wiring	PIN/ Signal 1/ Tx+ 2/ Tx- 3/ Rx+ 4/ not used 5/ not used 6/ Rx- 7/ not used 8/ not used	PIN/Signal/ Description 1/ not used 2/ not used 3/ not used 4/ D1 5/ D0 6/ not used 7/ VP (5 Vdc supply) 8/ Common housing/cable shield
Baud rate	10/100 Mbit/s, full/half duplex	up to 115200 bps

Module-specific characteristics	XPSMCMCO0000EM(G)	XPSMCMCO0000PB(G)
Reference description	**MTP** : Modbus TCP non-safety-related communication modules	**PDP**: Profibus DP V1 non-safety-related communication module
Output and PIN number	MTP (Modbus TCP)  RJ45- female	PDP (Profibus DP)  DB9 – female
Wiring	PIN/ Signal 1/ Tx+ 2/ Tx- 3/ Rx+ 4/ not used 5/ not used 6/ Rx- 7/ not used 8/ not used	PIN/Signal/ Description 1 / not used 2 / not used 3 / B Line / + RxD/TxD, RS485 level 4 / RTS / Request to send 5 / GND Bus/ 0 Vdc (isolated)) 6 / 5 V / +5 V Bus Output / +5V termination power (isolated, short-circuit protected) 7 / not used 8 / A Line / - RxD/TxD, RS485 level 9 / not used Housing/ cable shield / Internally connected to the protective earth using cable shield filters according to the PROFIBUS standard
Baud rate	10/100 Mbit/s, full/half duplex	Auto Baud rate

Checklist After Installation

The following must be verified:

Step	Action
1	Conduct a full functional test of the system (see *Validation* in the *Modular Safety Controller User Guide*.)
2	Verify that all the cables are correctly inserted and the terminal blocks are within correct torque for screw terminals.
3	Verify that all the LED indicators are correctly illuminating for the inputs and outputs used.
4	Verify the positioning and function of all input and output sensors and actuators used with the XPSMCM•.
5	Verify the correct mounting of XPSMCM• to the DIN rail.
6	Verify that all the external indicators (lamps/beacons/sirens) are correctly functioning.

LED Indicators

Frontface View

LED Indicators for Operation

The following table describes the states of the LED indicators of the fieldbus expansion modules.

PWR green	RUN green	E IN red	E EX red	Module-specific LED[1]	Meaning
ON	ON	ON	ON	See the module-specific tables[1]	Startup - Initial test
ON	OFF	OFF	OFF		Waiting for configuration from the Modular Safety Controller
ON	ON	OFF	OFF		Received configuration from the Modular Safety Controller
[1] Two LEDs indicate the communication protocol status. These LEDs are described in the module-specific tables.					

LED Indicators for Troubleshooting

The following table describes the states of the LED indicators between the different communication expansion modules, when the power (**PWR**) indicator is illuminated.

Detected error	RUN green	E IN red	E EX red	Module-specific LED[1]	Solution
Internal microcontroller error detected.	OFF	2 flashes	OFF	See the module-specific tables[1]	Replace the product if the condition persists after reboot.
Internal board error detected.	OFF	3 flashes	OFF		
Configuration error detected.	OFF	5 flashes	OFF		Verify correct configuration.
Fieldbus communication error detected.	OFF	5 flashes	OFF		Verify the fieldbus connections.
Fieldbus communication interruption detected.	OFF	ON	OFF		Verify wiring, connectors, and state of the fieldbus master.
Duplicate addresses detected on the fieldbus.	OFF	5 flashes	5 flash-es		Set a correct fieldbus address.
[1] Two LEDs indicate the communication status. These LEDs are described in the module-specific tables. **NOTE:** The LED frequency of flashing is: ON for 300 ms and OFF for 400 ms with an interval between flash sequences of 1 second.					

XPSMCMCO0000CO(G) CANopen

The following table presents the LED indicator **CAN RUN**.

State	Indication
OFF	No power
Green	Online, connected
Flashes slow green	Operating state Pre-Operational
Periodic single green flash	Operating state Stopped
Flashes fast green	Baud rate detection in progress
Red	Fieldbus not operational
Operating states mentioned in the table according to the CANopen state machine	

The following table presents the LED indicator **ERR**.

State	Indication
OFF	No error detected
Periodic single red flash	A fieldbus error counter has reached an alert level
Fast red flashing	Layer Setting Service (LSS) operational
Periodic double red flash	Network monitoring event: node guarding or heartbeat not detected
Red	Fieldbus not operational

XPSMCMCO0000E(G) Ethernet Based Multi-Protocol

The following tables present the LED indicators **ETH MS** and **NS**, depending on the protocol selected.

NOTE: The additional LEDs located next to the Ethernet ports (RJ-45 sockets) indicate Ethernet connection state and Ethernet connection activity.

Ethernet/IP protocol

LED	State	Indication
ETH MS (module status)	OFF	No power
	Green	Operating state Operational
	Flashes green	Not configured or scanner is idle
	Flashes green/red	Self-test
	Red	One or more unrecoverable errors detected
	Flashes red	One or more recoverable errors detected
NS (node status)	OFF	No power or no IP address
	Green	Online, connected. One or more connections established (CIP Class 1 or 3)
	Flashes green	Online, not connected
	Flashes green/red	Self-test
	Red	Duplicate IP address
	Flashes Red	Connection timeout, one or more connections timed out (CIP class 1 or 3)

EtherCAT protocol

LED	State	Indication
ETH MS (module status)	OFF	Operating state Init or no power
	Green	Operating state Operational
	Flashes green	Operating state Pre-Operational
	Flashes green once	Operating state Safe-Operational
NS (node status)	OFF	No error or no power
	Flashes red	Configuration not valid Operating state transition not possible
	Flashes red once	Local error detected
	Flashes red twice	Timeout EtherCAT SynchManager watchdog

Modbus TCP protocol

LED	State	Indication
ETH MS (module status)	OFF	No power or no IP address
	Green	Online, connected
	Flashes green	Online, Modbus/TCP task is not yet configured
	Fast flashes green	Modbus/TCP task is configured
NS (node status)	OFF	No error or no power
	Flashes red	One or more system errors detected
	Red	One or more communication errors detected

Profinet protocol

LED	State	Indication
ETH MS (module status)	OFF	No error or no power
	Red	Watchdog timeout or system error
	Flashes red	Communication established through the bus
NS (node status)	OFF	No error or no power
	Red	No configuration
	Flashes red	No data exchange

XPSMCMCO0000EC(G) EtherCAT

The following table presents the LED indicator **ECT RUN**.

State	Indication
OFF	Operating state Init or no power
Green	Operating state Operational
Flashes green	Operating state Pre-Operational
Flashes green once	Operating state Safe-Operational
Red	System locked
Operating states mentioned in the table according to the EtherCAT state machine	

The following table presents the LED indicator **ERR**.

State	Indication
OFF	No error or no power
Flashes red	Configuration not valid Operating state transition requested by master not possible
Flashes red twice	Timeout EtherCAT SynchManager watchdog
Red	Error detected, fieldbus module not operational

XPSMCMCO0000EI(G) Ethernet/IP

The following table presents the LED indicator **EIP NS**.

State	Indication
OFF	No power or no IP address
Green	Online, connected. One or more connections established (CIP Class 1 or 3)
Flashes green	Online, not connected
Red	Duplicate IP address
Flashes red	Connection timeout, one or more connections timed out (CIP class 1 or 3)

The following table presents the LED indicator **MS**.

State	Indication
OFF	No power
Green	Operating state Operational
Flashes green	Not configured or scanner is idle
Red	One or more non-recoverable errors detected
Flashes red	One or more recoverable errors detected
Operating states mentioned in the table according to the EtherNet/IP state machine	

XPSMCMCO0000MB(G) Modbus Serial

The following table presents the LED indicator **MBS COM**.

State	Indication
OFF	No power or no data exchange
Yellow	Frame reception or transmission
Red	One or more non-recoverable errors detected

The following table presents the LED indicator **STS**.

State	Indication
OFF	No power or initializing
Green	Module initialized
Red	One or more non-recoverable errors detected
Periodic single red flash	Communication or configuration error detected
Periodic double red flash	Application diagnostics available

XPSMCMCO0000EM(G) Modbus TCP

The following table presents the LED indicator **MTP NET**.

State	Indication
OFF	No power or no IP address.
Green	Online, connected.
Flashes green	Online, not connected.
Red	Duplicate IP address.
Flashes red	Connection timeout.

The following table presents the LED indicator **STS**.

State	Indication
OFF	No power.
Green	Running.
Red	One or more non-recoverable errors detected.
Flashes red	One or more recoverable errors detected.

XPSMCMCO0000PB(G) Profibus DP

The following table presents the LED indicator **PDP MODE**.

State	Indication
OFF	No power
Green	Online, connected
Flashes green	Online, clear
Periodic single red flash	Parameterization error detected
Periodic double red flash	Profibus DP configuration error detected (configuration data in master or slave incorrect)

The following table presents the LED indicator **STS**.

State	Indication
OFF	Module not initialized
Flashes green	Diagnostics exchange active with master
Green	Initialized
Flashes red	One or more recoverable errors detected
Red	Non-recoverable error detected

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