Modular Safety Controller
Hardware Guide

10/2020

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The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

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

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

START-UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

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

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

At a Glance

Document Scope

This manual describes how to use the XPSMCM• Modular Safety Controller system.

The XPSMCM• Modular Safety Controller system consists of a controller unit XPSMCMCP0802•, which can be configured using the SoSafe Configurable software. Expansion input and output modules can be connected to the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller.

Validity Note

This document has been updated for the release of EcoStruxure™ Machine Expert V1.2.4.

The technical characteristics of the devices described in the present document also appear online.To access the information online, go to the Schneider Electric home page *www.se.com*.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

Document title	Reference
Modular Safety Controller - Library and Programming Guide	*EIO0000004007 (ENG)*; *EIO0000004008 (FRE)*; *EIO0000004009 (GER)*; *EIO0000004010 (ITA)*; *EIO0000004011 (SPA)*; *EIO0000004012 (CHS)* *EIO0000004013 (POR)*
Modular Safety Controller - Communication Guide	*EIO0000004014 (ENG)*; *EIO0000004015 (FRE)*; *EIO0000004016 (GER)*; *EIO0000004017 (ITA)*; *EIO0000004018 (SPA)*; *EIO0000004019 (CHS)* *EIO0000004020 (POR)*

Product Related Information

The XPSMCM• can reach a maximum Safety Integrity Level (SIL) 3 as per IEC 61508, a maximum Safety Integrity Level Claim Limit (SILcl) as per IEC 62061, and a maximum Performance Level (PL) e, category 4, as per 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

INSUFFICIENT SAFETY-RELATED FUNCTIONS

- Perform a risk assessment as per ISO 12100 and/or other equivalent assessment and appropriately consider all applicable regulations and standards that apply to your machine/process before using this software.
- In your risk assessment, determine all requirements regarding the Safety Integrity Level (SIL), the Performance Level (PL), and any other safety-related requirements and capabilities applicable to your machine/process.

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

NOTE: Configuration of the module is the sole responsibility of the installer or user.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2015	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction

Standard	Description
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2015	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2016	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive* (*2006/42/EC*) and *ISO 12100:2010*.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

Standards Relating to the Modular Safety Controller

The following list provides an overview of the standards that relate to the Modular Safety Controller:

Standard	Description
ISO 13849-1:2015	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
ISO 13855:2010	Safety of machinery - Positioning of safeguards with respect to the approach speeds of parts of the human body
IEC 61131-2	Industrial-process measurement and control - Programmable controllers – Part 2: Equipment requirements and tests
EN 61496-1:2013	Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 1: General requirements
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 3: Software requirements
IEC 61508-4:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems- Part 4: Definitions and abbreviations
IEC 61800-5-2:2016	Adjustable speed electrical power drive systems - Part 5-2: Safety requirements – Functional
2014/65/EU	Restriction of the use of certain hazardous substances in Electrical and Electronic Equipment

The list of standards relating to the modular safety controller is not intended to be exhaustive relative to your specific application. Further, there may be additional functional safety standards that may apply to your particular application. Consult the User Guides of the Modular Safety Controller and visit the Schneider Electric website at *www.se.com* for product certifications which detail compliance with specific standards, regulations, and directives.

Part I
Common Hardware Information

What Is in This Part?

This part contains the following chapters:

Chapter 1
General Information on the Modular Safety Controller

What Is in This Chapter?

This chapter contains the following topics:

Safety Information on XPSMCMx Modular Safety Controller

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 other, 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.

⚠ DANGER

LOSS OF DESIGNATED SAFETY FUNCTION

- Install the XPSMCM• Modular Safety Controller system in an enclosure with a degree of protection of at least IP 54.
- Use a Protective Extra Low Voltage (PELV) power supply to isolate the equipment from line voltage.
- Do not directly connect the equipment to line voltage.

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

NOTE: The safety-related function can be compromised if this equipment is not used for the intended purpose and in accordance with the instructions in the present document. This equipment must only be used as safety-related equipment on machines intended to protect persons, material, and installations.

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use the Modular Safety Controller in non-hazardous locations only.

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

NOTE: The observation of operating limits and duty cycles is of particular importance for equipment designed to perform a safety-related function. If this module has been subjected to electrical, mechanical, or environmental stresses in excess of its stated limits, do not use it.

⚠ 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 servicable components in the Modular Safety Controller and expansion modules. Inoperable products need to be replaced by a new products of the same references.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not open the housing or otherwise attempt to service the safety-related products in any way.
- Immediately return any product that you perceive to be damaged, malfunctioning or defective to your place of purchase.

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

User Responsibilities

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user, machine builder, or system integrator to perform the appropriate and complete risk analysis, evaluation, and testing of the products with respect to the relevant specific application or use thereof.

Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found discrepancies in this publication, notify Schneider Electric. All pertinent safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

Qualified Personnel

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. A qualified person is one who has skills and knowledge related to the construction and operation of this electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Modular Safety Controller

Key safety values	Value	Standard
Probability of a dangerous failure per hour (PFHd)	Refer to module-specific characteristics.	IEC 61508
Safety Integrity Level (SIL)	3	
Hardware Fault Tolerance (HFT)	1 (type B)	
Defined “Safe state”(1)	All outputs off	
Safety Integrity Level claim limit (SILcl)	3	IEC 62061
Type	4	EN 61496-1

(1) The Modular Safety Controller and expansion modules are in the defined safe state when their functional safety-related outputs are deactivated. To exit the defined safe state condition, a combination of hardware inputs is required.
(2) The EN ISO 13849-1 performance level (PL) and safety category (Cat) of the overall system depends on multiple factors, including the selected modules, wiring practices, the physical environment, and the application.
(3) If expansion modules are added to the configuration, the MTTFd of the overall system is affected, refer to the SoSafe Configurable Project Report.

Key safety values	Value	Standard
Performance Level (PL)(2)	e	EN ISO 13849-1
Diagnostic Coverage$_{avg}$	High	
Mean Time to Dangerous Failure (MTTFd)	2500 years with Category 4 architecture, otherwise 100 years(3)	
Category(2)	4	
Maximum service life	20 years	

(1) The Modular Safety Controller and expansion modules are in the defined safe state when their functional safety-related outputs are deactivated. To exit the defined safe state condition, a combination of hardware inputs is required.
(2) The EN ISO 13849-1 performance level (PL) and safety category (Cat) of the overall system depends on multiple factors, including the selected modules, wiring practices, the physical environment, and the application.
(3) If expansion modules are added to the configuration, the MTTFd of the overall system is affected, refer to the SoSafe Configurable Project Report.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- You must carry out a risk assessment in accordance with ISO 12100.
- Validate the entire system/machine in accordance with the required performance level and risk assessment.

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

Regular proof test intervals as defined by IEC 61508 are required. Observe the required test cycles according to your application.

Modular Safety Controller System

Presentation

The XPSMCM• functional safety offer consists of a XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller, which can be configured using the SoSafe Configurable software *(see Modular Safety Controller, Communication Guide)*. The controllers have eight safety-related inputs and two or four dual-channel solid-state safety-related outputs. Expansion input and output modules can be connected to the XPSMCMCP0802• or XPSMCMC10804• controller via the backplane expansion bus *(see page 216)*. Together, these references form the structural basis of a functional safety system.

The system may include a number of electronic expansions up to a maximum of 14, with not more than four I/O modules of the same reference. The number of external relay modules XPSMCMER0002• and XPSMCMER0004• which can be installed is limited by the number of OSSD outputs and status outputs of the system.

With 14 expansions, the system supports up to 128 inputs, 16 dual-channel safety-related outputs, and 32 status outputs. The controller and its expansion modules communicate via the 5-way backplane expansion bus physically arranged on the back of the controller and expansion modules. However, if the `Network` function block is used within the configuration, a maximum of 9 expansion modules can be used with a controller.

In addition, fieldbus inputs and fieldbus probes can be used for non-safety-related commands through the addition of fieldbus expansion modules. Numbers of available fieldbus inputs and fieldbus probes depend on the type of the Modular Safety Controller.

The SoSafe Configurable software enables you to create simple to complex configurations with the mixture of safety-related functions and logic; such as the combination of muting function with timers or counters.

The configuration created on the PC is sent to the XPSMCMCP0802• or XPSMCMC10804• controller via a USB (PC) to Mini B USB (controller) cable. The file resides in the XPSMCMCP0802• or XPSMCMC10804• controller and can also be saved on the optional memory card accessory *(see page 213)* XPSMCMME0000. The configuration can therefore quickly be copied to another XPSMCMCP0802• or XPSMCMC10804• controller unit.

The Modular Safety Controller is capable of monitoring the following safety-related sensors and command devices:

- Optoelectronic sensors (safety light curtains, scanners, safety photo cells)
- Mechanical switches
- Safety mats
- Emergency stops
- Two-hand controls
- Enabling devices
- Magnetic switches
- Proximity switches
- Encoders

Controller Modules

The following controller modules are available:

Controller module	Type	Description
XPSMCMCP0802• *(see page 46)* XPSMCMCP0802•G *(see page 46)*	CP0802	• 8 safety-related inputs • 2 dual-channel solid-state safety-related outputs (Output Signal Switching Device, 0SSD).
XPSMCMC10804• *(see page 58)* XPSMCMC10804•G *(see page 58)*	C10804	• 8 safety-related inputs • 4 solid-state safety-related outputs which can be used as 4 single or 2 dual (Output Signal Switching Device, 0SSD).

I/O Expansion Modules

The following input and output expansion modules are available:

Input and output expansion module	Type	Description
XPSMCMDO00042A• *(see page 113)*	DO042A	• 4 single-channel solid-state safety-related outputs (Output Signal Switching Device, 0SSD). • With this module, the system can provide 4 safety-related higher current outputs.
XPSMCMAI0400• *(see page 74)*	AI04	• 4 configurable analog input channels. • With this module, a wide range of analog sensors can be used in the system.
XPSMCMMX0804• *(see page 182)*	MX0804	• 8 safety-related inputs • 4 solid-state safety-related outputs which can be used as 4 single or 2 dual (Output Signal Switching Device, 0SSD).
XPSMCMDO0004S• *(see page 127)*	DO04S	• 4 single-channel solid-state safety-related outputs (Output Signal Switching Device, 0SSD). • With this module, the system can provide 4 safety-related outputs.
XPSMCMDO0008C1• *(see page 139)*	DO08C1	• 8 status outputs for PL c, SIL 1 • With this module, the number of inputs in the system can be increased to allow more external devices to be connected.
XPSMCMDO0016C1• *(see page 146)*	DO16C1	• 16 status outputs for PL c, SIL 1 • With this module, the number of status outputs in the system can be increased to allow more external devices to be connected.
XPSMCMMX0802• *(see page 173)*	MX0802	• 8 safety-related inputs • 2 dual-channel solid-state safety-related outputs (Output Signal Switching Device, 0SSD).

Input and output expansion module	Type	Description
XPSMCMDI0800• Module *(see page 87)*	DI08	• 8 safety-related inputs • With this module, the number of inputs in the system can be increased to allow more external devices to be connected.
XPSMCMDI1600• Module *(see page 87)*	DI16	• 16 safety-related inputs • With this module, the number of inputs in the system can be increased to allow more external devices to be connected.
XPSMCMDI1200MT• Module *(see page 94)*	DI12M	• Application-specific module dedicated to safety mats. • Provides 8 test outputs for line control monitoring. • With this module, the number of inputs in the system can be increased to allow more external devices to be connected.
XPSMCMDO0002• Module *(see page 101)*	DO02	2 dual-channel solid-state safety-related output pairs for connection to contactors or drives.
XPSMCMDO0004• Module *(see page 101)*	DO04	4 dual-channel solid-state safety-related output pairs for connection to contactors or drives.
XPSMCMER0002• Module *(see page 154)*	ER02	• 2 forcibly guided contact safety-related relay output (2 NO +1 NC) module without backplane connection. • The XPSMCMER0002• module is not connected to the backplane expansion bus.
XPSMCMER0004• Module *(see page 154)*	ER04	• 4 forcibly guided contact safety-related relay output (2x 2 NO +1 NC) module without backplane connection. • The XPSMCMER0004• module is not connected to the backplane expansion bus.
XPSMCMRO0004• Module *(see page 163)*	R04	• 4 forcibly guided contact safety-related relay output (4x 2 NO) module without backplane connection. • Expansion module with 4 independent safety-related relay outputs and the corresponding 4 inputs for the external feedback contacts (EDM). • The relay can be configured according to Category 1, 2 and 4 architectures.
XPSMCMRO0004DA• Module *(see page 163)*	R04DA	• 4 forcibly guided contact safety-related relay output (4x 2 NO) module without backplane connection. • Expansion module with 4 independent safety-related relay outputs and the corresponding 4 inputs for the external feedback contacts (EDM). • The relay can be configured according to Category 1, 2 and 4 architectures. • Contains 8 non-safety-related status outputs.

Input and output expansion module	Type	Description
XPSMCMEN• Module *(see page 194)*	• PROX • E01HT • E01SC • E01TT • E02HT • E02SC • E02TT	• Modules for monitoring speed by proximity sensors, and, depending on the reference, safety encoders with SinCos, HTL or TTL interface. • The XPSMCMEN• expansion units can be used to control the following (up to PLe): ❍ Zero speed, maximum speed, speed range; ❍ Direction of movement, rotation/translation • Up to 4 speed thresholds can be set for each logic output (axis). • Each unit incorporates two logic outputs that can be configured using the SoSafe Configurable software and is thus capable of controlling up to two independent axes.

Communication Modules

The following communication modules are available:

Communication module	Type	Description
XPSMCMCO0000S• Module *(see page 204)*	**SCOM1**, **SCOM2**	• The XPSMCMCO0000S1 and XPSMCMCO0000S2 units are used to build remote functional safety islands between controller and I/O expansion modules at distance (< 50 m / 164 ft) between islands and up to 6 islands. • Two XPSMCMCO0000S1 or XPSMCMCO0000S2 expansion modules can be connected using a RS-485 shielded cable *(see page 217)*.
XPSMCMCO0000•• Module *(see Modular Safety Controller, Communication Guide)*	**CAN** , **ECT**, **EIP**, **MBS**, **MTP**, **PDP**	The fieldbus expansion modules allow connection to the most common industrial fieldbus systems for diagnostics and data transmission.

Accessories

The following accessories are available:

Accessories	Type	Description
TCSXCNAMUM3P *(see page 212)*	USB/Mini B USB configuration cable	Cable for configuring both the XPSMCMCP0802• controller and fieldbus communication modules
XPSMCMME0000 *(see page 213)*	Memory card	The memory card can be installed in the Modular Safety Controller and is used to save/restore the hardware/software configuration
XPSMCMCN0000SG *(see page 216)*	Backplane expansion connector	The connector allows you to add expansion input/output and communication modules to the XPSMCM• Modular Safety Controller. The Modular Safety Controller requires one XPSMCMCN0000SG connector; the expansion modules are delivered with the connector. Modular Safety Controllers with a reference BC (XPSMCMCP0802*BC* or XPSMCMC10804*BC*) are delivered with backplane connector.

Accessories	Type	Description
TSXSCMCN0•• *(see page 217)*	RS485 cables	RS485 serial interface shielded cables are used between the Bus expansion communications modules to create decentralized safety-related islands. The cable is available in 10 m (32.81 ft), 25 m (82.02 ft) and 50 m (164.04 ft) lengths.
TSXESPPM••• *(see page 218)* TSXESPP3••• *(see page 220)*	Encoder splitter cables	An encoder splitter cable is used to split the motor encoder feedback signal. One signal is then directed to the drive and one to the safety-related speed monitoring module. The cables is available in 1 m (3.28 ft), 3 m (9.84 ft), and 5 m (16.4 ft) lengths.

Scope of Delivery

Overview

Each controller is provided with:

- Multi-language instruction sheet
- Backplane connector XPSMCMCN0000SG (with XPSMCMCP0802*BC* or XPSMCMC10804*BC* only; controllers with a reference without “BC” are delivered without backplane connector for stand-alone use)
- Controllers whose reference number have a suffix “G” are delivered with spring terminal blocks, the other controllers with screw terminal blocks

Each expansion module including fieldbus and specific modules is provided with:

- Multi-language instruction sheet
- Backplane XPSMCMCN0000SG connector (except for XPSMCMER0002• and XPSMCMER0004• because they are not connected to the backplane expansion bus)
- Modules whose reference number have a suffix “G” are delivered with spring terminal blocks, the other modules with screw terminal blocks

NOTE: For each controller, you must order the following items separately as optional accessories:

- TCSXCNAMUM3P: USB/Mini B USB configuration cable *(see page 212)*
- XPSMCMME0000: Memory card *(see page 213)*
- XPSMCMCN0000SG: Backplane expansion connector *(see page 216)* (except for controllers XPSMCMCP0802*BC* or XPSMCMC10804*BC*)

China RoHS

Declaration on the Restriction of Hazardous Substances (RoHS)

The data shown in this spreadsheet are related to the following version of the China RoHS 2.0: Administrative Measures for the Restriction of Hazardous Substances in Electric Appliances and Electronic Products" released January 21st 2016.

部件名称 Part name	有害物质 - Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
金属部件 Metal parts	X	O	O	O	O	O
塑料部件 Plastic parts	O	O	O	O	O	O
电子件 Electronic	X	O	O	O	O	O
触点 Contacts	O	O	O	O	O	O
线缆和线缆附件 Cables & cabling accessories	O	O	O	O	O	O

本表格依据 SJ/T11364 的规定编制。

O: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

This table is made according to SJ/T 11364.

O: indicates that the concentration of hazardous substance in all of the homogeneous materials for this part is below the limit as stipulated in GB/T 26572.

X: indicates that concentration of hazardous substance in at least one of the homogeneous materials used for this part is above the limit as stipulated in GB/T 26572

Table 1

Chapter 2
Technical Data

What Is in This Chapter?

This chapter contains the following topics:

General System Characteristics

General Characteristics

General characteristics			
Rated voltage	24 Vdc ± 20 % (PELV supply)		
Dissipated power	3 W maximum (per module)		
Overvoltage category	II		
Ambient operating temperature	-10...+55 °C (14...131 °F), for vertical or horizontal mounting position		
Storage temperature	-20...+85 °C (-4...185 °F)		
Relative humidity	10...95%		
Maximum operation altitude	2000 m (6562 ft)		
Pollution degree	2		
Vibration resistance (EN 61496-1)	+/- 0.35 mm (0.014 in) 10...55 Hz		
Bump resistance (EN 61496-1)	10 g (16 ms half-sine)		
Response time (ms) The response time depends on the following parameters: ● Number of expansion modules installed ● Number of operators ● Number of OSSD outputs ● Status outputs For the overall system response time, refer to the one calculated by the SoSafe Configurable software (see project report). T_{Input_filter} = filtering time set in the project for the inputs. For details, refer to the Input functions *(see Modular Safety Controller, Library and Programming Guide)*.	Controller (XPSMCMCP0802•)	10.6...12.6	+ T_{Input_filter}
	Controller + 1 expansion module	11.8...26.5	+ T_{Input_filter}
	Controller + 2 expansion modules	12.8...28.7	+ T_{Input_filter}
	Controller + 3 expansion modules	13.9...30.8	+ T_{Input_filter}
	Controller + 4 expansion modules	15...33	+ T_{Input_filter}
	Controller + 5 expansion modules	16...35	+ T_{Input_filter}
	Controller + 6 expansion modules	17...37.3	+ T_{Input_filter}
	Controller + 7 expansion modules	18.2...39.5	+ T_{Input_filter}
	Controller + 8 expansion modules	19.3...41.7	+ T_{Input_filter}
	Controller + 9 expansion modules	20.4...43.8	+ T_{Input_filter}
	Controller + 10 expansion modules	21.5...46	+ T_{Input_filter}
	Controller + 11 expansion modules	22.5...48.1	+ T_{Input_filter}
	Controller + 12 expansion modules	23.6...50.3	+ T_{Input_filter}
	Controller + 13 expansion modules	24.7...52.5	+ T_{Input_filter}
	Controller + 14 expansion modules	25.8...54.6	+ T_{Input_filter}

General characteristics			
Response time (ms) The response time depends on the following parameters: ● Number of expansion modules installed ● Number of operators ● Number of OSSD outputs ● Status outputs For the overall response time, refer to the one calculated by the SoSafe Configurable software (see project report). T_{Input_filter} = filtering time set in the project for the inputs. For details, refer to the Input functions *(see Modular Safety Controller, Library and Programming Guide)*.	Controller (XPSMCMC10804•)	12.75...14.75	+ T_{Input_filter}
	Controller + 1 expansion module	13.83...37.84	+ T_{Input_filter}
	Controller + 2 expansion modules	14.91...40.00	+ T_{Input_filter}
	Controller + 3 expansion modules	15.99...42.16	+ T_{Input_filter}
	Controller + 4 expansion modules	17.07...44.32	+ T_{Input_filter}
	Controller + 5 expansion modules	18.15...46.48	+ T_{Input_filter}
	Controller + 6 expansion modules	19.23...48.64	+ T_{Input_filter}
	Controller + 7 expansion modules	20.31...50.80	+ T_{Input_filter}
	Controller + 8 expansion modules	21.39...52.96	+ T_{Input_filter}
	Controller + 9 expansion modules	22.47...55.12	+ T_{Input_filter}
	Controller + 10 expansion modules	23.55...57.28	+ T_{Input_filter}
	Controller + 11 expansion modules	24.63...59.44	+ T_{Input_filter}
	Controller + 12 expansion modules	25.71...61.60	+ T_{Input_filter}
	Controller + 13 expansion modules	26.79...63.76	+ T_{Input_filter}
	Controller + 14 expansion modules	27.87...65.92	+ T_{Input_filter}

NOTE: Specific characteristics for each reference can be found in Component-Specific Hardware Information *(see page 43)*.

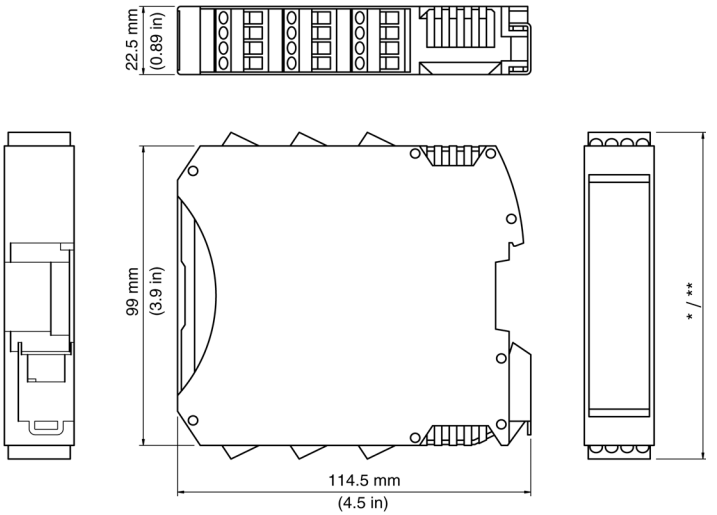
Housing Characteristics

Housing characteristics	
Housing material	Polyamide
Housing degree of protection	IP20
Terminal blocks degree of protection	IP2x
Mounting	35 mm DIN rail according to EN/IEC 60715
Mounting position	Vertical or horizontal
Dimensions (h x l x d)	● with screw terminals: 108 x 22.5 x 114.5 mm (4.25 x 0.89 x 4.5 in) ● with spring terminals: 118.5 x 22.5 x 114.5 mm (4.67 x 0.89 x 4.5 in)

Mechanical Dimensions

Dimensions

The graphics indicate the dimensions of the XPSMCM• references:



* 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 (1.57 in). Allow at least 100 mm (3.93 in) 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), but for XPSMCMDO00042A• module an additional distance to adjacent modules is mandatory *(see page 114)*. Other equipment in proximity may require larger distances and those clearances must also be taken into account.

Chapter 3
Electrical Requirements

What Is in This Chapter?

This chapter contains the following topics:

Wiring Best Practices

Overview

This section describes the wiring guidelines and associated best practices to be respected when using the XPSMCM• Modular Safety Controller system.

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- 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

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

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

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

Wiring Guidelines

The following rules must be applied when wiring a XPSMCM• Modular Safety Controller system:

- I/O and communication wiring must be kept separate from the power wiring. Route these two types of wiring in separate cable ducting.
- Verify that the operating conditions and environment are within the specification values found in the technical characteristics.
- Use proper wire sizes to meet voltage and current requirements.
- Use copper conductors (required).
- Use twisted pair, shielded cables for networks, and fieldbus.
- The maximum length of cables connected to inputs and of cables connecting controllers via the Network function block is 100 m (328 ft). There are other limiting factors by resistance and capacitance of the cable. The values can be found in the technical data of each module.

To help minimize the effects of electromagnetic interference, use shielded, properly grounded cables for all I/O susceptible to electrical noise and all communication connections. If you do not use shielded cable for these connections, electromagnetic interference can cause signal degradation. Degraded signals can cause the controller or attached modules and equipment to perform in an unintended manner.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use shielded cables for communication signals and any I/O that may be susceptible to electromagnetic radiation.
- Ground cable shield at a single point[(1)].
- Route communication and I/O cables separately from power cables.

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

[1]Multipoint grounding is permissible (and in some cases inevitable) if connections are made to an equipotential ground plane dimensioned to help avoid cable shield damage in the event of power system short-circuit currents.

The use of shielded cables requires compliance with the following wiring rules:

- For protective ground connections (PE), metal conduit or ducting can be used for part of the shielding length, provided there is no break in the continuity of the ground connections. For functional ground (FE), the shielding is intended to attenuate electromagnetic interference and the shielding must be continuous for the length of the cable. If the purpose is both functional and protective, as is often the case for communication cables, the cable must have continuous shielding.
- Wherever possible, keep cables carrying one type of signal separate from the cables carrying other types of signals or power.

Protective Ground (PE) on the Backplane

The protective ground (PE) should be connected to the conductive backplane by a heavy-duty wire, usually a braided copper cable with the maximum allowable cable section.

Shielded Cables Connections

Shielded I/O cables and fieldbus communication signals must be securely connected to ground. The I/O shields may be connected either to the functional ground (FE) or to the protective ground (PE) of your installation. The fieldbus communication cable shields must be connected to the protective ground (PE) with a connecting clamp secured to the conductive backplane of your installation.

The shielding of any Modbus cabling must be connected to the protective ground (PE).

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

Ensure that a proper ground exists between the integrated ground clamp of the equipment and the mounting rail to which it is attached.

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

Cable Types and Wire Sizes

Cable types and wire sizes

for a 5.08 pitch removable **screw** terminal block

mm / in. 7 / 0.28								
mm^2	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					
mm^2	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 of longer than 50 m (164 ft) must have a cross-section of at least 1 mm^2 (AWG 16).

NOTE: Spring cage clamp connectors have the added advantage of requiring no maintence in order to retain the tension on the wire. However, screw connectors do require tightening maintenance on a regular schedule.

⚠⚠ DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCK

Tighten connections in conformance with the torque specifications.

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

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

The spring clamp connectors of the terminal block are designed for only one wire or one cable end. Two wires to the same connector must be installed with a double wire cable end to help prevent loosening.

⚠⚠ DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCK

Do not insert more than one wire per connector of the spring terminal blocks unless using a double wire cable end (ferrule).

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

Protecting Outputs from Inductive Load Damage

Depending on the load, a protection circuit may be needed for the outputs on the controllers and certain modules. Inductive loads using DC voltages may create voltage reflections resulting in overshoot that will damage or shorten the life of output devices.

⚠ CAUTION

OUTPUT CIRCUIT DAMAGE DUE TO INDUCTIVE LOADS

Use an appropriate external protective circuit or device to reduce the risk of inductive direct current load damage.

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

If your controller or module contains relay outputs, these types of outputs can support up to 240 Vac. Inductive damage to these types of outputs can result in welded contacts and loss of control. Each inductive load must include a protection device such as a peak limiter, RC circuit or flyback diode. Capacitive loads are not supported by these relays.

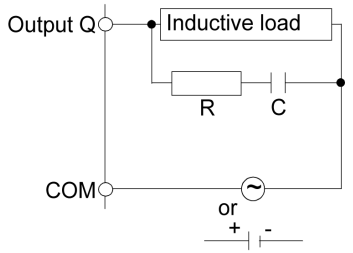
⚠ WARNING

RELAY OUTPUTS WELDED CLOSED

- Always protect relay outputs from inductive alternating current load damage using an appropriate external protective circuit or device.
- Do not connect relay outputs to capacitive loads.

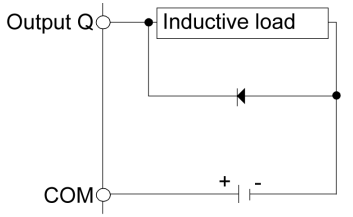
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Protective circuit A for relay outputs: this protection circuit can be used for both AC and DC load power circuits.



C 0.1 to 0.82 µF (including capacitance of cables)
R Resistor of approximately the same resistance value as the load

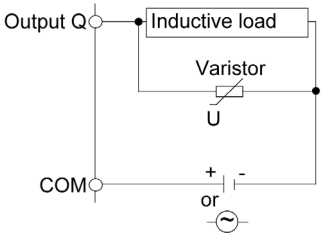
Protective circuit B for relay outputs: this protection circuit can be used for DC load power circuits.



Use a diode with the following ratings:

- Reverse withstand voltage: power voltage of the load circuit x 10.
- Forward current: more than the load current.

Protective circuit C: this protection circuit can be used for both AC and DC load power circuits.



In applications where the inductive load is switched on and off frequently and/or rapidly, ensure that the continuous energy rating (J) of the varistor exceeds the peak load energy by 20 % or more.

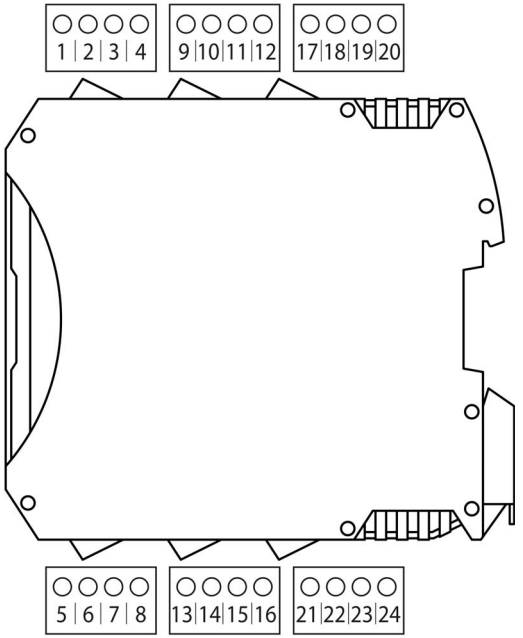
The recommendations for component ratings are the same as for the relay output protection above.

Terminal Blocks

Presentation

The Modular Safety Controller references are provided with removable terminal blocks for the electrical connections. Each reference can have 8 (2 terminal blocks), 16 (4 terminal blocks) or 24 (6 terminal blocks) terminals.

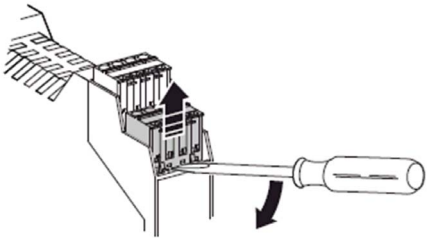
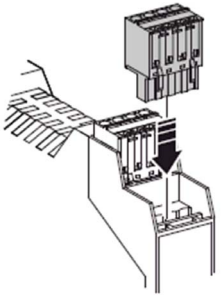
The following graphic shows an example with the maximum number of terminals:



The terminal blocks are either screw or spring cage clamp terminal blocks depending on the reference.

Removing the I/O Terminal Block

To remove a terminal block, use a flat, insulated or otherwise non-conductive screwdriver as described:

Step	Action
1	Slide the tip of the screwdriver into the slit located between the front of the terminal block and the module to lever the terminal block up.  **NOTE:** You can remove the terminal block to wire it.
2	To put a terminal block in the module, slide it in the proper location until you hear it click into place. 

Part II
Component-Specific Hardware Information

What Is in This Part?

This part contains the following chapters:

Chapter 4
Technical Features

What Is in This Chapter?

This chapter contains the following sections:

Section 4.1
XPSMCMCP0802x Modular Safety Controller

What Is in This Section?

This section contains the following topics:

Controller and Functional Description

Presentation

XPSMCMCP0802• is a Modular Safety Controller providing eight safety-related inputs and two safety-related, dual-channel-outputs, which can be configured using SoSafe Configurable. In addition, the Modular Safety Controller can be combined with a number of expansion modules through the backplane expansion bus.

Configuration of the controller: The XPSMCMCP0802• Modular Safety Controller requires a USB (computer) to Mini B USB (controller) configuration cable connected to a PC via a USB 2.0 (or greater) port to configure the controller. The XPSMCMCP0802• requires SoSafe Configurable to configure the controller and system (for more information, refer to the *Modular Safety Controller Library and Programming Guide (see Modular Safety Controller, Library and Programming Guide)*).

Optional memory card: An optional backup memory card can be installed in the XPSMCMCP0802• Modular Safety Controller and used to store the software configuration parameters.

Input MASTER_ENABLE

The XPSMCMCP0802• Modular Safety Controller contains two enabling EN inputs: MASTER_ENABLE1 and MASTER_ENABLE2. These signals must both be permanently set to logic level 1 (24 Vdc) for the controller to operate. To disable the controller, deactivate the supply voltage to the inputs, logic level 0 (0 Vdc).

Input RESTART (RST)

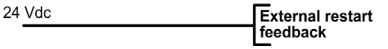
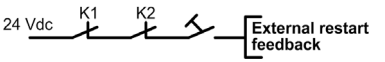
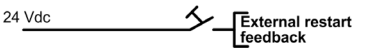
The RESTART (RST) signal input allows the XPSMCMCP0802• Modular Safety Controller to verify an EDM (External Device Monitoring) feedback signal (series of contacts) from external contactors, and to monitor manual or automatic operation.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- The RESTART command device must be installed outside the zone of operation in a position where the zone of operation and the entire work area concerned are clearly visible.
- It must not be possible to operate the RESTART command device from inside the zone of operation.

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

Operation mode	EDM	Restart_fbk
Automatic	With K1_K2 control	
	Without K1_K2 control	
Manual	With K1_K2 control	
	Without K1_K2 control	

Output STATUS (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

⚠ WARNING

INSUFFICIENT SAFETY-RELATED FUNCTIONS

Do not use status outputs for safety-related purposes greater than SIL 1/PL c (EN 61508:2010).

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

The status outputs are SIL 1/PL c outputs configurable by means of the SoSafe Configurable. Two status outputs are available on the XPSMCMCP0802• Modular Safety Controller.

Output TEST

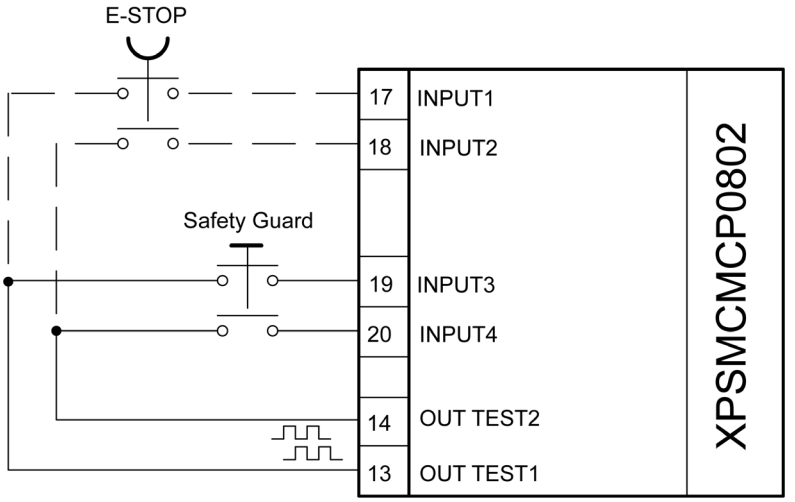
The TEST outputs are related to be used with the input circuits of the Modular Safety Controller.

The TEST outputs must be used to monitor the presence of cross circuits or short-circuits on the inputs. Connecting the test outputs helps to reach PL e in accordance with ISO 13849-1 and SILCL 3 in accordance with IEC 62061.

NOTE: These safety levels can also be obtained by applying other means of fault exclusion as described in ISO 13849-2.

NOTE: The test outputs of a specific module can only be linked to the inputs of the same module.

The maximum number of controllable inputs for each test outputs terminal is:
- Two inputs (parallel connection) for XPSMCMCP0802•, XPSMCMMX0802•, XPSMCMDI0800•, XPSMCMDI1200MT•
- Four inputs (parallel connection) for XPSMCMDI1600•



Type C, class 3 according to "ZVEI CB24I Ed.2" with a maximum test pulse duration of 100 µs.

Solid-State Safety-Related Output (OSSD)

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect any equipment to an OSSD unless the OSSD is appropriately configured with SoSafe Configurable.

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

The two OSSD safety-related outputs of the Modular Safety Controller are short-circuit protected. A Category 4 architecture requires redundancy, that is, two outputs.

The outputs are able to supply:
- In the ON condition: (Uv - 0.75 V)...Uv (24 Vdc ± 20%);
- In the OFF condition: 0...2 V r.m.s.

The maximum load current of 400 mA (per OSSD). The minimum resistive load is 60 Ω.

The maximum capacitive load is 0.82 µF.

The maximum inductive load is 30 mH.

Type C, class 3 according to "ZVEI CB24I Ed.2" with a maximum test pulse duration of 100 µs.

The following table indicates how each 0SSD output can be configured:

Automatic	The output is activated according to the configurations set by the SoSafe Configurable software, only if the corresponding RESTART input is connected to Uv (24 Vdc ± 20%).
Manual	The output is activated according to the configurations set by the SoSafe Configurable software, only if the level at the corresponding RESTART input changes from 0 Vdc to Uv (24 Vdc ± 20%).
Monitored	The output is activated according to the configurations set by the SoSafe Configurable software, only if the level at the corresponding RESTART input changes from 0 Vdc to Uv (24 Vdc ± 20%) and back to 0 Vdc.

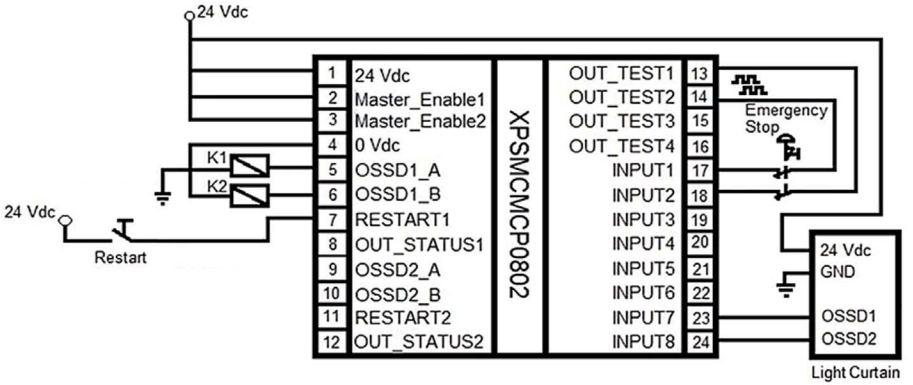
Connector Designations and Sample Wiring Diagrams

Modular Safety Controller Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	MASTER_ENABLE1	EN	Input	Master enable 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	MASTER_ENABLE2	EN		Master enable 2	
4	0 VDC	PWR	-	0 Vdc power supply	-
5	OSSD1_A	OSSD1	Output	Safety-related output 1	PNP active at Uv (24 Vdc ± 20%).
6	OSSD1_B				
7	RESTART1	RST 1	Input	Feedback/Restart 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
8	OUT_STATUS 1	STATUS 1	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
9	OSSD2_A	OSSD2		Safety-related output 2	PNP active at Uv (24 Vdc ± 20%).
10	OSSD2_B				
11	RESTART2	RST 2	Input	Feedback/Restart 2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
12	OUT_STATUS 2	STATUS 2	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
13	OUT_TEST1	-		Test output for detection of short circuits/cross circuits in input circuits	PNP active at 24 Vdc.
14	OUT_TEST2	-			
15	OUT_TEST3	-			
16	OUT_TEST4	-			
17	INPUT1	IN 1	Input	Safety-related input 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
18	INPUT2	IN 2		Safety-related input 2	
19	INPUT3	IN 3		Safety-related input 3	
20	INPUT4	IN 4		Safety-related input 4	
21	INPUT5	IN 5		Safety-related input 5	
22	INPUT6	IN 6		Safety-related input 6	
23	INPUT7	IN 7		Safety-related input 7	
24	INPUT8	IN 8		Safety-related input 8	

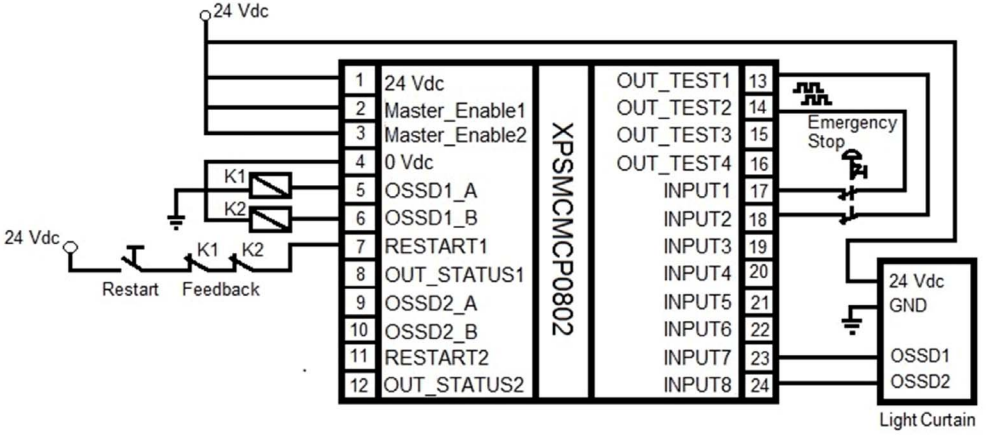
Modular Safety Controller Sample Wiring Diagram

Category 3 wiring for XPSMCMCP0802:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

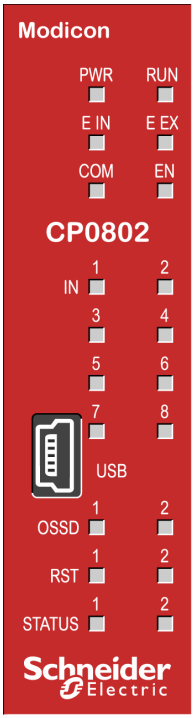
Category 4 wiring for XPSMCMCP0802• with feedback of the contactors K1 and K2:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of the operation states of the XPSMCMCP0802• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1 /2 red/ green	RST 1/2 yellow	STATUS 1/2 yellow	Meaning
ON	ON	ON	ON	ON	ON	red	ON	ON	Power on - initial test
OFF	OFF	OFF	ON (maximum 1 s)	ON (maximum 1 s)	OFF	red	OFF	OFF	Memory card recognized
(1) MASTER_ENABLE1 and MASTER_ENABLE2 inputs are at state 1									

RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1 /2 red/ green	RST 1/2 yellow	STATUS 1/2 yellow	Meaning
OFF	OFF	OFF	5 flashes	5 flashes	OFF	red	OFF	OFF	Writing/loading/ project to/from memory card
OFF	OFF	OFF	ON	OFF	OFF	red	OFF	OFF	Controller stopped
ON	OFF	OFF	ON = connected / OFF	ON (1)/ OFF	Input state	Output state: red = 0 green = 1	ON = waiting for reboot / Flashing = no feedback	Output diagnostics	Normal operation
(1) MASTER_ENABLE1 and MASTER_ENABLE2 inputs are at state 1									

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMCP0802• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1/2 red/ green	RST 1/ 2 yellow	STATUS 1/2 yellow	Solution
Internal error detected	OFF	2 or 3 flashes	OFF	OFF	OFF	OFF	red	OFF	OFF	Product non serviceable(1).
Internal configuration not present	OFF	OFF	OFF	Slow flashes	OFF	OFF	red	OFF	OFF	Download the configuration to the controller(1).
Module or node number not correct	OFF	OFF	OFF	Rapid flashes	OFF	OFF	red	OFF	OFF	Verify the hardware configuration and the terminal 2 and 3 of each expansion module.
Module unavailable or not ready	Rapid flashes	OFF	OFF	Rapid flashes	OFF	OFF	red	OFF	OFF	Verify the hardware configuration and the state of each expansion module.
(1) If the condition persists, contact your local Schneider Electric representative.										

Detected error	RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1/2 red/ green	RST 1/ 2 yellow	STATUS 1/2 yellow	Solution
External wiring error detected	ON	OFF	ON	ON = connected / OFF	OFF	Flashing = input with error	OFF	OFF	OFF	Verify all I/O connections.
Internal error detected	OFF	2 or 3 flashes	OFF	OFF	OFF	OFF	red	OFF	OFF	Product non serviceable(1).
Configuration error detected	OFF	5 flashes	OFF	OFF	OFF	5 flashes				Download the configuration to the controller(1).
0SSD output error	OFF	4 flashes	OFF	OFF	OFF	OFF	4 flashes	OFF	OFF	Verify solid-state safety-related output (0SSD)1/2 connections(1).
Error in communication with expansion module	OFF	5 flashes	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Reboot the system(1).
Expansion module unit error	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Reboot the system. Verify which expansion module is in error and consult its troubleshooting guide.
Memory card error detected.	OFF	6 flashes	OFF	6 flashes	OFF	OFF	OFF	OFF	OFF	Replace the memory card *(see page 213)*.
(1) If the condition persists, contact your local Schneider Electric representative.										

Controller Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Controller-specific characteristics	
Reference description	Electronic housing maximum 24-poles, with locking latch mounting
Maximum number of inputs	128
Maximum number of outputs	16
Maximum number of expansion modules (excluding XPSMCMER0002 - XPSMCMER0004)	14
Maximum number of expansion modules of the same reference (excluding XPSMCMER0002 - XPSMCMER0004)	4
Unit enable (No./description)	2 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.
Digital inputs (No./description)	8 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.
Restart Input (No./description)	2 / EDM (External Device Monitoring) input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ. / Possible automatic restart function or manual operation with restart pushbutton
Test output (No./description)	4 / to test for cross circuits - short circuits, maximum current 100 mA, nominal voltage 24 Vdc

Controller-specific characteristics	
Controller to controller by Network function	Maximum 10 Modular Safety Controllers with distance of up to 100 m (328 ft) between each controller.
Solid-state safety-related output (OSSD) (No./description)	2 pairs / solid-state safety-related outputs PNP active high ● The outputs are able to supply: ❍ In the ON condition: (Uv - 0.75 V)...Uv (24 Vdc ± 20 %) ❍ In the OFF condition: 0 to 2 Vrms (root mean square) ● The maximum load current of 400 mA (per OSSD) corresponds to a minimum resistive load of 60 Ω. ❍ The maximum capacitive load is 0.82 µF. ❍ The maximum inductive load is 30 mH. ● Test pulses are used to detect short circuits and interruptions of wires. The switch off test pulse interval is 5.5 ms, the test pulse duration is 100 µs.
Status outputs	Maximum output current per channel: 100 mA, nominal voltage 24 Vdc
Probability of a dangerous failure per hour (PFHd)	6.06E-9
Mean Time to Dangerous Failure (MTTFd) in years	382
Connection to PC	USB 2.0 or greater (High speed), no insulation. Maximum cable length: 3 m (9.84 ft)
Connection to expansion modules	5-way backplane expansion
Weight	0.12 kg (4.2 oz)
Slot for memory card	Yes

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.2
XPSMCMC10804x Modular Safety Controller

What Is in This Section?

This section contains the following topics:

Controller and Functional Description

Presentation

XPSMCMC10804• is a Modular Safety Controller providing eight safety-related inputs and four solid-state safety-related outputs, which can be used as four single or two dual (Output Signal Switching Device, OSSD), and can be configured using SoSafe Configurable. In addition, the Modular Safety Controller can be combined with a number of expansion modules through the backplane expansion bus.

For more information refer to the *Modular Safety Controller Library and Programming Guide*.

Configuration of the controller: The XPSMCMC10804• Modular Safety Controller requires a USB (computer) to Mini B USB (controller) configuration cable connected to a PC via a USB 2.0 (or greater) port to configure the controller. The XPSMCMC10804• requires SoSafe Configurable to configure the controller and system.

Optional memory card: An optional backup memory card can be installed in the XPSMCMC10804• Modular Safety Controller and used to store the software configuration parameters.

Input RESTART (RST)

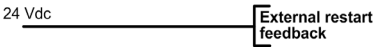
The RESTART (RST) signal input allows the XPSMCMC10804• controller to verify an EDM (External Device Monitoring) feedback signal (series of contacts) from external contactors, and to monitor manual/automatic operation.

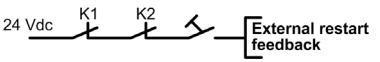
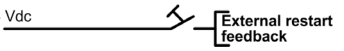
⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- The RESTART command device must be installed outside the zone of operation in a position where the zone of operation and the entire work area concerned are clearly visible.
- It must not be possible to operate the RESTART command device from inside the zone of operation.

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

Operation mode	EDM	Restart_fbk
Automatic	With K1_K2 control	
	Without K1_K2 control	

Operation mode	EDM	Restart_fbk
Manual	With K1_K2 control	
	Without K1_K2 control	

Output STATUS (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

Four status outputs are available on the XPSMCMC10804• Modular Safety Controller. The status outputs are shared with the feedback/restart inputs of the OSSDs. To use the status outputs, the corresponding OSSD must be used with automatic reset without external feedback monitoring. For example, to use the STATUS1 output (Terminal 7), you must program OSSD1 (by means of the SoSafe Configurable) with automatic reset without K feedback monitoring.

The status outputs are SIL 1/PL c outputs.

⚠ WARNING

INSUFFICIENT SAFETY-RELATED FUNCTIONS

Do not use status outputs for safety-related purposes greater than SIL 1/PL c (EN 61508:2010).

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

Output TEST

The TEST outputs are related to be used with the input circuits of the Modular Safety Controller.

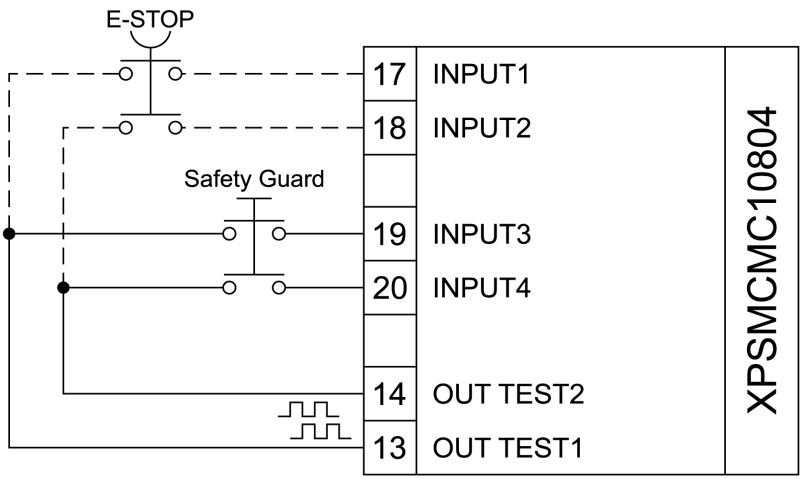
The TEST outputs must be used to monitor the presence of cross circuits or short-circuits on the inputs. Connecting the test outputs helps to reach PL e in accordance with ISO 13849-1 and SILCL 3 in accordance with IEC 62061.

NOTE: These safety levels can also be obtained by applying other means of fault exclusion as described in ISO 13849-2.

NOTE: The test outputs of a specific module can only be linked to the inputs of the same module.

The maximum number of controllable inputs for each test output terminal is:

- Four inputs (parallel connection) for XPSMCMC10804•, XPSMCMMX0802•, XPSMCMMX0804•, XPSMCMDI0800•, XPSMCMDI1200MT•, XPSMCMDI1600•.



Type C, class 3 according to "ZVEI CB24I Ed.2" with a maximum test pulse duration of 100 µs.

Solid-State Safety-Related Output (OSSD)

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect any equipment to an OSSD unless the OSSD is appropriately configured with SoSafe Configurable.

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

The four OSSD safety-related outputs of the Modular Safety Controller are short-circuit protected.

The outputs are able to supply:
- In the ON condition: (Uv - 0.6 V)...Uv (24 Vdc ± 20%);
- In the OFF condition: 0...2 Vrms (root mean square)

The maximum load current of 400 mA (per OSSD). The minimum resistive load is 60 Ω.

The maximum capacitive load is 0.82 µF.

The maximum inductive load is 2.4 mH.

Type C, class 3 according to "ZVEI CB24I Ed.2" with a maximum test pulse duration of 100 µs.

Different output configurations (configurable with SoSafe Configurable) can be set:
- 4 single channels (1 safety-related output per channel with its corresponding feedback input).
- 2 dual channels (2 safety-related outputs with their corresponding feedback input per channel).
- 1 dual channel and 2 single channels.

The following table indicates how each OSSD output can be configured:

Automatic	The output is activated according to the configurations set by the SoSafe Configurable software, only if the corresponding RESTART input is connected to Uv (24 Vdc ± 20%).
Manual	The output is activated according to the configurations set by the SoSafe Configurable software, only if the level at the corresponding RESTART input changes from 0 Vdc to Uv (24 Vdc ± 20%).
Monitored	The output is activated according to the configurations set by the SoSafe Configurable software, only if the level at the corresponding RESTART input changes from 0 Vdc to Uv (24 Vdc ± 20%) and back to 0 Vdc.

Connector Designations and Sample Wiring Diagrams

Modular Safety Controller Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	NC	–	–	–	–
3	NC	–	–	–	–
4	0 VDC	PWR	-	0 Vdc power supply	-
5	OSSD1	OSSD 1	Output	Safety-related output 1	PNP active at Uv (24 Vdc ± 20%).
6	OSSD2	OSSD 2	Output	Safety-related output 2	
7	RESTART_FBK1/ STATUS1	STATUS 1	Input/output	Feedback/Restart 1 for OSSD1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 1 for OSSD1	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
8	RESTART_FBK2/ STATUS2	STATUS 2	Input/output	Feedback/Restart 2 for OSSD2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 2 for OSSD2	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
9	OSSD3	OSSD 3	Output	Safety-related output 3	PNP active at Uv (24 Vdc ± 20%).
10	OSSD4	OSSD 4	Output	Safety-related output 4	
11	RESTART_FBK3/ STATUS3	STATUS 3	Input/output	Feedback/Restart 3 for OSSD3	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 3 for OSSD3	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)

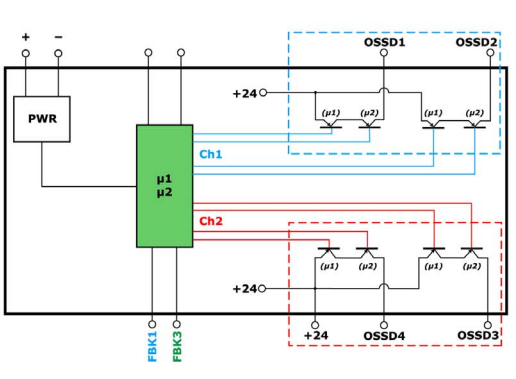
Terminal	Signal	LED	Type	Description	Operation
12	RESTART_FBK4/ STATUS4	STATUS 4	Input/output	Feedback/Restart 4 for OSSD2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 4 for OSSD2	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
13	OUT_TEST1	-	Output	Test output for detection of short circuits/cross circuits in input circuits	PNP active at 24 Vdc.
14	OUT_TEST2	-			
15	OUT_TEST3	-			
16	OUT_TEST4	-			
17	INPUT1	IN 1	Input	Safety-related input 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
18	INPUT2	IN 2		Safety-related input 2	
19	INPUT3	IN 3		Safety-related input 3	
20	INPUT4	IN 4		Safety-related input 4	
21	INPUT5	IN 5		Safety-related input 5	
22	INPUT6	IN 6		Safety-related input 6	
23	INPUT7	IN 7		Safety-related input 7	
24	INPUT8	IN 8		Safety-related input 8	

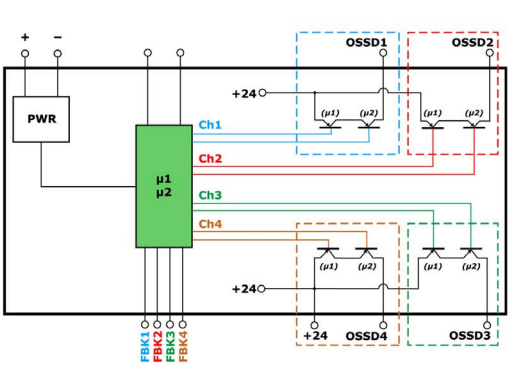
NOTE: The status outputs signal are shared with the feedback/restart inputs of the OSSDs. To use them, the corresponding OSSD must be used with automatic reset without external feedback monitoring.

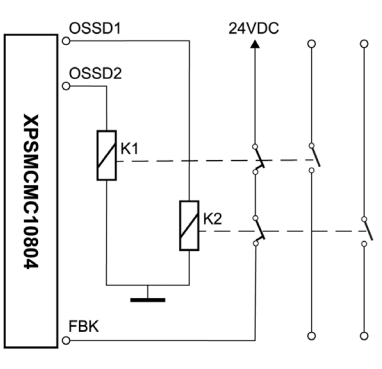
For example, to use the STATUS1 output (Terminal7), you must program OSSD1 (by means of the SoSafe Configurable software) with automatic reset without K feedback monitoring.

Modular Safety Controller Sample Wiring Diagram

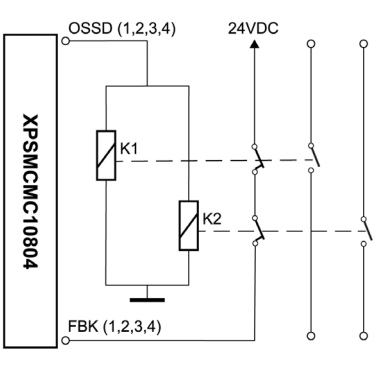
The following internal wiring diagram depicts the difference between single and dual channel logic within the module:





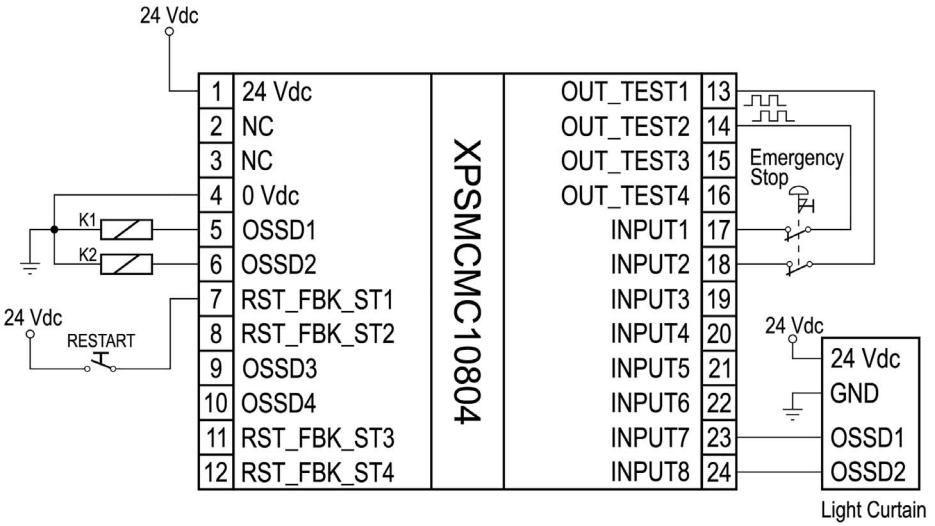


Dual channel OSSD configuration with 2 dual channel outputs, safety category SIL3/PL e: EN 61508:2010.

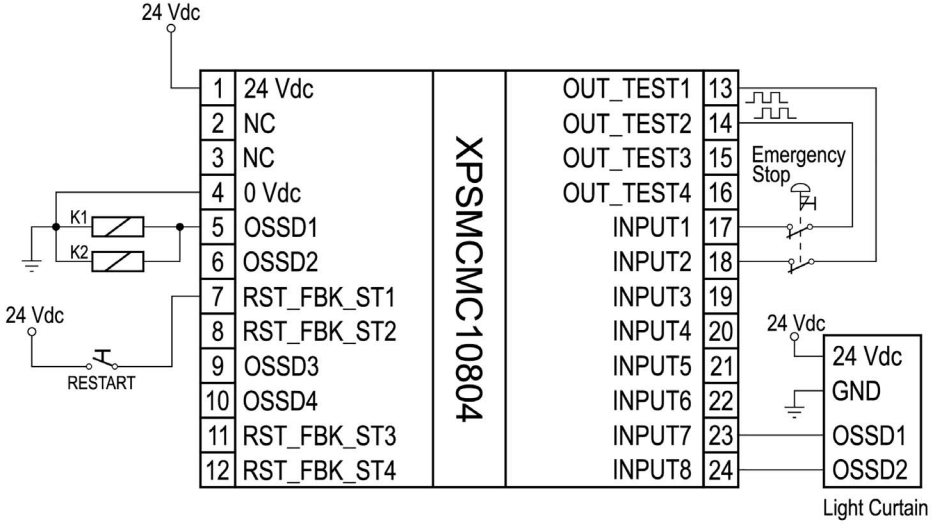


Single channel OSSD configuration with 4 single outputs, safety category SIL3/PL e: EN 61508:2010.

Category 3 wiring for XPSMCMC10804:

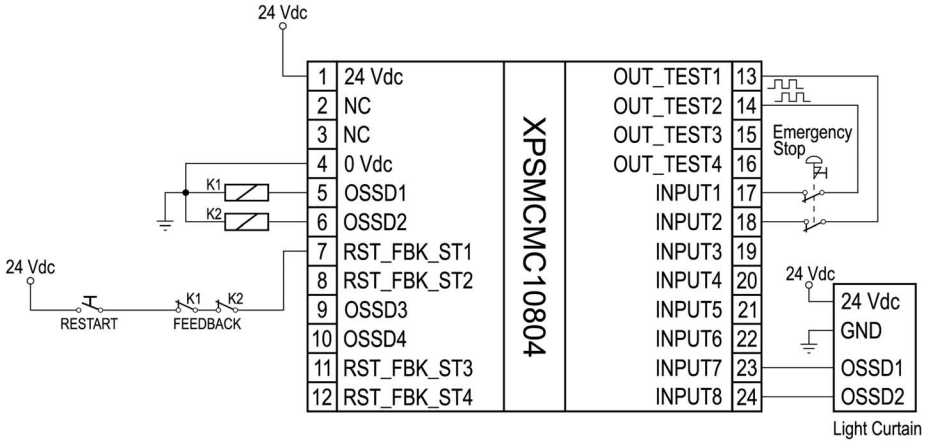


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

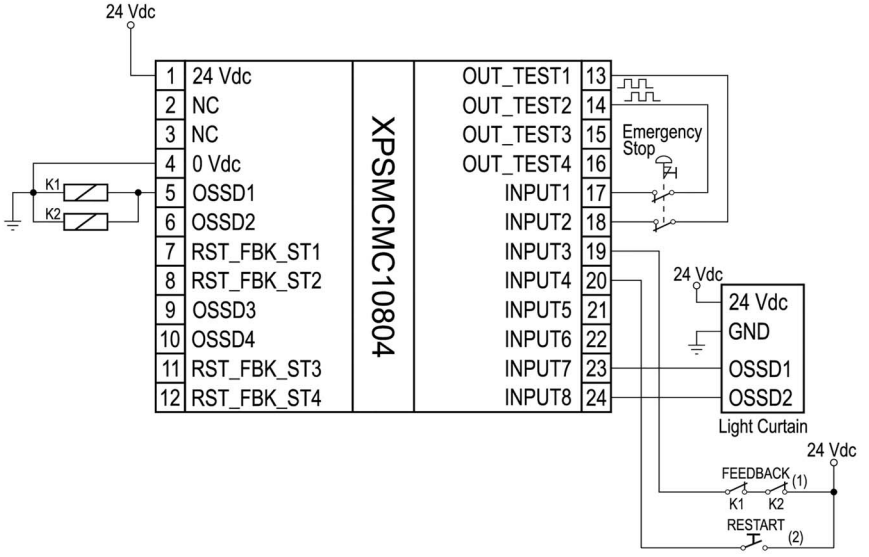


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

Category 4 wiring for XPSMCMC10804• with feedback of the contactors K1 and K2:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.



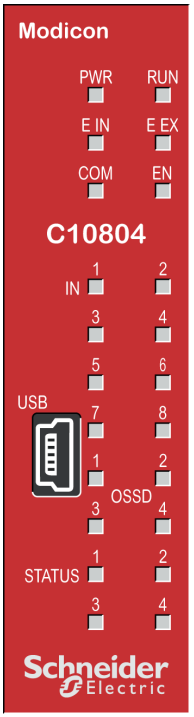
(1) Contacts connected to the `OSSD EDM` functional block

(2) Contacts connected to the `USER RESTART MANUAL, USER RESTART MONITORED` or `MACRO RESTART MANUAL, MACRO RESTART MONITORED` function block.

NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMC10804• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1-4 red/ green/yellow	STATUS 1-4 yellow	Meaning
ON	ON	ON	ON	ON	ON	Red	ON	Power on - initial test
OFF	OFF	OFF	ON (maximum 1 s)	ON (maximum 1 s)	OFF	Red	OFF	Memory card recognized

RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1-4 red/ green/yellow	STATUS 1-4 yellow	Meaning
OFF	OFF	OFF	5 flashes	5 flashes	OFF	Red	OFF	Writing/loading project to/from memory card
ON	OFF	OFF	ON = connected OFF = not connected	ON	Reflect input state	Output state: Red = 0 Green = 1 Yellow on = waiting for restart Yellow flashing = no feedback	Reflect status output state	Normal operation

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMC10804• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1-4 red/ green/yellow	STATUS 1-4 yellow	Solution
Internal error detected	OFF	2 or 3 flashes periodically	OFF	OFF	OFF	OFF	Red	OFF	Product non serviceable(1).
Configuration error detected	OFF	OFF	OFF	Flashes slowly	OFF	OFF	Red	OFF	Download the configuration to the controller(1).
Expansion module or node number not correct	OFF	OFF	OFF	Flashes quickly	OFF	OFF	Red	OFF	Verify the hardware configuration and the terminal 2 and 3 of each expansion module.
(1) If the condition persists, contact your local Schneider Electric representative.									

Detected error	RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1-4 red/ green/yellow	STATUS 1-4 yellow	Solution
Expansion module not found or not ready	Flashes quickly	OFF	OFF	Flashes quickly	OFF	OFF	Red	OFF	Verify the hardware configuration and the state of each expansion module.
External wiring error detected	ON	OFF	ON	ON = connected OFF = not connected	ON	Flashing = input with error	Output state: Red = 0 Flashing Yellow = no feedback	Reflect status output state	Verify all I/O connections.
OSSD output error detected	OFF	4 flashes periodically repeated	OFF	OFF	OFF	OFF	4 flashes (only corresponding LED)	OFF	Verify correct wiring of the safety-related outputs (OSSD)(1).
Overload on OSSD / OSSD load connected to 24 Vdc detected	ON	OFF	ON	OFF	ON	Input state	Flashing red (only corresponding LED)	Reflect status output state	Verify correct wiring of the safety-related outputs (OSSD)(1).
Error in communication with expansion module detected	OFF	5 flashes periodically repeated	OFF	OFF	OFF	OFF	OFF	OFF	Restart the system(1).
Expansion module error detected	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Restart the system. Identify the expansion module affected by this condition and consult its user guide.
(1) If the condition persists, contact your local Schneider Electric representative.									

Detected error	RUN green	E IN red	E EX red	COM orange	EN blue	IN 1-8 yellow	OSSD 1-4 red/ green/yellow	STATUS 1-4 yellow	Solution
Memory card error detected.	OFF	6 flashes periodically repeated	OFF	6 flashes	OFF	OFF	OFF	OFF	Replace the memory card *(see page 213)*.
Short circuit or overload detected on status output	ON	OFF	ON	OFF	Input state	ON	Output state	Flashing	Verify correct wiring of STATUS output(1).
(1) If the condition persists, contact your local Schneider Electric representative.									

Controller Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

To achieve Performance Level PL e, according to standard EN 13849-1, the OSSD safety-related outputs must be independent.

Reduce Common Cause Failures (CCF) of OSSD safety-related outputs by separating cable paths (refer to EN 13849-2 for event exclusion).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Run single channel, dual wiring in separate cabling.

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

Controller-specific characteristics	
Description	Electronic housing maximum 24-poles, with locking latch mounting
Mounting	DIN rail mounting with locking latch
Maximum number of inputs of a complete MCM system	128
Maximum number of OSSD safety-related outputs of a complete MCM system	32
Maximum number of expansion modules (excluding XPSMCMER0002 and XPSMCMER0004)	14

Controller-specific characteristics	
Maximum number of expansion modules of the same reference (excluding XPSMCMER0002 and XPSMCMER0004)	4
Safety-related input (number / description)	8 / Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
Restart Input (optional to status outputs) (number / description)	4 / EDM (External Device Monitoring) type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ. Possible automatic restart function or manual operation with restart pushbutton.
Status outputs (optional to restart input) (number / description)	4 / SIL 1/PL c in accordance with standard EN 61508:2010. Maximum current per output: 100 mA, nominal voltage 24 Vdc.
Test output (number / description)	4 / For cross circuit/short circuit monitoring, maximum current 100 mA, nominal voltage 24 Vdc.
Controller to controller by Network function	Maximum 10 Modular Safety Controllers with distance of up to 100 m (328 ft) between each controller.
Solid-state safety-related output (OSSD)	4 / solid-state safety-related outputs PNP active high ● Interface type C class 3 (ZVEI CB24I Ed.2) ● The outputs are able to supply: ❍ In the ON condition: (Uv-0.6 Vdc)...Uv (24 Vdc ± 20 %) ❍ In the OFF condition: 0...2 Vrms (root mean square) ● The maximum load current of 400 mA (per OSSD) corresponds to a minimum resistive load of 60 Ω. ❍ The maximum capacitive load is 0.82 µF. ❍ The maximum inductive load is 2.4 mH. ● Test pulses are used to detect short circuits and interruptions of wire continuity. The switch-off test pulse interval is every 650 ms, the test pulse duration is 100 µs.
Probability of a Dangerous Failure per Hour (PFHd)	1.35E-08
Mean Time to Dangerous Failure (MTTFd) in years	161
Connection to PC	USB 2.0 or greater (high speed), no insulation. Maximum cable length: 3 m (9.84 ft)
Connection to expansion modules	5-way backplane expansion
Weight	0.155 kg (5.46 oz)
Slot for memory card	Yes

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.3
XPSMCMAI0400x Analog Input Expansion Module

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMAI0400• is an analog input expansion module. The XPSMCMAI0400• module can only be configured with the XPSMCMC10804• Modular Safety Controller. The XPSMCMAI0400• provides up to four single or two dual channel of safety-related analog inputs. Each of the four channels is isolated and must be configured by SoSafe Configurable as voltage input or current input.

XPSMCMAI0400• can support a wide range of analog sensors (usually installed in a redundant configuration) such as:

- Temperature sensors
- Level sensors
- Load cell
- Position sensors
- Etc.

The expansion module supports two inputs `NODE_ADDR0` and `NODE_ADDR1` which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Current Sensor Input/Output `IN_S1/OUT_S1,IN_S2/OUT_S2,IN_S3/OUT_S3,IN_S4/OUT_S4`

XPSMCMAI0400• can provide up to four external safety-related input/output for external current sensor. Each channel of XPSMCMAI0400• can supply sensors with 24 Vdc at 30 mA (maximum load current).

The safety-related analog inputs are used to connect transducers with:

- 0...20 mA or 4...20 mA (selectable by SoSafe Configurable) safety-related analog current signals: `IN_S1/OUT_S1`, `IN_S2/OUT_S2`, `IN_S3/OUT_S3`, `IN_S4/OUT_S4`.

Voltage Sensor Input/Output NEG_S1/POS_S1, NEG_S2/POS_S2, NEG_S3/POS_S3, NEG_S4/POS_S4

XPSMCMAI0400• can provide up to four external input/output for external voltage sensor. Each channel of XPSMCMAI0400• can supply sensors with 24 Vdc at 30 mA.

The safety-related analog inputs are used to connect transducers with:

- 0…10 Vdc (selectable by SoSafe Configurable) safety-related analog voltage signals: NEG_S1/POS_S1, NEG_S2/POS_S2, NEG_S3/POS_S3, NEG_S4/POS_S4.

Connector Designations and Sample Wiring Diagrams

XPSMCMAI0400• Module Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR0	ADDR1			
4	0 VDC	PWR	-	0 Vdc power supply	-
9	24VDC_S1	CH 1	Output	Sensor 1 connections	Isolated 24 Vdc power supply for sensor 1
10	IN_S1		Input		0/20 mA sensor 1 input(1)
	NEG_S1		Input		0/10 V sensor 1 negative input(2)
11	OUT_S1		Output		0/20 mA sensor 1 output(1)
	POS_S1		Input		0/10 V sensor 1 positive input(2)
12	0 VDC_S1		Output		Isolated 0 Vdc reference for sensor 1
13	24VDC_S3	CH 3	Output	Sensor 3 connections	Isolated 24 Vdc power supply for sensor 3
14	IN_S3		Input		0/20 mA sensor 3 input(1)
	NEG_S3		Input		0/10 V sensor 3 negative input(2)
15	OUT_S3		Output		0/20 mA sensor 3 output(1)
	POS_S3		Input		0/10 V sensor 3 positive input(2)
16	0 VDC_S3		Output		Isolated 0 Vdc reference for sensor 3
17	24VDC_S2	CH 2	Output	Sensor 2 connections	Isolated 24 Vdc power supply for sensor 2
18	IN_S2		Input		0/20 mA sensor 2 input(1)
	NEG_S2		Input		0/10 V sensor 2 negative input(2)
19	OUT_S2		Output		0/20 mA sensor 2 output(1)
	POS_S2		Input		0/10 V sensor 2 positive input(2)
20	0 VDC_S2		Output		Isolated 0 Vdc reference for sensor 2

(1) Input impedance (channel configured as current input) = 200 Ω according to EN 61131-2.
(2) Input impedance (channel configured as voltage input) = 250 kΩ according to EN 61131-2.

Terminal	Signal	LED	Type	Description	Operation
21	24VDC_S4	CH 4	Output	Sensor 4 connections	Isolated 24 Vdc power supply for sensor 4
22	IN_S4		Input		0/20 mA sensor 4 input(1)
	NEG_S4		Input		0/10 V sensor 4 negative input(2)
23	OUT_S4		Output		0/20 mA sensor 4 output(1)
	POS_S4		Input		0/10 V sensor 4 positive input(2)
24	0 VDC_S4		Output		Isolated 0 Vdc reference for sensor 4
(1) Input impedance (channel configured as current input) = 200 Ω according to EN 61131-2. **(2)** Input impedance (channel configured as voltage input) = 250 kΩ according to EN 61131-2.					

XPSMCMAI0400• Sample Wiring Diagrams

Analog signals are susceptible to electromagnetic interference. Interference may lead to unreliable analog signal values and to unintended behavior of the module.

⚠ WARNING

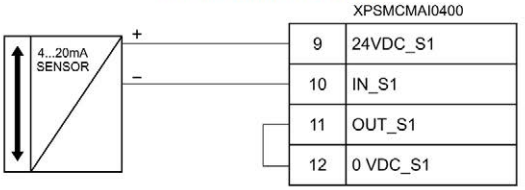
UNINTENDED EQUIPMENT OPERATION

Use shielded cables for analog device connection and ensure the shields are terminated to Protective Earth (Ground) on both ends of the cable.

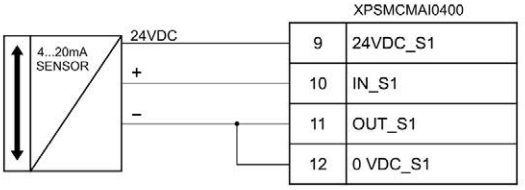
Failure to follow these instructions can result in death, serious injury, or equipment damage.

For more information refer to Wiring Best Practices *(see page 34)*.

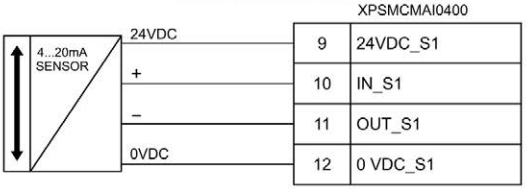
2 WIRES CURRENT SENSOR



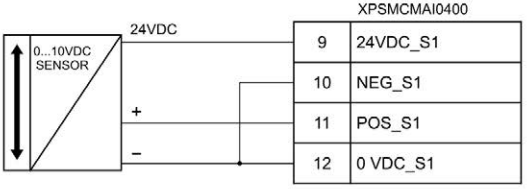
3 WIRES CURRENT SENSOR



4 WIRES CURRENT SENSOR

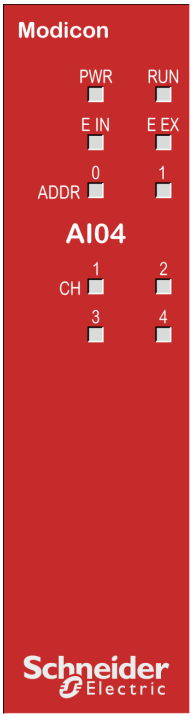


3 WIRES VOLTAGE SENSOR



LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMAI0400• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	**E IN red**	**E EX red**	**ADDR 0-1 orange**	**CH 1-4 red / green**	**Meaning**
ON	ON	ON	ON	Red	Power on - initial test
OFF = awaiting initialization	OFF	OFF Normal operation ON Anomaly detected on measurement channel	Encoded Node address *(see page 75)*	Red OFF, green OFF = channel not configured Red OFF, green ON (only corresponding LED) = channel configured	Normal operation
Flashes = no inputs or outputs configured					
ON = inputs or outputs configured					

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMAI0400• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	ADDR 0-1 orange	CH 1-4 red/ green	Solution
Internal error detected.	OFF	2 or 3 flashes	OFF	Encoded Node address *(see page 75)*	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	3 flashes	OFF		OFF	Firmware version not compatible with controller(1).
Error in communication with controller detected.	OFF	5 flashes	OFF		OFF	Restart the system(1).
Error on other module or controller detected.	OFF	ON	OFF		OFF	Restart the system. Identify the expansion module affected by this condition and consult its user guide(1).
Two units of the same module reference detected with the same node address detected.	OFF	5 flashes	5 flashes		OFF	Modify the unit node address *(see page 75)*.
Incorrect configuration detected.	OFF	5 flashes	OFF		OFF	Verify system bus connection(1).
Channel configured as single or not configured at all						
(1) If the condition persists, contact your local Schneider Electric representative.						

Detected error	RUN green	E IN red	E EX red	ADDR 0-1 orange	CH 1-4 red/ green	Solution
Sensor supply overload detected.	ON	OFF	ON	Encoded Node address *(see page 75)*	1 red flash every 600 ms	Verify sensor connections. Verify sensor status.
Input channel overload error detected.	ON	OFF	ON		1 red flash every 600 ms	Verify sensor connections. Verify sensor status.
Read value over threshold detected.	ON	OFF	ON		3 quick red flashes and a pause of 600 ms	Verify sensor connections. Verify sensor status. Verify threshold values set with SoSafe Configurable.
Read value under threshold detected.	ON	OFF	ON		3 quick red flashes and a pause of 600 ms	Verify sensor connections. Verify sensor status. Verify threshold values set with SoSafe Configurable.
Disconnected sensor detected.	ON	OFF	ON		3 quick red flashes and a pause of 600 ms	Verify sensor connections. Verify sensor status.

Channel configured as redundant (two sensors connected), conditions:

1. Sensor supply overload / Input channel overload / Read value over threshold / Read value under threshold / Disconnected sensor:
   When one of these diagnostics is detected on one channel:
   - The red LED relative to the channel with the issue will flash.
   - The red LED of the other channel remains ON (no flash).

   If one of the above diagnostics is detected at the same time on both channel:
   - The red LED of the second channel will flash.
   - The red LED of the first channel remains ON (no flash).
2. Read value from dual sensor out of tolerance detected: both LEDs of channel pair will flash.

(1) If the condition persists, contact your local Schneider Electric representative.

Detected error	RUN green	E IN red	E EX red	ADDR 0-1 orange	CH 1-4 red/ green	Solution
Sensor supply overload detected.	ON	OFF	ON	Encoded Node address *(see page 75)*	1 red flash every 600 ms	Verify sensor connections. Verify sensor status.
Input channel overload error detected.	ON	OFF	ON		1 red flash every 600 ms	Verify sensor connections. Verify sensor status.
Read value over threshold detected.	ON	OFF	ON		3 quick red flashes and a pause of 600 ms	Verify sensor connections. Verify sensor status. Verify threshold values set with SoSafe Configurable.
Read value under threshold detected.	ON	OFF	ON		3 quick red flashes and a pause of 600 ms	Verify sensor connections. Verify sensor status. Verify threshold values set with SoSafe Configurable.
Disconnected sensor detected.	ON	OFF	ON		3 quick red flashes and a pause of 600 ms	Verify sensor connections. Verify sensor status.
Read value from sensor pair out of tolerance detected.	ON	OFF	ON		1 red flash every 100 ms	Verify sensor connections. Verify sensor status. Verify threshold values set with SoSafe Configurable.
(1) If the condition persists, contact your local Schneider Electric representative.						

NOTE: Refer to module-specific characteristics table *(see page 85)* to verify the isolated channel power supply overload condition.

XPSMCMAI0400• Module Characteristics

Presentation

Module-specific characteristics	
Description	Electronic housing maximum 24-poles, with locking latch mounting
Mounting	DIN rail mounting with locking latch
Rated voltage	24 Vdc ± 20 %
Channels number / description	4 / isolated (500 Vdc) between channels, and between channels and control electronics. Each channel can be configured as voltage input or current input.
Diagnostic	
Isolated sensor supply overload detection (if the sensor draws more than 30 mA)	Yes with active protection(1).
Input overvoltage / input overcurrent detection	Yes with active protection(1).
Disconnected cable detection	Yes
Overthreshold / underthreshold detection	Yes
Redundant channels mismatch detection	Yes
Probability of a dangerous failure per hour (PFHd)	1,53E-8
Mean Time to Dangerous Failure (MTTFd) in years	106
Connection to expansion modules	5-way backplane expansion
Weight	0.164 kg (5.78493 oz)
(1) When this condition is detected, the power supply of the sensor is disconnected for 1 second and then rearmed. The disconnection and rearming of the power supply continues until the over-current condition has been removed.	

Module current inputs	
Nominal range	0...20 mA / 4...20 mA
User selectable allowable current limits	0...23 mA (if 0...20 mA selected), 2.5...23 mA (if 4...20 mA is selected)
Digital resolution	16
Resolution value	381 nA

Module current inputs	
Sample rate (samples per second)	User selectable. Allowable values: 2.5, 5, 10, 16.6, 20, 50, 60, 100, 200, 400, 800, 1000, 2000, 4000
Input impedance	200 Ω
Maximum input current	23 mA

Module voltage inputs	
Range	0...10 Vdc
User selectable allowable voltage limits	0...11.5 Vdc
Digital resolution	16
Resolution value	152 µV
Sample rate (samples per second)	User selectable. Allowable values: 2.5, 5, 10, 16.6, 20, 50, 60, 100, 200, 400, 800, 1000, 2000, 4000
Input impedance	250 kΩ

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.4
XPSMCMDI0800x and XPSMCMDI1600x Input Expansion Modules

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMDI0800• and XPSMCMDI1600• are input expansion modules for the XPSMCM• Modular Safety Controller. The XPSMCMDI0800• and XPSMCMDI1600• modules are configured with the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller. The XPSMCMDI0800• module provides 8 safety-related inputs and the XPSMCMDI1600• module provides 16 safety-related inputs.

The expansion module supports two inputs `NODE_ADDR0` and `NODE_ADDR1` which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Output TEST

For more information, refer to Output TEST *(see page 48)*.

Connector Designations and Sample Wiring Diagram

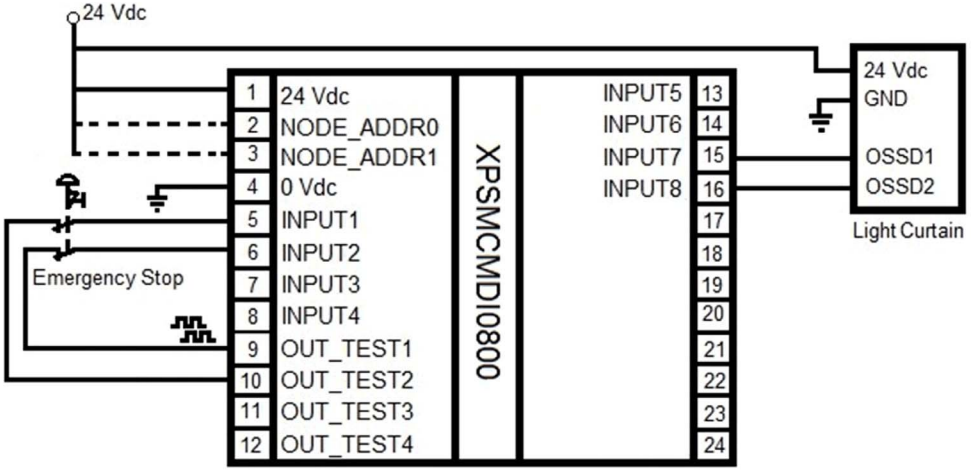
XPSMCMDI0800• and XPSMCMDI1600• Module Connector Designations

The connections for the XPSMCMDI1600• module are identical with the other 8 inputs occupying terminals 17 through 24.

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	–
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	-	0 Vdc power supply	–
5	INPUT1	IN 1	Input	Safety-related input 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
6	INPUT2	IN 2		Safety-related input 2	
7	INPUT3	IN 3		Safety-related input 3	
8	INPUT4	IN 4		Safety-related input 4	
9	OUT_TEST1	–	Output	Test output for detection of short circuits/cross circuits in input circuits	PNP active at 24 Vdc.
10	OUT_TEST2	–			
11	OUT_TEST3	–			
12	OUT_TEST4	–			
13	INPUT5	IN 5	Input	Safety-related input 5	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
14	INPUT6	IN 6		Safety-related input 6	
15	INPUT7	IN 7		Safety-related input 7	
16	INPUT8	IN 8		Safety-related input 8	

XPSMCMDI0800• and XPSMCMDI1600• Module Sample Wiring Diagram

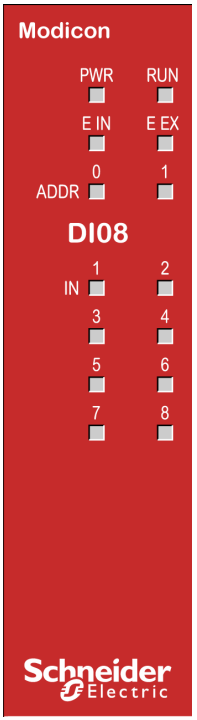
The connections for the XPSMCMDI1600• module are identical with the other 8 inputs occupying terminals 17 through 24.

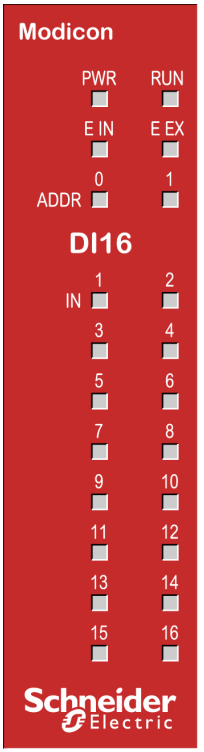


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View





Operation States

The following table describes the indication of operation states of the XPSMCMDI0800• by means of the LEDs. The LED descriptions for the XPSMCMDI1600• are identical. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	E IN red	E EX red	ADDR 0/1 orange	IN 1 to 8 (16) yellow	Meaning
ON	ON	ON	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF / ON = Wiring error detected	Encoded Node address *(see page 88)*	Input state Flashing = input with error	Normal operation
Flashing = no inputs or outputs configured					
ON = inputs or outputs configured					

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMDI0800• by means of the LEDs. The LED descriptions for the XPSMCMDI1600• are identical. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	IN 1 to 8 (16) yellow	Solution
Internal error detected.	OFF	2 or 3 flashes	OFF	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	5 flashes	OFF	5 flashes	Firmware version not compatible with XPSMCMCP0802•(1).
Error detected in the communication with controller.	OFF	5 flashes	OFF	OFF	Reboot the system(1).
Error detected on other expansion module or XPSMCMCP0802•.	OFF	ON	OFF	OFF	Reboot the system. Verify which module /controller is in error and consult its troubleshooting guide.
Two units of the same module reference detected with the same node address.	OFF	5 flashes		OFF	Modify the unit node address *(see page 88)*.

(1) If the condition persists, contact your local Schneider Electric representative.

Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Module-specific characteristics	XPSMCMDI0800•	XPSMCMDI1600•
Reference description	Electronic housing maximum 16-poles, with locking latch mounting	Electronic housing maximum 24-poles, with locking latch mounting
Node address (No./description)	2 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.	
Digital inputs (No./description)	8 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.	16 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.
Test output (No./description)	4 / to test for cross circuits - short circuits, maximum current 100 mA, nominal voltage / 24 Vdc	
Probability of a dangerous failure per hour (PFHd)	5.75E-9	7.09E-9
Mean Time to Dangerous Failure (MTTFd) in years	474	402
Connection to expansion modules	5-way backplane expansion	
Weight	0.12 kg (4.2 oz)	

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.5
XPSMCMDI1200MTx Input Expansion Module

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMDI1200MT• is an input expansion module for the XPSMCM• Modular Safety Controller. The XPSMCMDI1200MT• module is configured with the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller. The XPSMCMDI1200MT• module provides 12 safety-related inputs.

The expansion module supports two inputs NODE_ADDR0 and NODE_ADDR1 which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Output TEST

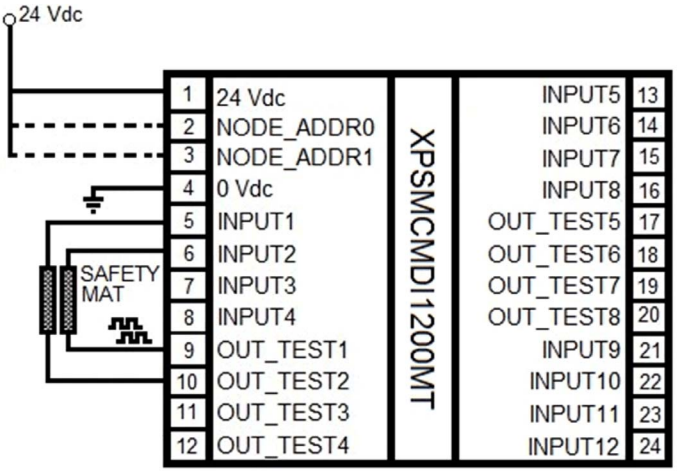
For more information, refer to Output TEST *(see page 48)*.

Connector Designations and Sample Wiring Diagram

XPSMCMDI1200MT• Module Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	–	24 Vdc power supply	–
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	–	0 Vdc power supply	-
5	INPUT1	IN 1	Input	Safety-related input 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
6	INPUT2	IN 2		Safety-related input 2	
7	INPUT3	IN 3		Safety-related input 3	
8	INPUT4	IN 4		Safety-related input 4	
9	OUT_TEST1	–	Output	Test output for detection of short circuits/cross circuits in input circuits	PNP active at 24 Vdc.
10	OUT_TEST2				
11	OUT_TEST3				
12	OUT_TEST4				
13	INPUT5	IN 5	Input	Safety-related input 5	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
14	INPUT6	IN 6		Safety-related input 6	
15	INPUT7	IN 7		Safety-related input 7	
16	INPUT8	IN 8		Safety-related input 8	
17	OUT_TEST5	–	Output	Test output for detection of short circuits/cross circuits in input circuits	PNP active at 24 Vdc.
18	OUT_TEST6				
19	OUT_TEST7				
20	OUT_TEST8				
21	INPUT9	IN 9	Input	Safety-related input 9	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
22	INPUT10	IN 10		Safety-related input 10	
23	INPUT11	IN 11		Safety-related input 11	
24	INPUT12	IN 12		Safety-related input 12	

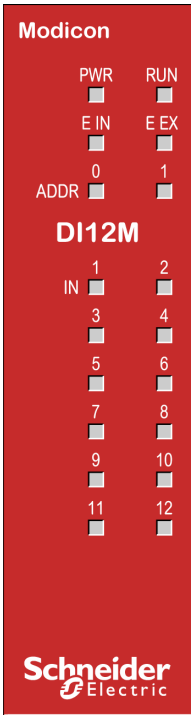
XPSMCMDI1200MT• Module Sample Wiring Diagram



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMDI1200MT• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	**E IN red**	**E EX red**	**ADDR 0/1 orange**	**IN 1 to 12 yellow**	**Meaning**
ON	ON	ON	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF ON = Wiring error detected	Encoded Node address *(see page 95)*	Input state Flashing = input with error	Normal operation
Flashing = no inputs or outputs configured					
ON = inputs or outputs configured					

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMDI1200MT• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	IN 1 to 12 yellow	Solution
Internal error detected	OFF	2 or 3 flashes	OFF	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	5 flashes	OFF	5 flashes	Firmware version not compatible with XPSMCMCP0802•(1).
Error detected in the communication with controller.	OFF	5 flashes	OFF	OFF	Reboot the system(1).
Error detected on other expansion module or XPSMCMCP0802•.	OFF	ON	OFF	OFF	Reboot the system. Verify which module /controller is in error and consult its troubleshooting guide.
Two units of the same module reference detected with the same node address.	OFF	5 flashes		OFF	Modify the unit node address *(see page 95)* `NODE ADDR`.
(1) If the condition persists, contact your local Schneider Electric representative.					

Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Module-specific characteristics	
Reference description	Electronic housing maximum 24-poles, with locking latch mounting
Node address (No./description)	2 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.
Digital inputs (No./description)	12 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.
Test output (No./description)	8 / to test for cross circuits - short circuits, maximum current 100 mA nominal voltage / 24 Vdc
Probability of a dangerous failure per hour (PFHd)	3.24E-9
Connection to expansion modules	5-way backplane expansion
Weight	0.12 kg (4.2 oz)

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.6
XPSMCMDO0002x and XPSMCMDO0004x Output Expansion Modules

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMDO0002• and XPSMCMDO0004• are output expansion modules for the XPSMCM• Modular Safety Controller. The XPSMCMDO0002• and XPSMCMDO0004• modules are configured with the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller. The XPSMCMDO0002• module provides two dual-channel safety-related outputs and two status outputs. The XPSMCMDO0004• module provides four dual-channel safety-related outputs and four status outputs.

The expansion module supports two inputs NODE_ADDR0 and NODE_ADDR1 which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Input RESTART (RST)

For more information, refer to Input RESTART (RST) *(see page 47)*.

Output STATUS (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

For more information, refer to Output STATUS *(see page 140)*.

Solid-State Safety-Related Output (OSSD)

For more information, refer to Solid-State safety-related output (OSSD) *(see page 49)*.

Connector Designations and Sample Wiring Diagram

XPSMCMDO0002• Module Connector Designations

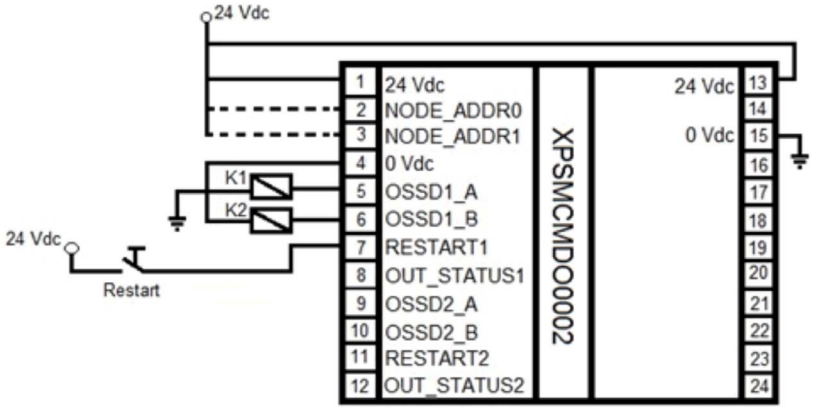
Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	–	24 Vdc power supply	–
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	–	0 Vdc power supply	–
5	OSSD1_A	OSSD 1	Output	Safety-related output 1	PNP active at Uv (24 Vdc ± 20%).
6	OSSD1_B				
7	RESTART1	RST 1	Input	Feedback/Restart 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
8	OUT_STATUS 1	STATUS 1	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
9	OSSD2_A	OSSD 2	Output	Safety-related output 2	PNP active at Uv (24 Vdc ± 20%).
10	OSSD2_B				
11	RESTART2	RST 2	Input	Feedback/Restart 2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
12	OUT_STATUS 2	STATUS 2	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
13	24 VDC	–	–	24 Vdc power supply	OSSD1/2 power supply
14	n.c.	–	–	-	–
15	0 VDC	–	–	0 Vdc power supply	–
16	n.c.	–	–	–	–

XPSMCMDO0004• Module Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	–	24 Vdc power supply	–
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	–	0 Vdc power supply	–
5	OSSD1_A	OSSD 1	Output	Safety-related output 1	PNP active at Uv (24 Vdc ± 20%).
6	OSSD1_B				
7	RESTART1	RST 1	Input	Feedback/Restart 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
8	OUT_STATUS 1	STATUS 1	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
9	OSSD2_A	OSSD 2	Output	Safety-related output 2	PNP active at Uv (24 Vdc ± 20%).
10	OSSD2_B				
11	RESTART2	RST 2	Input	Feedback/Restart 2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
12	OUT_STATUS 2	STATUS 2	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
13	24 VDC	–	–	24 Vdc power supply	OSSD1/2 power supply
14	24 VDC	–	–	24 Vdc power supply	OSSD3/4 power supply
15	0 VDC	–	–	0 Vdc power supply	–
16					
17	OSSD4_A	OSSD 4	Output	Safety-related output 4	PNP active at Uv (24 Vdc ± 20%).
18	OSSD4_B				
19	RESTART4	RST 4	Input	Feedback/Restart 4	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
20	OUT_STATUS4	STATUS 4	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
21	OSSD3_A	OSSD 3	Output	Safety-related output 3	PNP active at Uv (24 Vdc ± 20%).
22	OSSD3_B				
23	RESTART3	RST 3	Input	Feedback/Restart 3	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
24	OUT_STATUS 3	STATUS 3	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)

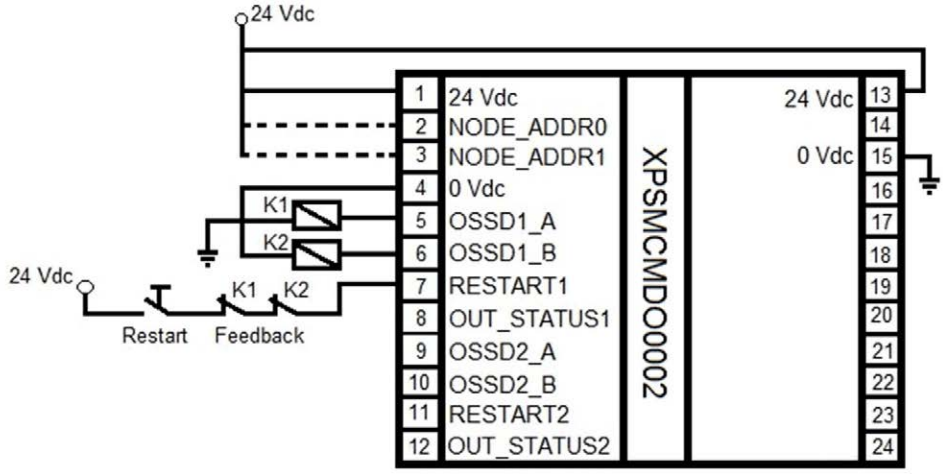
XPSMCMDO0002• Module Sample Wiring Diagram

Category 3 wiring for XPSMCMDO0002•:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

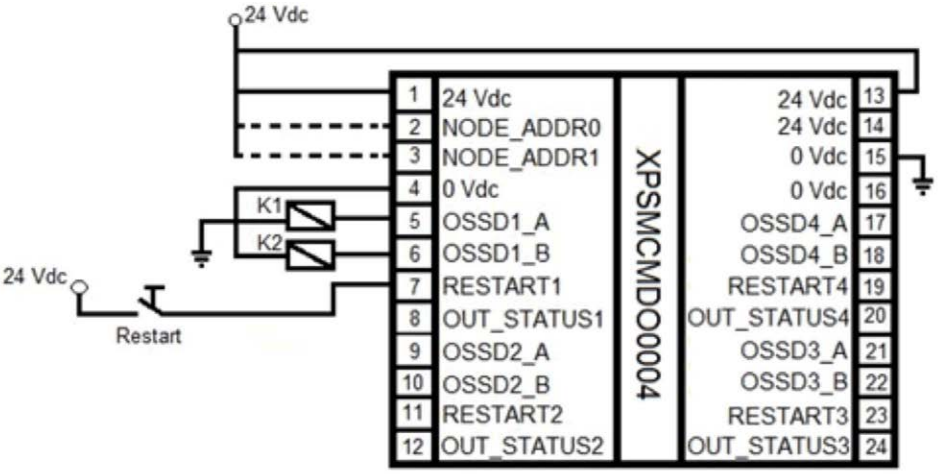
Category 4 wiring for XPSMCMDO0002• with feedback of the contactors K1 and K2:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

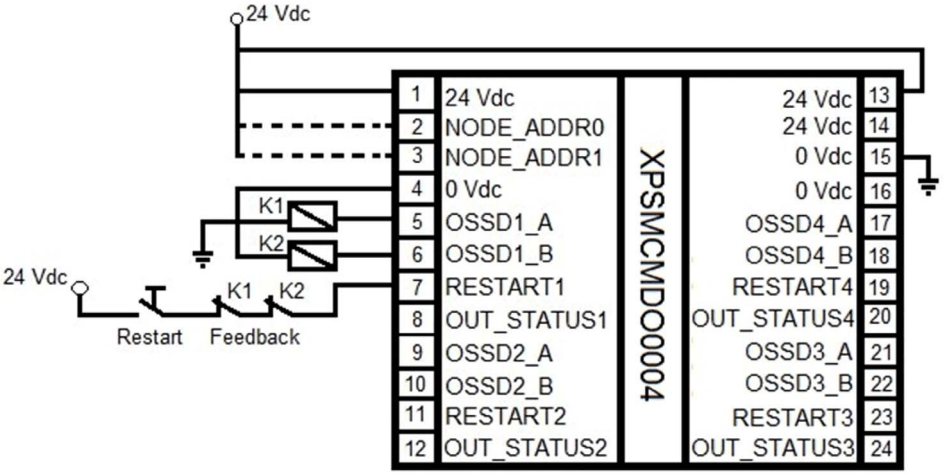
XPSMCMDO0004• Module Sample Wiring Diagram

Category 3 wiring for XPSMCMDO0004•:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

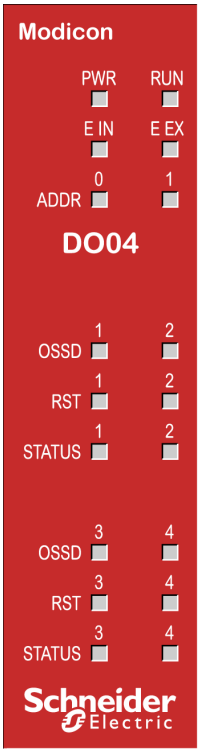
Category 4 wiring for XPSMCMDO0004• with feedback of the contactors K1 and K2:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMDO0002• by means of the LEDs. The LED descriptions for the XPSMCMDO0004• are identical. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	E IN red	E EX red	ADDR 1/2 orange	OSSD 1/2 (4) red/green	RST 1/2 (4) yellow	STATUS 1/2 (4) yellow	Meaning
ON	ON	ON	ON	RED	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF ON = Wiring error detected	Encoded Node address *(see page 102)*	Output state: red = 0 green = 1	ON = waiting for restart Flashing = no feedback	Output diagnostics	Normal operation
Flashing = no inputs or outputs configured							
ON = inputs or outputs configured							

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMDO0002• by means of the LEDs. The LED descriptions for the XPSMCMDO0004• are identical. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	OSSD 1/2 (4) red/green	RST 1/2 (4) yellow	STATUS 1/2 (4) yellow	Solution
Internal error detected.	OFF	2 or 3 flashes	OFF	Red	OFF	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	5 flashes	OFF	5 flashes			Firmware version not compatible with XPSMCMCP0802•(1).
0SSD output error detected.	OFF	4 flashes	OFF	4 flashes	OFF	OFF	Verify solid-state safety-related output (0SSD) 1/2 connections(1).
Error detected in the communication with controller.	OFF	5 flashes	OFF	OFF	OFF	OFF	Reboot the system(1).
Error detected on other expansion module or XPSMCMCP0802•.	OFF	ON	OFF	OFF	OFF	OFF	Reboot the system. Verify which module /controller is in error and consult its troubleshooting guide.
(1) If the condition persists, contact your local Schneider Electric representative.							

Detected error	RUN green	E IN red	E EX red	OSSD 1/2 (4) red/green	RST 1/2 (4) yellow	STATUS 1/2 (4) yellow	Solution
Two units of the same module reference detected with the same node address.	OFF	5 flashes		OFF	OFF	OFF	Modify the unit node address *(see page 102)*.
No power supply detected on OSSD 3,4 (MO4 only).	ON	OFF	ON	Red flashes	Flashes	Output condition	Connect 13 and 14 pin to power supply.
Error detected on node detection circuit.	OFF	3 flashes	OFF	OFF	OFF	OFF	Product non serviceable(1).
(1) If the condition persists, contact your local Schneider Electric representative.							

Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Module-specific characteristics	XPSMCMDO0002•	XPSMCMDO0004•
Reference description	Electronic housing maximum 16-poles, with locking latch mounting	Electronic housing maximum 24-poles, with locking latch mounting
Node address (No./description)	2 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.	
Restart Input (No./description)	2 / EDM (External Device Monitoring) input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ. / Possible automatic restart function or manual operation with restart pushbutton	
Solid-state safety-related output (OSSD) (No./description)	2 pairs / solid-state safety-related outputs PNP active high	4 pairs / solid-state safety-related outputs PNP active high
	• The outputs are able to supply: ❍ In the ON condition: (Uv - 0.75 V)...Uv (24 Vdc ± 20 %) ❍ In the OFF condition: 0 to 2 Vrms (root mean square) • The maximum load current of 400 mA (per OSSD) corresponds to a minimum resistive load of 60 Ω. ❍ The maximum capacitive load is 0.82 µF. ❍ The maximum inductive load is 30 mH. • To detect short circuit and line break on the outputs, a line monitoring is made by using an output pulse on each channel. The output pulse is generated every 5.5 ms with a pulse of 100 microseconds.	
Status outputs	Maximum output current per channel: 100 mA, nominal voltage 24 Vdc	
Probability of a dangerous failure per hour (PFHd)	3.16E-9	3.44E-9

Module-specific characteristics	XPSMCMDO0002•	XPSMCMDO0004•
Mean Time to Dangerous Failure (MTTFd) in years	954	686
Connection to expansion modules	5-way backplane expansion	
Weight	0.12 kg (4.2 oz)	

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.7
XPSMCMDO00042Ax Output Expansion Module

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMDO00042A• is an output expansion module for the XPSMCM• Modular Safety Controller. The XPSMCMDO00042A• is configured with the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller. The XPSMCMDO00042A• module provides four solid state safety-related high current outputs which can be used as four single or two dual (Output Signal Switching Device, OSSD) and eight SIL 1/PL c status outputs.

The expansion module supports two inputs `NODE_ADDR0` and `NODE_ADDR1` which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Input RESTART (RST)

For more information, refer to `Input RESTART (RST)` *(see page 59)* of XPSMCMC10804• controller.

Output STATUS (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

For more information, refer to Output STATUS *(see page 140)*.

Solid-State Safety-Related Output (OSSD)

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect any equipment to an OSSD unless the OSSD is appropriately configured with SoSafe Configurable.

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

When using XPSMCMDO00042A• with sum output current > 5 A, then separate adjacent modules by interposing a XPSMCMCN0000SG connector.

Only one side of the XPSMCMDO00042A• module must be free. That is, mounting the module at either end(s) of the physical configuration would not require the connector. Modules mounted within the physical configuration require a connector on one side or the other, but not both.

⚠ WARNING

OVERHEATING AND FIRE

Separate adjacent XPSMCMDO00042A• modules either by interposing a XPSMCMCN0000SG connector between it and adjacent modules, or by ensuring that it is the first and/or last module in the physical configuration.

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

XPSMCMDO00042A• provides 4 higher current safety-related outputs single channel (2 A maximum per channel).

Different output configurations (configurable with SoSafe Configurable) can be set:
- 4 single channels (1 safety-related output per channel with its corresponding feedback input).
- 2 dual channels (2 safety-related outputs with their corresponding feedback input per channel).
- 1 dual channel and 2 single channels.

NOTE: To ensure the correct operation of the `OSSD 1, 2, 3, 4`, you must connect terminals 1 and 14 to power supply Uv (24 Vdc ± 20%).

Connector Designations and Sample Wiring Diagrams

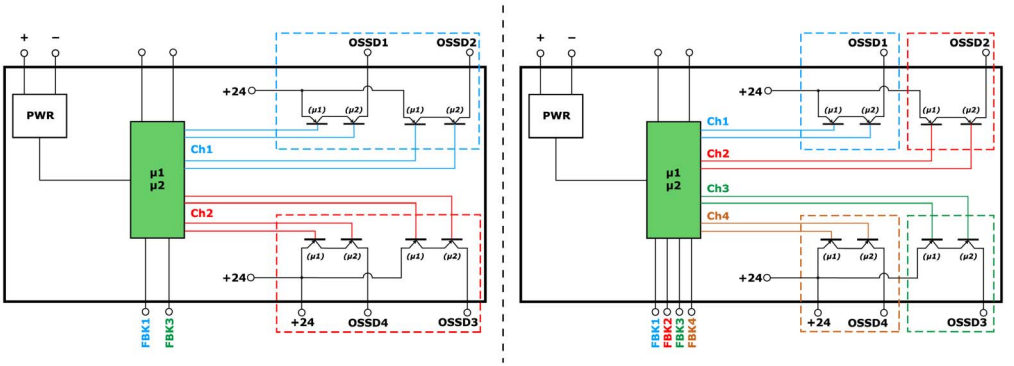
XPSMCMDO00042A• Module Connector Designations

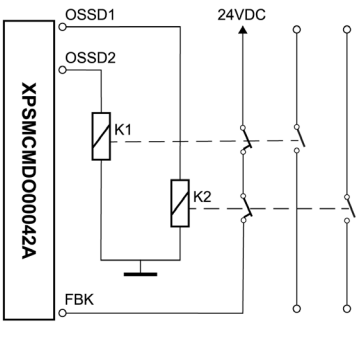
Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	-	0 Vdc power supply	-
5	RESTART_FBK1	RST 1	Input	Feedback/restart 1 for OSSD1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
6	RESTART_FBK2	RST 2	Input	Feedback/restart 2 for OSSD2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
7	RESTART_FBK3	RST 3	Input	Feedback/restart 3 for OSSD3	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
8	RESTART_FBK4	RST 4	Input	Feedback/restart 4 for OSSD4	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
9	OSSD1	OSSD 1	Output	Safety-related output 1	PNP active at Uv (24 Vdc ± 20%).
10	OSSD2	OSSD 2	Output	Safety-related output 2	
11	OSSD3	OSSD 3	Output	Safety-related output 3	
12	OSSD4	OSSD 4	Output	Safety-related output 4	
13	-	-	-	-	-
14	24 VDC	PWR	-	24 Vdc power supply	-
15	-	-	-	-	-
16	-	-	-	-	-

Terminal	Signal	LED	Type	Description	Operation
17	OUT_STATUS1	STATUS 1	Output	Configurable output 1	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
18	OUT_STATUS2	STATUS 2		Configurable output 2	
19	OUT_STATUS3	STATUS 3		Configurable output 3	
20	OUT_STATUS4	STATUS 4		Configurable output 4	
21	OUT_STATUS5	STATUS 5		Configurable output 5	
22	OUT_STATUS6	STATUS 6		Configurable output 6	
23	OUT_STATUS7	STATUS 7		Configurable output 7	
24	OUT_STATUS8	STATUS 8		Configurable output 8	

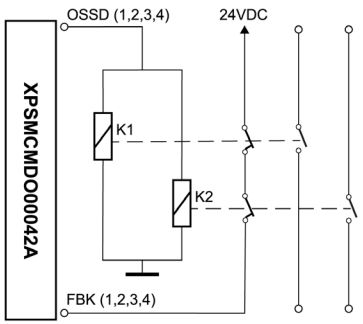
Modular Safety Controller Sample Wiring Diagram

The following internal wiring diagram depicts the difference between single and dual channel logic within the module:



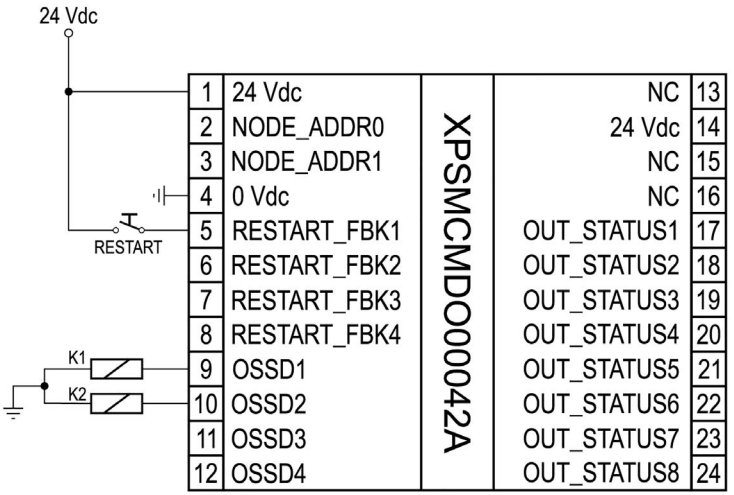


Dual channel OSSD configuration with 2 dual channel outputs, safety category SIL3/PL e: EN 61508:2010

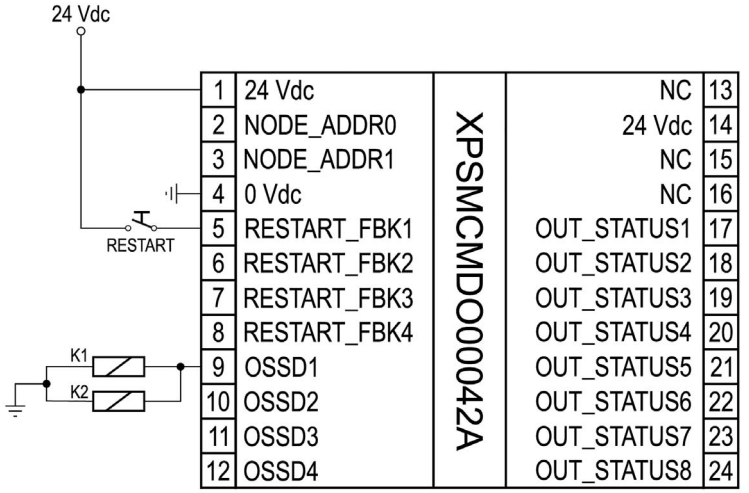


Single channel OSSD configuration with 4 single outputs, safety category SIL3/PL e: EN 61508:2010

Category 3 wiring for XPSMCMDO00042A:

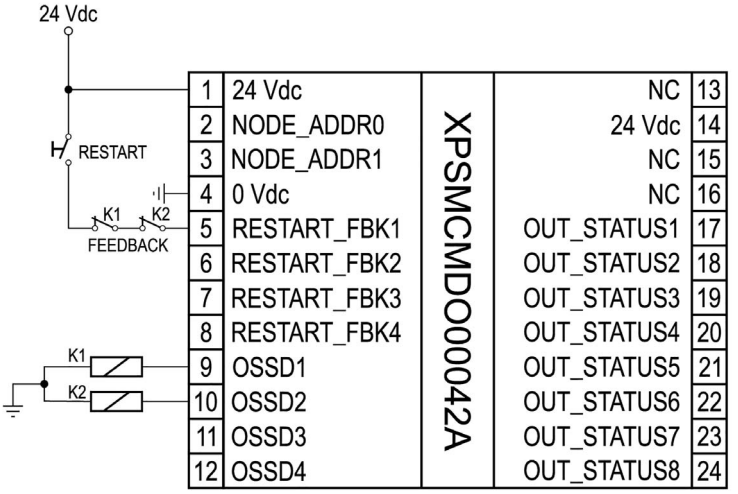


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

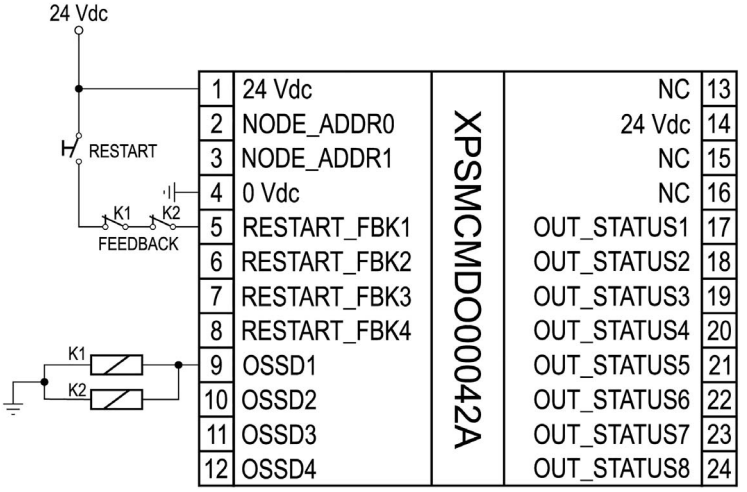


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

Category 4 wiring for XPSMCMDO00042A• with feedback of the contactors K1 and K2:



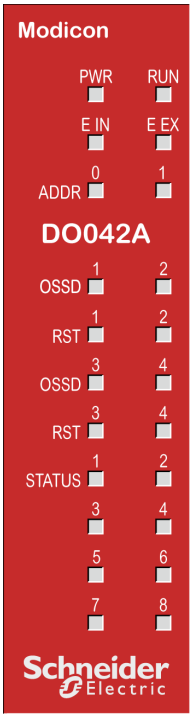
NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMDO00042A• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	**E IN red**	**E EX red**	**ADDR 0-1 orange**	**OSSD 1-4 red/ green**	**RST 1-4 yellow**	**STATUS 1-8 yellow**	**Meaning**
ON	ON	ON	ON	Red	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Encoded Node address *(see page 114)*	Red = output OFF Green = output ON	ON = waiting for restart Flashes = no feedback	Reflect status output state	Normal operation
Flashes = no inputs or outputs configured							
ON = inputs or outputs configured							

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMDO00042A• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	ADDR orange	OSSD 1-4 red/ green	RST 1-4 yellow	STATUS 1-4 yellow	Solution
Internal error detected	OFF	2 or 3 flashes	OFF	Encoded Node address *(see page 114)*	Red	OFF	OFF	Product non serviceable(1).
Compatibility error detected	OFF	5 flashes	OFF		5 flashes	5 flashes	5 flashes	Firmware version not compatible with controller(1).
OSSD output error detected	OFF	4 flashes periodically repeated	OFF		4 flashes (only corresponding LED)	OFF	OFF	Product non serviceable(1).
Error in communication with controller detected	OFF	5 flashes	OFF		OFF	OFF	OFF	Restart the system(1).
Expansion module or controller error detected	OFF	ON	OFF		OFF	OFF	OFF	Restart the system. Identify the expansion module affected by this condition and consult its user guide.
Two units of the same module reference with the same node address detected	OFF	5 flashes	5 flashes		OFF	OFF	OFF	Modify the unit node address *(see page 114)*.
Short circuit or overload detected on status output	ON	OFF	ON	Encoded Node address *(see page 114)*	Output state	OFF	Flashes	Verify correct wiring of status output(1).
Overload on OSSD / OSSD load connected to 24 Vdc detected	ON	OFF	ON		Flashing red (only corresponding LED)	OFF	Status output state	Verify correct wiring of the safety-related outputs (OSSD)(1).
(1) If the condition persists, contact your local Schneider Electric representative.								

Detected error	RUN green	E IN red	E EX red	ADDR orange	OSSD 1-4 red/ green	RST 1-4 yellow	STATUS 1-4 yellow	Solution
No power supply detected on OSSD3, OSSD4 output	ON	OFF	ON		Flashing red (OUT 3,4)	Flashing (RST 3,4)	Status output state	Connect pin 14 to power supply.
Node detection circuit error detected.	OFF	3 flashes	OFF	3 flashes	OFF	OFF	OFF	Product non serviceable(1).
(1) If the condition persists, contact your local Schneider Electric representative.								

XPSMCMDO00042A• Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

To achieve Performance Level PL e, according to standard EN 13849-1, the OSSD safety-related outputs must be independent.

Reduce Common Cause Failures (CCF) of OSSD safety-related outputs by separating cable paths (refer to EN 13849-2 for event exclusion).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Run single channel, dual wiring in separate cabling.

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

Module-specific characteristics	
Description	Electronic housing maximum 24-poles, with locking latch mounting
Mounting	DIN rail mounting with locking latch
Restart Input	4 / EDM (External Device Monitoring) input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ. Possible automatic restart function or manual operation with restart pushbutton.
Status outputs	8 / SIL 1/PL c in accordance with standard EN 61508:2010. Maximum current per output: 100 mA, nominal voltage 24 Vdc.

Module-specific characteristics	
Solid-state safety-related output (OSSD)	4 / solid-state safety-related outputs PNP active high ● Interface type C class 3 (ZVEI CB24I Ed.2) ● The outputs are able to supply: ❍ In the ON condition: (Uv - 0.2 Vdc) to Uv (24 Vdc ± 20 %) ❍ In the OFF condition: 0...2 Vrms (root mean square) ● The maximum load current of 2 A at 24 Vdc (each OSSD) corresponds to a minimum resistive load of 12 Ω. ❍ The maximum capacitive load is 1 µF. ❍ The maximum inductive load is 2.4 mH. ● Test pulses are used to detect short circuits and interruptions of wires. The switch-off test pulse interval is every 550 ms, the test pulse duration is 100 µs.
Probability of a Dangerous Failure per Hour (PFHd)	8,64E-09
Mean Time to Dangerous Failure (MTTFd) in years	395
Connection to expansion modules	5-way backplane expansion
Weight	0.150 kg (5.29 oz)

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.8
XPSMCMDO0004Sx Output Expansion Module

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMDO0004S• is an output expansion module. The XPSMCMDO0004S• module can only be configured with the XPSMCMC10804• Modular Safety Controller.

The XPSMCMDO0004S• module provides four solid-state safety-related outputs which can be used as four single or two dual (Output Signal Switching Device, OSSD) and four SIL 1/PL c status outputs.

The expansion module supports two inputs NODE_ADDR0 and NODE_ADDR1 which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Input RESTART (RST)

For more information, refer to Input RESTART (RST) *(see page 59)* of XPSMCMC10804• controller.

Output STATUS (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

For more information, refer to Output STATUS *(see page 60)* of XPSMCMC10804• controller.

Solid-State Safety-Related Output (OSSD)

For more information, refer to Solid-State safety-related output (OSSD) *(see page 61)* of XPSMCMC10804• controller.

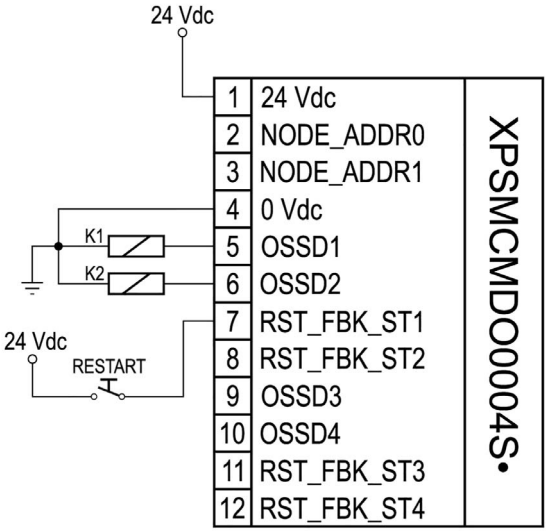
Connector Designations and Sample Wiring Diagrams

XPSMCMDO0004S• Module Safety Connector Designations

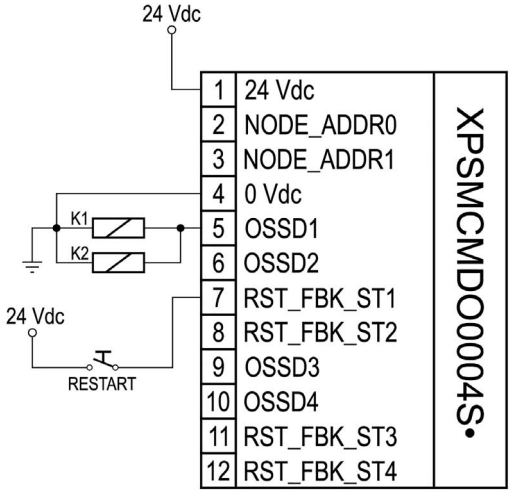
Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR0	ADDR1			
4	0 VDC	PWR	-	0 Vdc power supply	-
5	OSSD1	OSSD 1	Output	Safety-related output 1	PNP active at Uv (24 Vdc ± 20%).
6	OSSD2	OSSD 2	Output	Safety-related output 2	
7	RESTART_FBK1 / STATUS1	STATUS 1	Input / Output	Feedback/restart 1 for OSSD1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 1 for OSSD1	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
8	RESTART_FBK2 / STATUS2	STATUS 2	Input / Output	Feedback/restart 2 for OSSD2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 2 for OSSD2	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
9	OSSD3	OSSD 3	Output	Safety-related output 3	PNP active at Uv (24 Vdc ± 20%).
10	OSSD4	OSSD 4	Output	Safety-related output 4	
11	RESTART_FBK3 / STATUS3	STATUS 3	Input / Output	Feedback/restart 3 for OSSD3	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 3 for OSSD3	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
12	RESTART_FBK4 / STATUS4	STATUS 4	Input / Output	Feedback/restart 4 for OSSD4	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 4 for OSSD4	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)

XPSMCMDO0004S• Sample Wiring Diagrams

Category 3 wiring for XPSMCMDO0004S•:

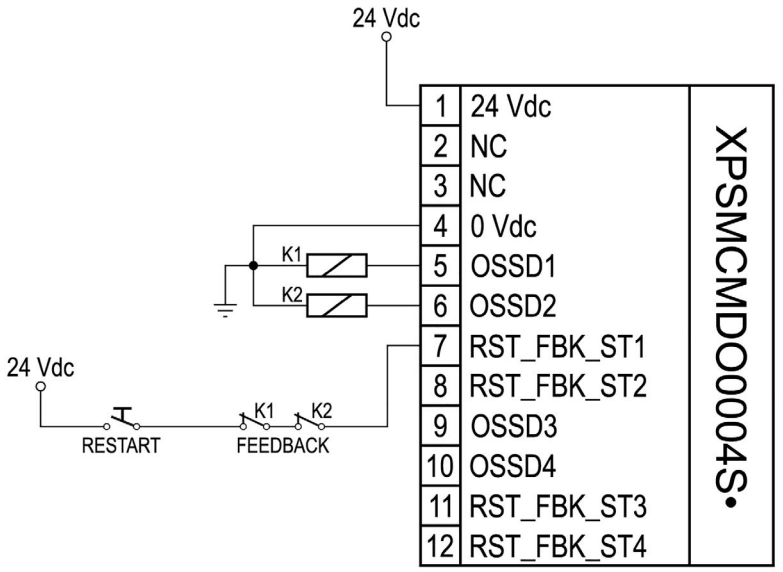


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

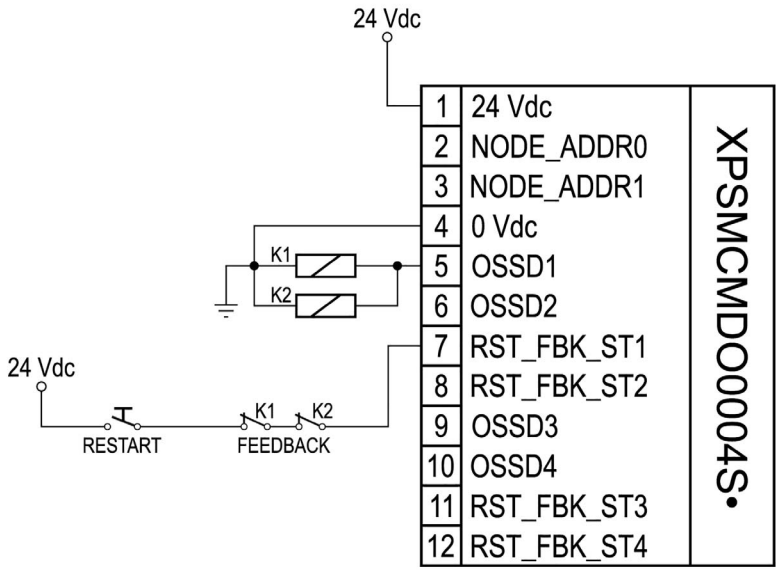


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

Category 4 wiring for XPSMCMDO0004S• with feedback of the contactors K1 and K2:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View

Operation States

The following table describes the indication of operation states of the XPSMCMDO0004S• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	**E IN red**	**E EX red**	**ADDR 0-1 orange**	**OSSD 1-4 red/ green/yellow**	**STATUS 1-4 yellow**	**Meaning**
ON	ON	ON	ON	Red	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Encoded Node address *(see page 128)*	Output state: Red = 0 Green = 1 Yellow = waiting for restart Yellow flashing = no feedback	Reflect status output state	Normal operation
Flashes = no inputs or outputs configured						
ON = inputs or outputs configured						

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMDO0004S• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	ADDR 0-1 orange	OSSD 1-4 red / green / yellow	STATUS 1-4 yellow	Solution
Internal error detected	OFF	2 or 3 flashes periodically repeated	OFF	Encoded Node address *(see page 128)*	Red	OFF	Product non serviceable(1).
Compatibility error detected	OFF	5 flashes	OFF		5 flashes	5 flashes	Firmware version not compatible with controller(1).
OSSD output error detected	OFF	4 flashes	OFF		4 flashes (only corresponding LED)	OFF	Verify correct wiring of the safety-related outputs (0SSD)(1).
Error in communication with controller detected	OFF	5 flashes	OFF		OFF	OFF	Restart the system(1).
Expansion module or controller error detected	OFF	ON	OFF		OFF	OFF	Restart the system. Identify the expansion module affected by this condition and consult its user guide(1).
Two units of the same module reference with the same node address detected	OFF	5 flashes	5 flashes		OFF	OFF	Modify the unit node address *(see page 128)*.
Overload on OSSD / OSSD load connected to 24 Vdc detected	ON	OFF	ON	Encoded Node address *(see page 128)*	Flashing red (only corresponding LED)	Reflect status output state	Verify correct wiring of the safety-related outputs (OSSD)(1).
Short circuit or overload detected on status output	ON	OFF	ON		Output state	Flashing	Verify correct wiring of STATUS output(1).

(1) If the condition persists, contact your local Schneider Electric representative.

XPSMCMDO0004S• Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

To achieve Performance Level PL e, according to standard EN 13849-1, the OSSD safety-related outputs must be independent.

Reduce Common Cause Failures (CCF) of OSSD safety-related outputs by separating cable paths (refer to EN 13849-2 for event exclusion).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Run single channel, dual wiring in separate cabling.

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

Module-specific characteristics	
Description	Electronic housing maximum 12-poles, with locking latch mounting
Mounting	DIN rail mounting with locking latch
Restart input (optional to status outputs) (number / description)	4 / EDM (External Device Monitoring) type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ. Possible automatic restart function or manual operation with restart pushbutton.
Status outputs (optional to restart input) (number / description)	4 / SIL 1/PL c in accordance with standard EN 61508:2010. Maximum current per output: 100 mA, nominal voltage 24 Vdc.

Module-specific characteristics	
Solid-state safety-related output (OSSD)	4 / solid-state safety-related outputs PNP active high ● Interface type C class 3 (ZVEI CB24I Ed.2) ● The outputs are able to supply: ❍ In the ON condition: (Uv - 0.6 Vdc)...Uv (24 Vdc ± 20 %) ❍ In the OFF condition: 0...2 Vrms (root mean square) ● The maximum load current of 400 mA (per OSSD) corresponds to a minimum resistive load of 60 Ω. ❍ The maximum capacitive load is 0.82 µF. ❍ The maximum inductive load is 2.4 mH. ● Test pulses are used to detect short circuits and interruptions of wires. The switch-off test pulse interval is every 650 ms, the test pulse duration is 100 µs.
Probability of a Dangerous Failure per Hour (PFHd)	1.12E-08
Mean Time to Dangerous Failure (MTTFd) in years	238
Connection to expansion modules	5-way backplane expansion
Weight	0.138 kg (4.86 oz)

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.9
XPSMCMDO0008C1x Output Expansion Module

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMDO0008C1• is an output expansion module for the XPSMCM• Modular Safety Controller. The XPSMCMDO0008C1• module provides 8 SIL 1/PL c outputs.

The expansion module supports two inputs `NODE_ADDR0` and `NODE_ADDR1` which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Output `STATUS` (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

The XPSMCMDO0008C1• module provides 8 SIL 1/PL c outputs.

The status outputs are SIL 1/PL c outputs configurable by means of the SoSafe Configurable.

⚠ WARNING

INSUFFICIENT SAFETY-RELATED FUNCTIONS

Do not use status outputs for safety-related purposes greater than SIL 1/PL c (EN 61508:2010).

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

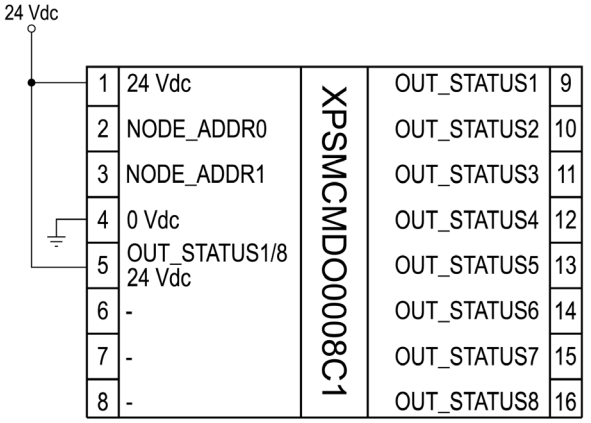
NOTE: To ensure the correct operation of the status outputs 1 to 8, you must connect terminal 5 to power supply (24 Vdc ± 20%).

Connector Designations and Sample Wiring Diagrams

XPSMCMDO0008C1• Module Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	-	0 Vdc power supply	-
5	OUT_STATUS 1/8 24 VDC	PWR	-	24 Vdc power supply	-
6	-	-	-	-	-
7	-	-	-	-	-
8	-	-	-	-	-
9	OUT_STATUS 1	STATUS 1	Output	Configurable output 1	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
10	OUT_STATUS 2	STATUS 2		Configurable output 2	
11	OUT_STATUS 3	STATUS 3		Configurable output 3	
12	OUT_STATUS 4	STATUS 4		Configurable output 4	
13	OUT_STATUS 5	STATUS 5		Configurable output 5	
14	OUT_STATUS 6	STATUS 6		Configurable output 6	
15	OUT_STATUS 7	STATUS 7		Configurable output 7	
16	OUT_STATUS 8	STATUS 8		Configurable output 8	

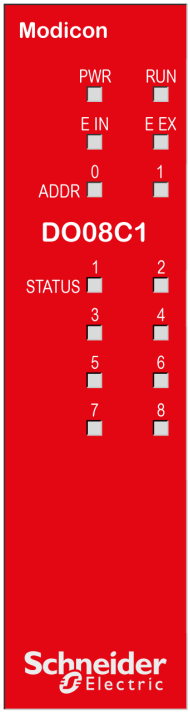
XPSMCMDO0008C1• Sample Wiring Diagram



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMDO0008C1• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	E IN red	E EX red	ADDR 0-1 orange	STATUS 1-8 yellow	Meaning
ON	ON	ON	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Encoded Node address *(see page 140)*	Reflect status output state	Normal operation
Flashing = no inputs or outputs configured					
ON = inputs or outputs configured					

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMDO0008C1• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	ADDR 0-1 orange	STATUS 1-8 yellow	Solution
Internal error detected.	OFF	2 or 3 flashes	OFF	Encoded Node address *(see page 140)*	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	5 flashes	OFF		5 flashes	Firmware version not compatible with controller(1).
Error in communication with controller detected.	OFF	5 flashes	OFF		OFF	Restart the system(1).
Error on other expansion module or controller detected.	OFF	ON	OFF		OFF	Restart the system. Identify the expansion module affected by this condition and consult its user guide(1).
Two units of the same module reference with the same node address detected	OFF	5 flashes	5 flashes		OFF	Modify the unit node address *(see page 140)*.
Error detected on node detection circuit error detected.	OFF	3 flashes	OFF	3 flashes	OFF	Product non serviceable(1).
Short circuit or overload detected on STATUS 1-8 output.	OFF	OFF	ON	OFF	Flashes	Verify correct wiring of status output(1).
No power supply detected on STATUS 1-8 output.	OFF	OFF	ON	OFF	Flashes (STATUS 1,3,5,7 and 2,4,6,8 alternatively)	Connect pin 5 to power supply.

(1) If the condition persists, contact your local Schneider Electric representative.

XPSMCMDO0008C1• Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Module-specific characteristics	XPSMCMDO0008C1•
Description	Electronic housing maximum 16-poles, with locking latch mounting
Mounting	DIN rail mounting with locking latch
Status outputs	8 / SIL 1/PL c in accordance with standard EN 61508:2010. Maximum current per output: 100 mA, nominal voltage 24 Vdc.
Probability of a Dangerous Failure per Hour (PFHd)	4.44E-09
Mean Time to Dangerous Failure (MTTFd) in years	985
Connection to expansion modules	5-way backplane expansion
Weight	0.13 kg (4.6 oz)

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.10
XPSMCMDO0016C1x Output Expansion Module

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMDO0016C1• is an output expansion module for the XPSMCM• Modular Safety Controller. The XPSMCMDO0016C1• module provides 16 SIL 1/PL c outputs.

The expansion module supports two inputs `NODE_ADDR0` and `NODE_ADDR1` which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Output `STATUS` (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

The XPSMCMDO0016C1• module provides 16 SIL 1/PL c outputs.

The status outputs are SIL 1/PL c outputs configurable by means of the SoSafe Configurable.

⚠ WARNING

INSUFFICIENT SAFETY-RELATED FUNCTIONS

Do not use status outputs for safety-related purposes greater than SIL 1/PL c (EN 61508:2010).

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

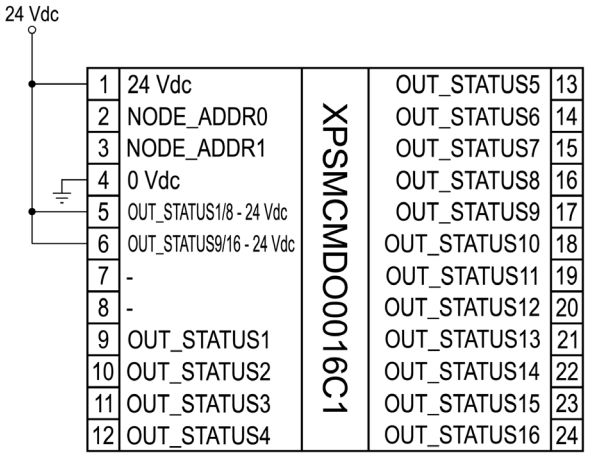
NOTE: To ensure the correct operation of the status outputs 1 to 16, you must connect terminals 5 and 6 to power supply (24 Vdc ± 20%).

Connector Designations and Sample Wiring Diagrams

XPSMCMDO0016C1• Module Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	-	0 Vdc power supply	-
5	OUT_STATUS 1/8 24 VDC	PWR	-	24 Vdc power supply	-
6	OUT_STATUS 9/16 24 VDC	PWR	-	24 Vdc power supply	-
7	-	-	-	-	-
8	-	-	-	-	-
9	OUT_STATUS 1	STATUS 1	Output	Configurable output 1	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
10	OUT_STATUS 2	STATUS 2		Configurable output 2	
11	OUT_STATUS 3	STATUS 3		Configurable output 3	
12	OUT_STATUS 4	STATUS 4		Configurable output 4	
13	OUT_STATUS 5	STATUS 5		Configurable output 5	
14	OUT_STATUS 6	STATUS 6		Configurable output 6	
15	OUT_STATUS 7	STATUS 7		Configurable output 7	
16	OUT_STATUS 8	STATUS 8		Configurable output 8	
17	OUT_STATUS 9	STATUS 9	Output	Configurable output 9	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
18	OUT_STATUS 10	STATUS 10		Configurable output 10	
19	OUT_STATUS 11	STATUS 11		Configurable output 11	
20	OUT_STATUS 12	STATUS 12		Configurable output 12	
21	OUT_STATUS 13	STATUS 13		Configurable output 13	
22	OUT_STATUS 14	STATUS 14		Configurable output 14	
23	OUT_STATUS 15	STATUS 15		Configurable output 15	
24	OUT_STATUS 16	STATUS 16		Configurable output 16	

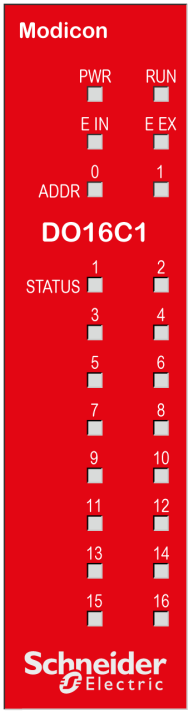
XPSMCMDO0016C1• Module Sample Wiring Diagram



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMDO0016C1• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	E IN red	E EX red	ADDR 0-1 orange	STATUS 1-16 yellow	Meaning
ON	ON	ON	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Encoded Node address *(see page 147)*	Reflect status output state	Normal operation
Flashing = no inputs or outputs configured					
ON = inputs or outputs configured					

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMDO0016C1• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	ADDR 0-1 orange	STATUS 1-8 yellow	STATUS 9-16 yellow	Solution
Internal error detected.	OFF	2 or 3 flashes	OFF	Encoded Node address *(see page 147)*	OFF	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	5 flashes	OFF		5 flashes	5 flashes	Firmware version not compatible with controller(1).
Error in communication with controller detected.	OFF	5 flashes	OFF		OFF	OFF	Restart the system(1).
Error on other expansion module or in the controller detected.	OFF	ON	OFF		OFF	OFF	Restart the system. Identify the expansion module affected by this condition and consult its user guide(1).
Two units of the same module reference with the same node address detected	OFF	5 flashes	5 flashes		OFF	OFF	Modify the unit node address *(see page 147)*.
Error detected on node detection circuit error detected.	OFF	3 flashes	OFF	3 flashes	OFF	OFF	Product non serviceable(1).
Short circuit or overload detected on `STATUS 1-8` output.	OFF	OFF	ON	OFF	Flashes	OFF	Verify correct wiring of status output(1).
(1) If the condition persists, contact your local Schneider Electric representative.							

Detected error	RUN green	E IN red	E EX red	ADDR 0-1 orange	STATUS 1-8 yellow	STATUS 9-16 yellow	Solution
Short circuit or overload detected on STATUS 9-16 output.	OFF	OFF	ON	OFF	OFF	Flashes	Verify correct wiring of status output(1).
No power supply detected on STATUS 1-8 output.	OFF	OFF	ON	OFF	Flashes (STATUS 1,3,5,7 and 2,4,6,8 alternatively)	OFF	Connect pin 5 to power supply.
No power supply detected on STATUS 9-16 output.	OFF	OFF	ON	OFF	OFF	Flashes (STATUS 9,11,13,15 and 10,12,14,16 alternatively)	Connect pin 6 to power supply.
(1) If the condition persists, contact your local Schneider Electric representative.							

XPSMCMDO0016C1• Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Module-specific characteristics	XPSMCMDO0016C1•
Description	Electronic housing maximum 24-poles, with locking latch mounting
Mounting	DIN rail mounting with locking latch
Status outputs	16 / SIL 1/PL c in accordance with standard EN 61508:2010. Maximum current per output: 100 mA, nominal voltage 24 Vdc.
Probability of a Dangerous Failure per Hour (PFHd)	6.61E-09
Mean Time to Dangerous Failure (MTTFd) in years	772
Connection to expansion modules	5-way backplane expansion
Weight	0.145 kg (5.11 oz)

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.11
XPSMCMER0002x and XPSMCMER0004x Output Expansion Modules

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMER0002• and XPSMCMER0004• are output expansion modules for the XPSMCM• Modular Safety Controller. The XPSMCMER0002• and XPSMCMER0004• modules are configured with the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller.

The XPSMCMER0002• module provides one Category 4 safety-related relay output (2 NO contacts and 1 NC contact). The XPSMCMER0004• module provides two Category 4 safety-related relay outputs (2 x 2 NO contacts and 1 NC contact). Digital outputs from the XPSMCMCP0802• Modular Safety Controller or XPSMCMDO0002•, XPSMCMDO0004•, or XPSMCMMX0802• expansion modules are physically wired directly to the inputs of the XPSMCMER0002• and XPSMCMER0004• modules. The XPSMCMER0002• and XPSMCMER0004• modules are not connected to the backplane expansion.

Input RESTART (RST)

For more information, refer to Input RESTART (RST) *(see page 47)*.

Connector Designations and Sample Wiring Diagram

XPSMCMER0002• Module Connector Designations

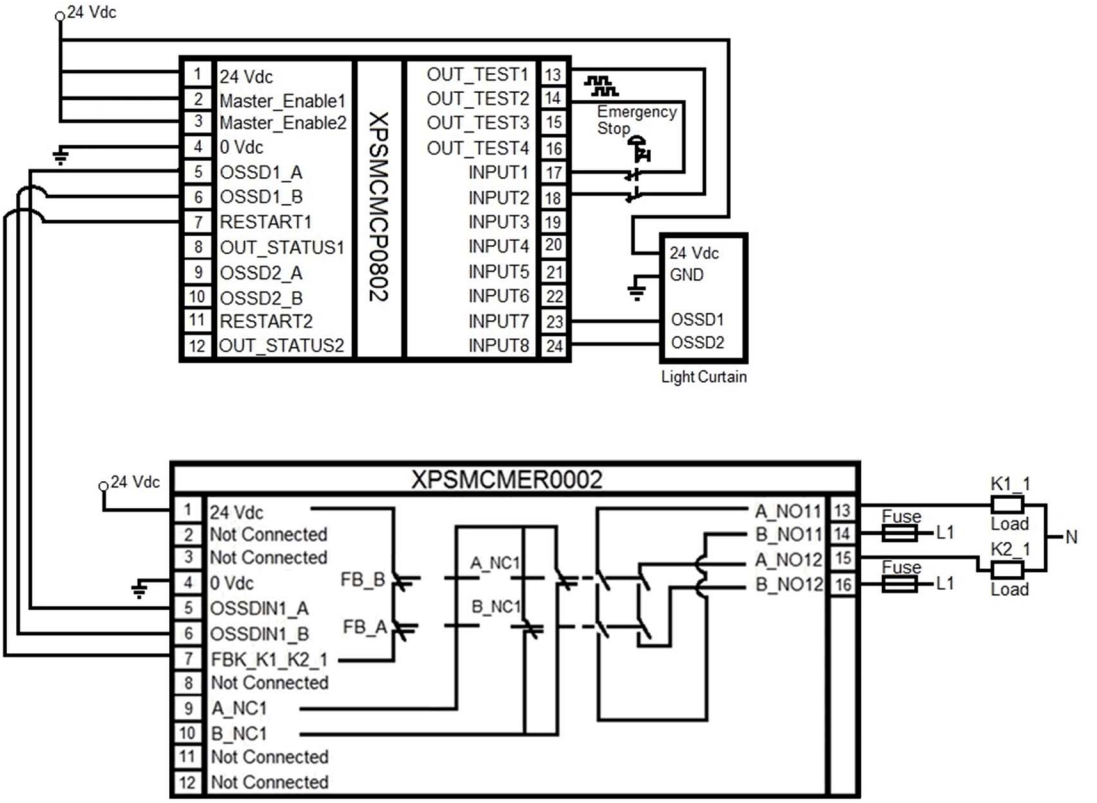
Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	–	24 Vdc power supply	–
4	0 VDC	PWR	–	0 Vdc power supply	
5	OSSDIN1_A	–	Input	Control circuit 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
6	OSSDIN1_B				
7	FBK_K1_K2_1	–	Output	Feedback K1K2 ZONE 1	–
9	A_NC1	RELAY 1		NC contact ZONE 1	
10	B_NC1				
13	A_NO11			NO1 contact ZONE 1	
14	B_NO11				
15	A_NO12			NO2 contact ZONE 1	
16	B_NO12				

XPSMCMER0004• Module Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	–	24 Vdc power supply	–
4	0 VDC	PWR		0 Vdc power supply	–
5	OSSDIN1_A	–	Input	Control circuit 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
6	OSSDIN1_B				
7	FBK_K1_K2_1	-	Output	Feedback K1 K2 ZONE 1	–
9	A_NC1	RELAY 1	Output	NC contact ZONE 1	–
10	B_NC1				
11	A_NC2	RELAY 2	Output	NC contact ZONE 2	–
12	B_NC2				
13	A_NO11	RELAY 1	Output	NO1 contact ZONE 1	–
14	B_NO11				
15	A_NO12			NO2 contact ZONE 1	
16	B_NO12				
17	OSSDIN2_A	–	Input	Control circuit 2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
18	OSSDIN2_B				

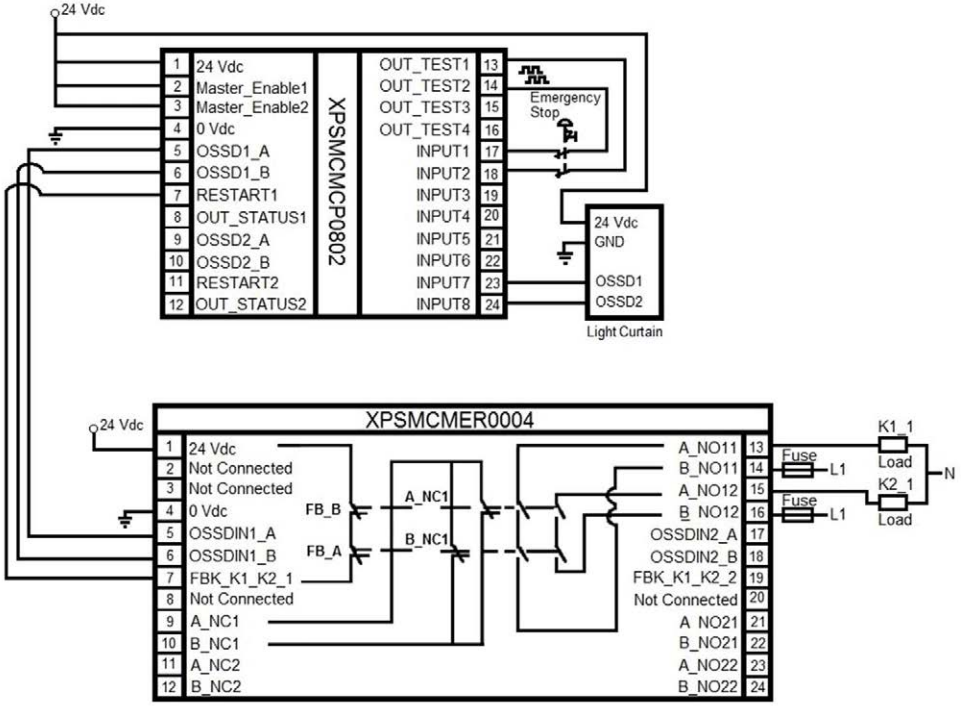
Terminal	Signal	LED	Type	Description	Operation
19	FBK_K1_K2_2	–	Output	Feedback K1 K2 ZONE 2	–
21	A_NO21	RELAY 2		NO1 contact ZONE 2	
22	B_NO21				
23	A_NO22			NO2 contact ZONE 2	
24	B_NO22				

XPSMCMER0002• Module Sample Wiring Diagram



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

XPSMCMER0004• Module Sample Wiring Diagram



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View

Operation State

The following table describes the operation state of the XPSMCMER0002• and XPSMCMER0004• LED indicator:

RELAY 1 (2) **green**	**Meaning**
ON with output activated	Normal operation

Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

- Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.
- For relay output (2 A) wiring, use conductors of at least 0.5 mm^2 (AWG 20) with a temperature rating of at least 80 °C (176 °F).
- For common conductors of relay output wiring (7 A), or relay output wiring greater than 2 A, use conductors of at least 1.0 mm^2 (AWG 16) with a temperature rating of at least 80 °C (176 °F).

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Module-specific characteristics	XPSMCMER0002•	XPSMCMER0004•
Reference description	Electronic housing maximum 16-poles, with locking latch mounting	Electronic housing maximum 24-poles, with locking latch mounting
Switching capacity according to EN 60947-5-1	AC-15, 240 V, 3 A or DC-13, 24 V, 2 A	
Switching current (resistive)	6 A maximum (minimum 17 V at 10 mA)	
Relay contact type	2 NO + 1 NC	2 x 2 NO + 1 NC
FEEDBACK contacts	1	2
Response time	12 ms	
Mechanical life of contacts	> 20 x 10^6	
Connection to expansion modules	No backplane expansion available, connection to digital outputs by hardwiring	
Weight	0.12 kg (4.2 oz)	

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

NOTE: To help ensure correct isolation and avoid the risk of premature aging of, or damage to, the relays, each output line must be protected using an appropriately dimensioned, slow blow fuse that takes into account the maximum current of the relay, the load on the relay and the wire size between relay and load. The load characteristics must be consistent with those specified. For more important information on the protection of relay outputs, refer to Protecting Outputs from Inductive Load Damage *(see page 37)*.

NOTE: If a relay module is connected, the response time of the OSSD linked must be increased by 12 ms.

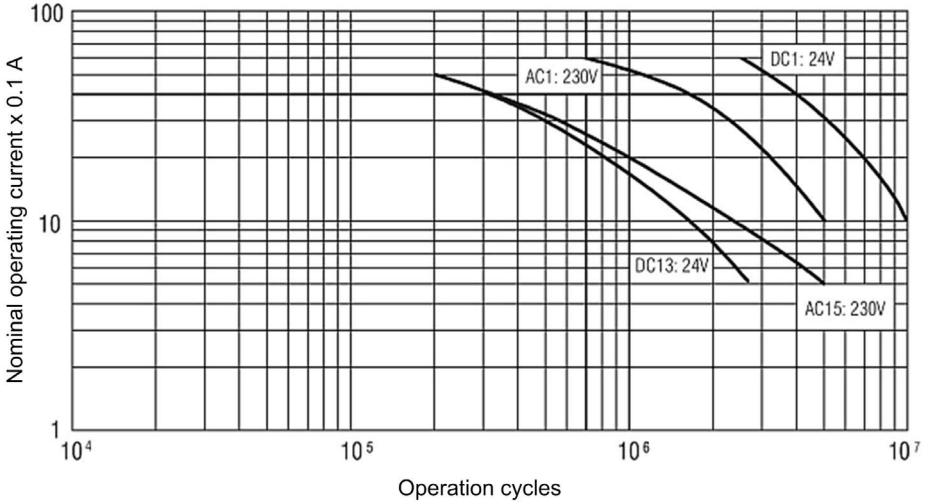
Module Characteristics Concerning Safety

Module-specific characteristics concerning safety (XPSMCMER0002•/XPSMCMER0004•)									
-		Feedback contact used				Feedback contact not used			
-		PFHd	SFF (%)	MTTFd (years)	DCavg	PFHd	SFF (%)	MTTFd (years)	DCavg
DC-13 (2A)	t_{cycle1}	3.09E-10	99.6	2335.94	98.9	9.46E-10	0.60	2335.93	0
	t_{cycle2}	8.53E-11	99.7	24453.47	97.7	1.08E-10	0.87	24453.47	0
	t_{cycle3}	6.63E-11	99.8	126678.49	92.5	6.75E-11	0.97	126678.59	0
AC-15 (3A)	t_{cycle1}	8.23E-09	99.5	70.99	99.0	4.60E-07	0.50	70.99	0
	t_{cycle2}	7.42E-10	99.5	848.16	99.0	4.49E-09	0.54	848.15	0
	t_{cycle3}	1.07E-10	99.7	12653.85	98.4	1.61E-10	0.79	12653.85	0
AC-15 (1A)	t_{cycle1}	3.32E-09	99.5	177.38	99.0	7.75E-08	0.51	177.37	0
	t_{cycle2}	3.36E-10	99.6	2105.14	98.9	1.09E-09	0.60	2105.14	0
	t_{cycle3}	8.19E-11	99.7	28549.13	97.5	1.00E-10	0.88	28549.13	0

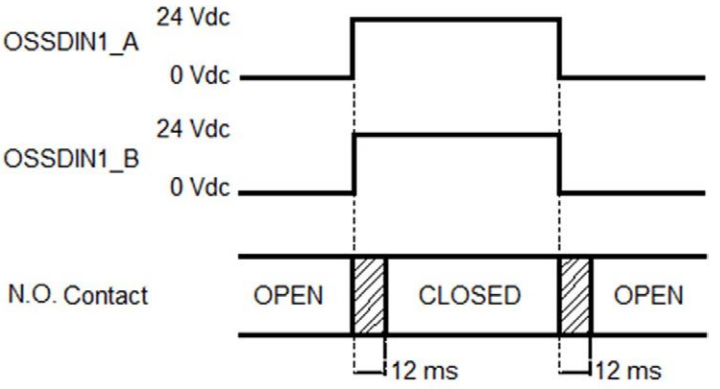
t_{cycle1} 300 s (1 commutation every 5 minutes)
t_{cycle2} 3600s (1 commutation every hour)
t_{cycle3} 1 commutation every day
PFHd Probability of a dangerous failure per hour according IEC 61508
MTTFd and DCavg Mean Time to dangerous Failure and Diagnostic Coverage average according EN ISO 13849-1

Electrical Life of the Output Contacts

The graphic shows the electrical life of the output contacts determined by EN 60947-51-1:



Switching Operation Timing Diagram



Section 4.12
XPSMCMRO0004DAx and XPSMCMRO0004x Output Expansion Modules

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMRO0004• and XPSMCMRO0004DA• are output expansion modules for the XPSMCM• Modular Safety Controller. The XPSMCMRO0004• and XPSMCMRO0004DA• modules are configured with the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller. The XPSMCMRO0004• module provides two Category 4, or four Category 1, or two single-channel relay outputs. The XPSMCMRO0004DA• module provides two Category 4, or four Category 1, or two single-channel safety-related relay outputs. XPSMCMRO0004DA• provides eight additional status outputs. The diagnostic status outputs are configured using SoSafe Configurable.

The expansion module supports two inputs `NODE_ADDR0` and `NODE_ADDR1` which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc
NOTE: Do not use the same physical address for two units of the same module reference. **NOTE:** The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively. **NOTE:** The node address wiring must match the configuration settings.		

Input RESTART (RST)

For more information, refer to Input RESTART (RST) *(see page 47)*.

Output STATUS for XPSMCMRO0004DA• (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

For more information, refer to Output STATUS *(see page 140)*.

Connector Designations and Sample Wiring Diagrams

XPSMCMRO0004DA• Module Connector Designations

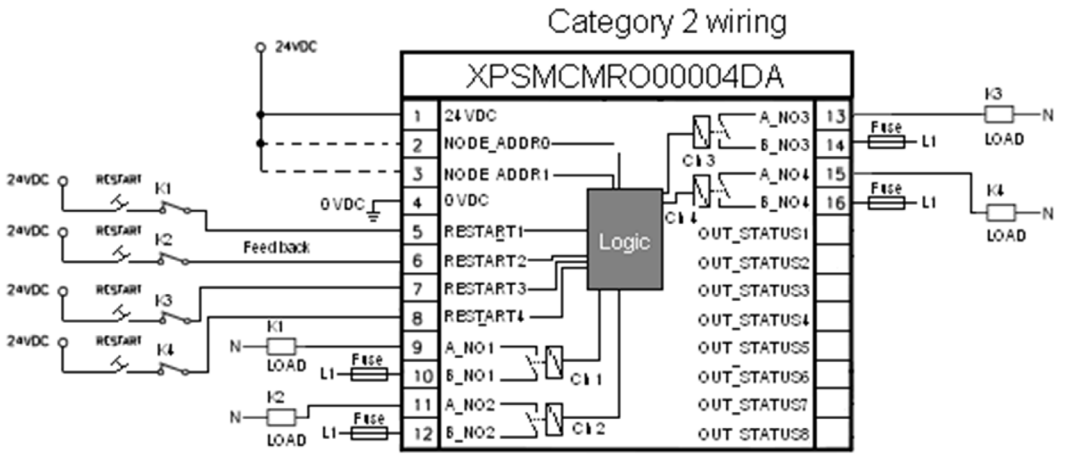
The connections for the XPSMCMRO0004• module are identical without the status outputs occupying terminals 17 through 24.

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	–	24 Vdc power supply	–
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	–	0 Vdc power supply	-
5	RESTART1	RST 1	Input	Feedback/Restart 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
6	RESTART2	RST 2		Feedback/Restart 2	
7	RESTART3	RST 3		Feedback/Restart 3	
8	RESTART4	RST 4		Feedback/Restart 4	
9	A_NO1	RELAY 1	Output	NO contact channel 1	-
10	B_NO1				
11	A_NO2	RELAY 2		NO contact channel 2	
12	B_NO2				
13	A_NO3	RELAY 3		NO contact channel 3	
14	B_NO3				
15	A_NO4	RELAY 4		NO contact channel 4	
16	B_NO4				
17	OUT_STATUS 1	STATUS 1	Output	Configurable diagnostic output	PNP active at Uv (24 Vdc ± 20%).
18	OUT_STATUS 2	STATUS 2			
19	OUT_STATUS 3	STATUS 3			
20	OUT_STATUS 4	STATUS 4			
21	OUT_STATUS 5	STATUS 5			
22	OUT_STATUS 6	STATUS 6			
23	OUT_STATUS 7	STATUS 7			
24	OUT_STATUS 8	STATUS 8			

XPSMCMRO0004DA• Module Sample Wiring Diagrams

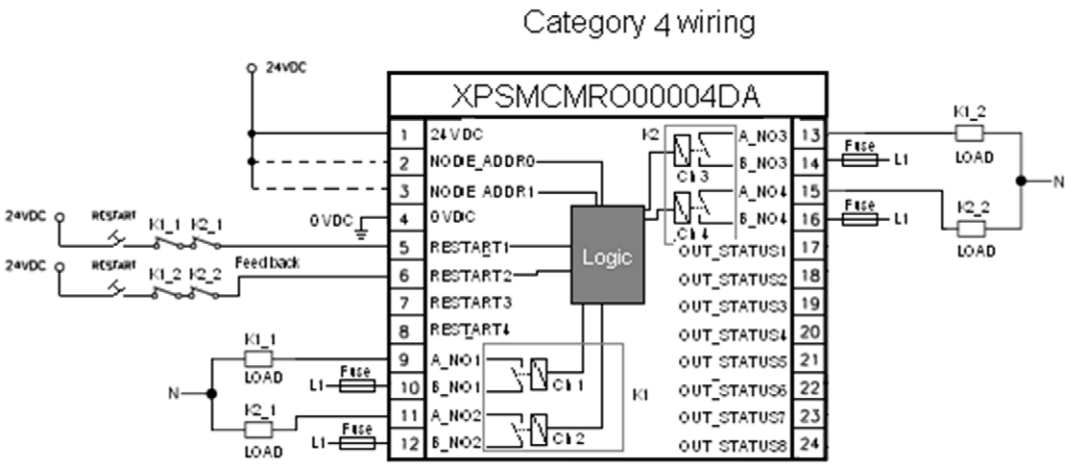
The connections for the XPSMCMRO0004• module are identical without the status outputs occupying terminals 17 through 24.

Category 2 wiring



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

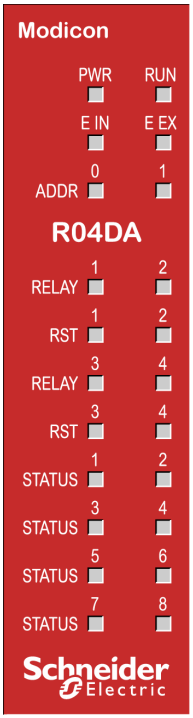
Category 4 wiring

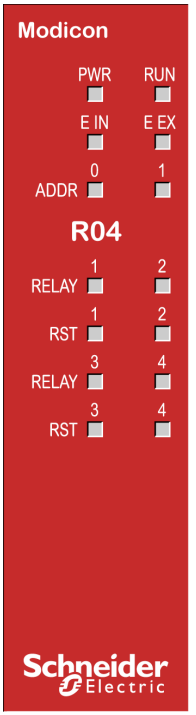


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View





Operation States

The following table describes the indication of operation states of the XPSMCMRO0004DA• by means of the LEDs. The LED descriptions for the XPSMCMRO0004• are identical except that it does not have the **STATUS** LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	**E IN red**	**E EX red**	**ADDR 0/1 orange**	**RELAY 1-4 red/green**	**RST 1-4 yellow**	**STATUS 1-8 yellow**	**Meaning**
ON	ON	ON	ON	Red	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Encoded Node address *(see page 164)*	Output state: red = 0 (contact opened) green = 1 (contact closed)	ON = waiting for restart	Output diagnostics	Normal operation
Flashing = no inputs or outputs configured					Flashing = no feedback		
ON = inputs or outputs configured							

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMRO0004DA• and XPSMCMRO0004• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	ADDR 0/1 orange	RELAY 1-4 red/green	RST 1-4 yellow	Solution
Internal error detected.	OFF	2 or 3 flashes	OFF	Encoded Node address *(see page 164)*	Red	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	5 flashes	OFF		5 flashes		Firmware version not compatible with XPSMCMCP0802•(1).
Relay output error detected.	OFF	4 flashes	OFF		4 flashes [1]	OFF	Product non serviceable(1).
Error detected in the communication with controller.	OFF	5 flashes	OFF		OFF	OFF	Reboot the system.
Error detected on other expansion module or XPSMCMCP0802•.	OFF	ON	OFF		OFF	OFF	Reboot the system(1). Verify which module /controller is in error and consult its troubleshooting guide.
Two units of the same module reference detected with the same node address.	OFF	5 flashes			OFF	OFF	Modify the unit node address *(see page 164)*.
No external feedback category 4 relay.	ON	OFF	4 flashes		4 red flashes	OFF	Verify connection 5,6,7,8.
Error detected on node detection circuit.	OFF	3 flashes	OFF	3 flashes	OFF	OFF	Product non serviceable(1).

(1) If the condition persists, contact your local Schneider Electric representative.

Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

- Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.
- For relay output (2 A) wiring, use conductors of at least 0.5 mm^2 (AWG 20) with a temperature rating of at least 80 °C (176 °F).
- For common conductors of relay output wiring (7 A), or relay output wiring greater than 2 A, use conductors of at least 1.0 mm^2 (AWG 16) with a temperature rating of at least 80 °C (176 °F).

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Module-specific characteristics	XPSMCMRO0004•	XPSMCMRO0004DA•
Reference description	Electronic housing maximum 16-poles, with locking latch mounting	Electronic housing maximum 24-poles, with locking latch mounting
Nominal switching capacity according to EN 60947-5-1	AC-15, 230 V, 3 A or DC-13, 24 V, 2 A AC-1, 230 V, 6 A DC-1, 24 V, 6 A	
Commutation voltage	17...31 Vdc	
Minimum switching voltage	10 Vdc	
Minimum switching current	20 mA	
Maximum switching voltage (DC)	250 Vdc	
Maximum switching voltage (AC)	400 Vac	
Relay contact type	4	
FEEDBACK contacts	4 / EDM (External Device Monitoring) input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ. / Possible automatic restart function or manual operation with restart pushbutton	

Module-specific characteristics	XPSMCMRO0004•	XPSMCMRO0004DA•
Status outputs	-	8 configurable diagnostic outputs PNP active high 100 mA, nominal voltage 24 Vdc
Response time	12 ms	
Mechanical life of contacts	> 20 x 10^6	
Connection to expansion modules	5-way backplane expansion	
Weight	0.12 kg (4.2 oz)	

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

NOTE: To help ensure correct isolation and avoid the risk of premature aging of, or damage to, the relays, each output line must be protected using an appropriately dimensioned, slow blow fuse that takes into account the maximum current of the relay, the load on the relay and the wire size between relay and load. The load characteristics must be consistent with those specified. For more important information on the protection of relay outputs, refer to Protecting Outputs from Inductive Load Damage *(see page 37)*.

NOTE: If a relay module is connected, the response time of the OSSD linked must be increased by 12 ms.

Module Characteristics Concerning Safety

Module-specific characteristics concerning safety (XPSMCMRO0004•/XPSMCMRO0004DA•)									
-		Feedback contact used				Feedback contact not used			
-		PFHd	SFF (%)	MTTFd (years)	DCavg	PFHd	SFF (%)	MTTFd (years)	DCavg
DC-13 (2A)	t_{cycle1}	3.09E-10	99.6	2335.94	98.9	9.46E-10	0.60	2335.93	0
	t_{cycle2}	8.53E-11	99.7	24453.47	97.7	1.08E-10	0.87	24453.47	0
	t_{cycle3}	6.63E-11	99.8	126678.49	92.5	6.75E-11	0.97	126678.5	0
AC-15 (3A)	t_{cycle1}	8.23E-09	99.5	70.99	99.0	4.60E-07	0.50	70.99	0
	t_{cycle2}	7.42E-10	99.5	848.16	99.0	4.49E-09	0.54	848.15	0
	t_{cycle3}	1.07E-10	99.7	12653.85	98.4	1.61E-10	0.79	12653.85	0

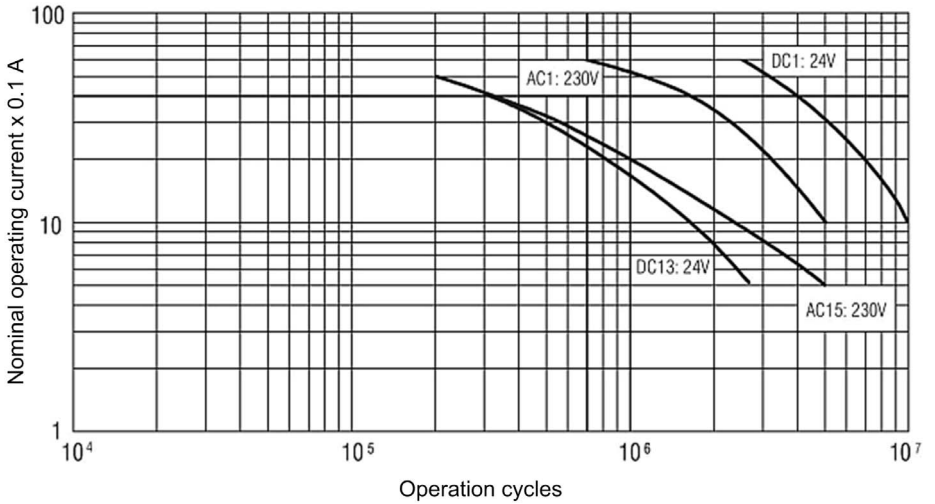
t_{cycle1} 300 s (1 commutation every 5 minutes)
t_{cycle2} 3600s (1 commutation every hour)
t_{cycle3} 1 commutation every day
PFHd Probability of a dangerous failure per hour according IEC 61508
MTTFd and DCavg Mean Time to dangerous Failure and Diagnostic Coverage average according EN ISO 13849-1

Module-specific characteristics concerning safety (XPSMCMRO0004•/XPSMCMRO0004DA•)									
-		Feedback contact used				Feedback contact not used			
-		PFHd	SFF (%)	MTTFd (years)	DCavg	PFHd	SFF (%)	MTTFd (years)	DCavg
AC-15 (1A)	t_{cycle1}	3.32E-09	99.5	177.38	99.0	7.75E-08	0.51	177.37	0
	t_{cycle2}	3.36E-10	99.6	2105.14	98.9	1.09E-09	0.60	2105.14	0
	t_{cycle3}	8.19E-11	99.7	28549.13	97.5	1.00E-10	0.88	28549.13	0

t_{cycle1} 300 s (1 commutation every 5 minutes)
t_{cycle2} 3600s (1 commutation every hour)
t_{cycle3} 1 commutation every day
PFHd Probability of a dangerous failure per hour according IEC 61508
MTTFd and DCavg Mean Time to dangerous Failure and Diagnostic Coverage average according EN ISO 13849-1

Electrical Life of the Output Contacts

The graphic shows the electrical life of the output contacts determined by EN 60947-51-1:



Section 4.13
XPSMCMMX0802x Input/Output Expansion Module

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMMX0802• is an input/output expansion module for the XPSMCM• Modular Safety Controller. The XPSMCMMX0802• module is configured with the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller. The XPSMCMMX0802• module provides eight safety-related inputs and two dual safety-related outputs.

The expansion module supports two inputs NODE_ADDR0 and NODE_ADDR1 which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Input RESTART (RST)

For more information, refer to Input RESTART (RST) *(see page 47)*.

Output STATUS (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

For more information, refer to Output STATUS *(see page 140)*.

Output TEST

For more information, refer to Output TEST *(see page 48)*.

Solid-State Safety-Related Output (OSSD)

For more information, refer to Solid-State safety-related output (OSSD) *(see page 49)*.

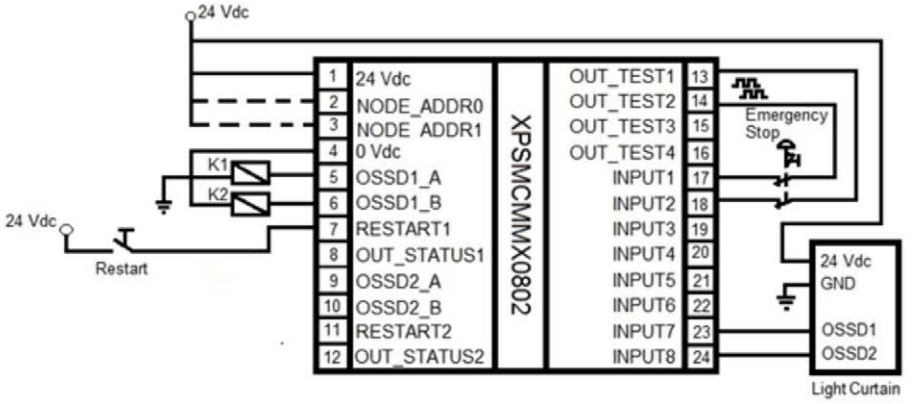
Connector Designations and Sample Wiring Diagrams

XPSMCMMX0802• Module Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	-	0 Vdc power supply	-
5	OSSD1_A	OSSD 1	Output	Safety-related output 1	PNP active at Uv (24 Vdc ± 20%).
6	OSSD1_B				
7	RESTART1	RST 1	Input	Feedback/Restart 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
8	OUT_STATUS 1	STATUS 1	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
9	OSSD2_A	OSSD 2 OUT 2		Safety-related output 2	PNP active at Uv (24 Vdc ± 20%).
10	OSSD2_B				
11	RESTART2	RST 2	Input	Feedback/restart 2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
12	OUT_STATUS 2	STATUS 2	Output	Configurable diagnostic output	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
13	OUT_TEST1	-		Test output for detection of short circuits/cross circuits in input circuits	PNP active at 24 Vdc.
14	OUT_TEST2	-			
15	OUT_TEST3	-			
16	OUT_TEST4	-			
17	INPUT1	IN 1	Input	Safety-related input 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
18	INPUT2	IN 2		Safety-related input 2	
19	INPUT3	IN 3		Safety-related input 3	
20	INPUT4	IN 4		Safety-related input 4	
21	INPUT5	IN 5		Safety-related input 5	
22	INPUT6	IN 6		Safety-related input 6	
23	INPUT7	IN 7		Safety-related input 7	
24	INPUT8	IN 8		Safety-related input 8	

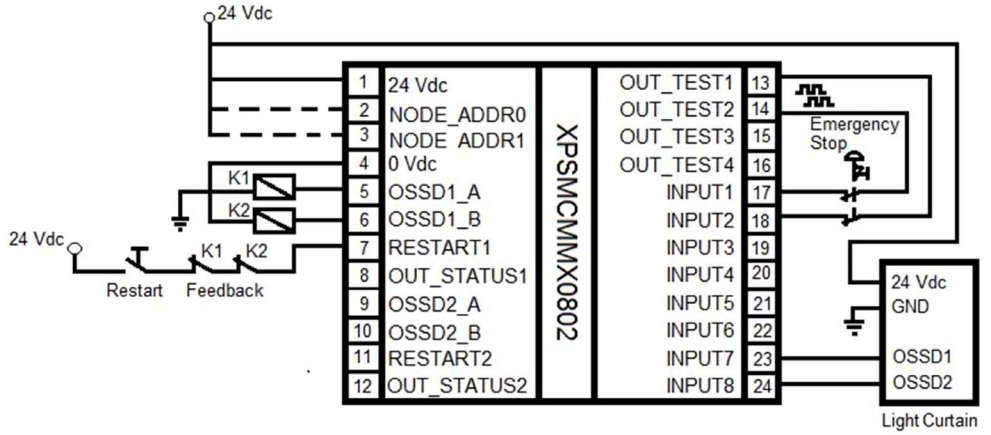
XPSMCMMX0802• Module Sample Wiring Diagrams

Category 3 wiring for XPSMCMMX0802•:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

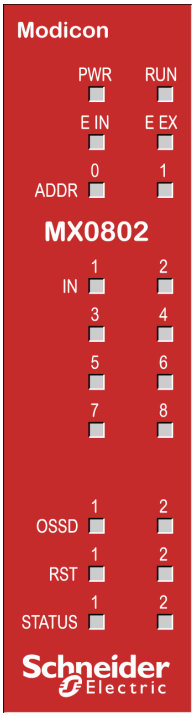
Category 4 wiring for XPSMCMMX0802• with feedback of the contactors K1 and K2:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMMX0802• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	E IN red	E EX red	ADDR 0/1 orange	IN 1-8 yellow	OSSD 1/2 red/ green	RST 1/2 yellow	STATUS 1/2 yellow	Meaning
ON	ON	ON	ON	ON	red	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Encoded Node address *(see page 174)*	Input state	Output state: red = 0 green = 1	ON = waiting for restart	Output diagnostics	Normal operation
Flashing = no inputs or outputs configured		ON = Wiring error detected		Flashing = input with error		Flashing = no feedback		
ON = inputs or outputs configured								

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMMX0802• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	IN 1-8 yellow	OSSD 1/2 red/ green	RST 1/2 yellow	STATUS 1/2 yellow	Solution
Internal error detected.	OFF	2 or 3 flashes	OFF	OFF	red	OFF	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	5 flashes	OFF	5 flashes	red 5 flashes	5 flashes	5 flashes	Firmware version not compatible with XPSMCMCP0802•(1).
OSSD output error detected.	OFF	4 flashes	OFF	OFF	red 4 flashes	OFF	OFF	Verify solid state safety-related output (OSSD)1/2 connections.
Error detected in the communication with controller.	OFF	5 flashes	OFF	OFF				Reboot the system(1).

(1) If the condition persists, contact your local Schneider Electric representative.

Detected error	RUN green	E IN red	E EX red	IN 1-8 yellow	OSSD 1/2 red/ green	RST 1/ 2 yellow	STATUS 1/2 yellow	Solution
Error detected on other expansion module or XPSMCMCP0802•.	OFF	ON	OFF	OFF				Reboot the system. Verify which module/controller is in error and consult its troubleshooting guide.
Two units of the same module reference detected with the same node address.	OFF	5 flashes	5 flashes	OFF				Modify the unit node address *(see page 174)* `NODE ADDR`.
(1) If the condition persists, contact your local Schneider Electric representative.								

Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

Module-specific characteristics	
Reference description	Electronic housing maximum 24-poles, with locking latch mounting
Unit enable (No./description)	2 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.
Digital inputs (No./description)	8 / Input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ.
Restart input (No./description)	2 / EDM (External Device Monitoring) input type 3 according to EN 61131-2. Maximum applicable resistance 1.2 kΩ. / Possible automatic restart function or manual operation with restart pushbutton
Test output (No./description)	4 / to test for cross circuits - short circuits, maximum current 100 mA, nominal voltage 24 Vdc

Module-specific characteristics	
Solid-state safety-related output (OSSD) (No./description)	2 pairs / solid-state safety-related outputs PNP active high ● The outputs are able to supply: ❍ In the ON condition: (Uv - 0.75 V)...Uv (24 Vdc ± 20 %) ❍ In the OFF condition: 0 to 2 Vrms (root mean square) ● The maximum load current of 400 mA (per OSSD) corresponds to a minimum resistive load of 60 Ω. ❍ The maximum capacitive load is 0.82 µF. ❍ The maximum inductive load is 30 mH. ● To detect short circuit and line break on the outputs, a line monitoring is made by using an output pulse on each channel. The output pulse is generated every 5.5 ms with a pulse of 100 microseconds.
Status outputs	Maximum output current per channel: 100 mA, nominal voltage 24 Vdc
Probability of a dangerous failure per hour (PFHd)	5.72E-9
Mean Time to Dangerous Failure (MTTFd) in years	459
Connection to expansion modules	5-way backplane expansion
Weight	0.12 kg (4.2 oz)

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.14
XPSMCMMX0804x Input/Output Expansion Module

What Is in This Section?

This section contains the following topics:

Module and Functional Description

Presentation

The XPSMCMMX0804• module is an input/output expansion module.The XPSMCMMX0804• module can only be configured with the XPSMCMC10804• Modular Safety Controller. The XPSMCMMX0804• module provides eight safety-related inputs, four solid-state safety-related outputs which can be used as four single or two dual (Output Signal Switching Device, OSSD) and four SIL 1/PL c status outputs.

The expansion module supports two inputs NODE_ADDR0 and NODE_ADDR1 which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	NODE_ADDR1 (Terminal 3)
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

NOTE: The node address wiring must match the configuration settings.

Input RESTART (RST)

For more information, refer to Input RESTART (RST) *(see page 59)* of XPSMCMC10804• controller.

Output STATUS (SIL 1/PL c in Accordance with Standard EN 61508:2010)

The status outputs are configurable digital diagnostic outputs that indicate the status of safety-related inputs and/or outputs.

For more information, refer to Output STATUS *(see page 60)* of XPSMCMC10804• controller.

Output TEST

For more information, refer to Output TEST *(see page 60)* of XPSMCMC10804• controller.

Solid-State Safety-Related Output (OSSD)

For more information, refer to Solid-State safety-related output (OSSD) *(see page 61)* of XPSMCMC10804• controller.

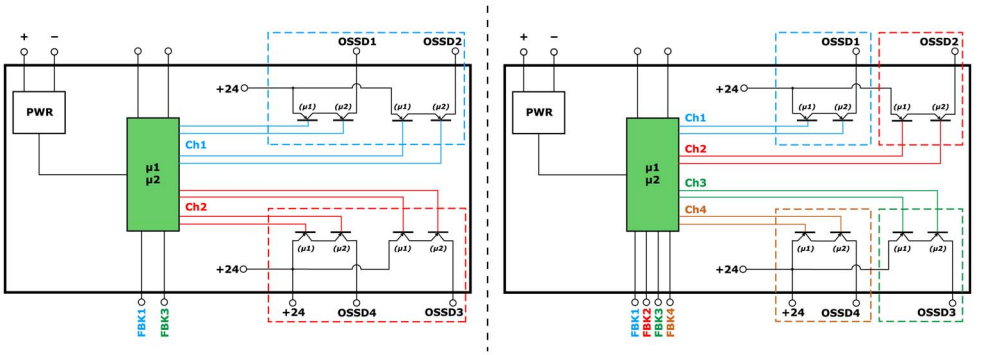
Connector Designations and Sample Wiring Diagrams

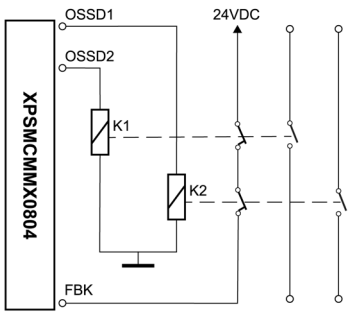
XPSMCMMX0804• Module Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	-	24 Vdc power supply	-
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	-	0 Vdc power supply	-
5	OSSD1	OSSD 1	Output	Safety-related output 1	PNP active at Uv (24 Vdc ± 20%).
6	OSSD2	OSSD 2	Output	Safety-related output 2	
7	RESTART_FBK1 / STATUS1	STATUS 1	Input / output	Feedback/Restart 1 for OSSD1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 1 for OSSD1	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
8	RESTART_FBK2 / STATUS2	STATUS 2	Input / output	Feedback/Restart 2 for OSSD2	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 2 for OSSD2	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
9	OSSD3	OSSD 3	Output	Safety-related output 3	PNP active at Uv (24 Vdc ± 20%).
10	OSSD4	OSSD 4	Output	Safety-related output 4	
11	RESTART_FBK3 / STATUS3	STATUS 3	Input / output	Feedback/Restart 3 for OSSD3	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 3 for OSSD3	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
12	RESTART_FBK4 / STATUS4	STATUS 4	Input / output	Feedback/Restart 4 for OSSD4	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
				Configurable output 4 for OSSD4	Configurable output (SIL 1/PL c in accordance with EN 61508:2010)
13	OUT_TEST1	-	Output	Test output for detection of short circuits/cross circuits in input circuits	PNP active at 24 Vdc.
14	OUT_TEST2	-			
15	OUT_TEST3	-			
16	OUT_TEST4	-			

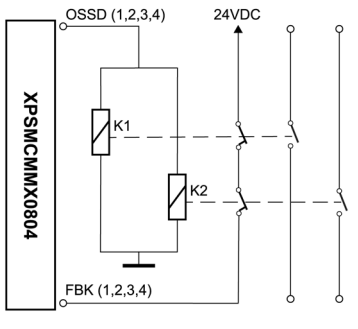
Terminal	Signal	LED	Type	Description	Operation
17	INPUT1	IN 1	Input	Safety-related input 1	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
18	INPUT2	IN 2		Safety-related input 2	
19	INPUT3	IN 3		Safety-related input 3	
20	INPUT4	IN 4		Safety-related input 4	
21	INPUT5	IN 5		Safety-related input 5	
22	INPUT6	IN 6		Safety-related input 6	
23	INPUT7	IN 7		Safety-related input 7	
24	INPUT8	IN 8		Safety-related input 8	

XPSMCMMX0804• Module Sample Wiring Diagrams



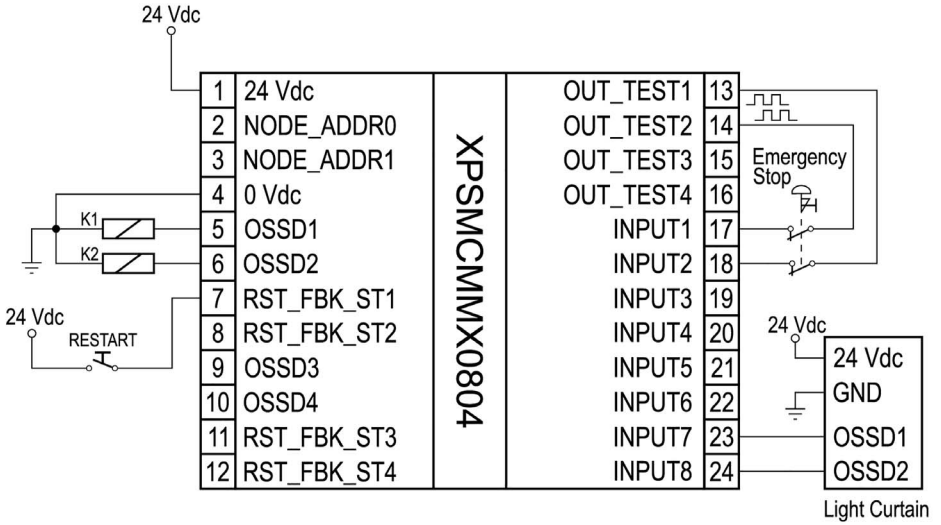


Dual channel OSSD configuration with 2 dual channel outputs, safety category SIL3/PL e: EN 61508:2010

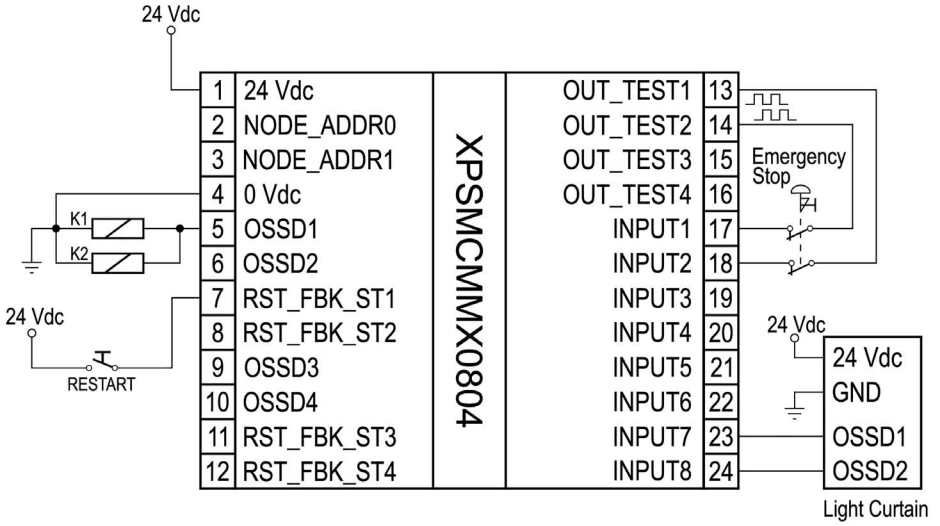


Single channel OSSD configuration with 4 single outputs, safety category SIL3/PL e: EN 61508:2010

Category 3 wiring for XPSMCMMX0804•:

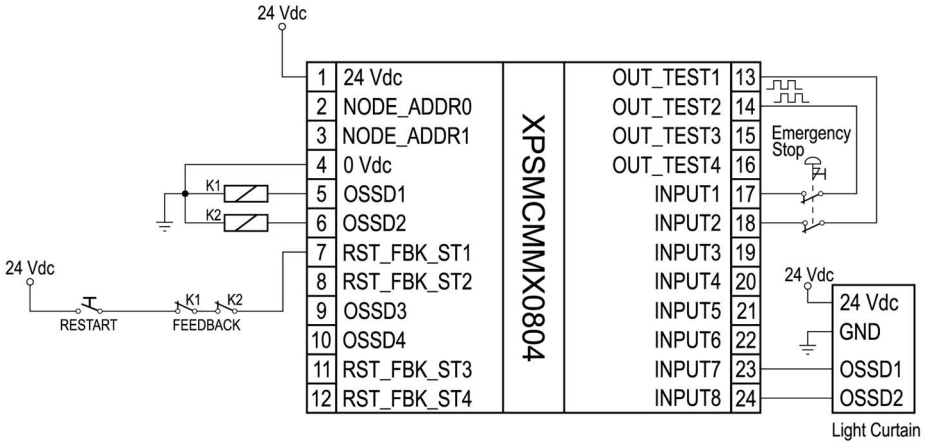


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

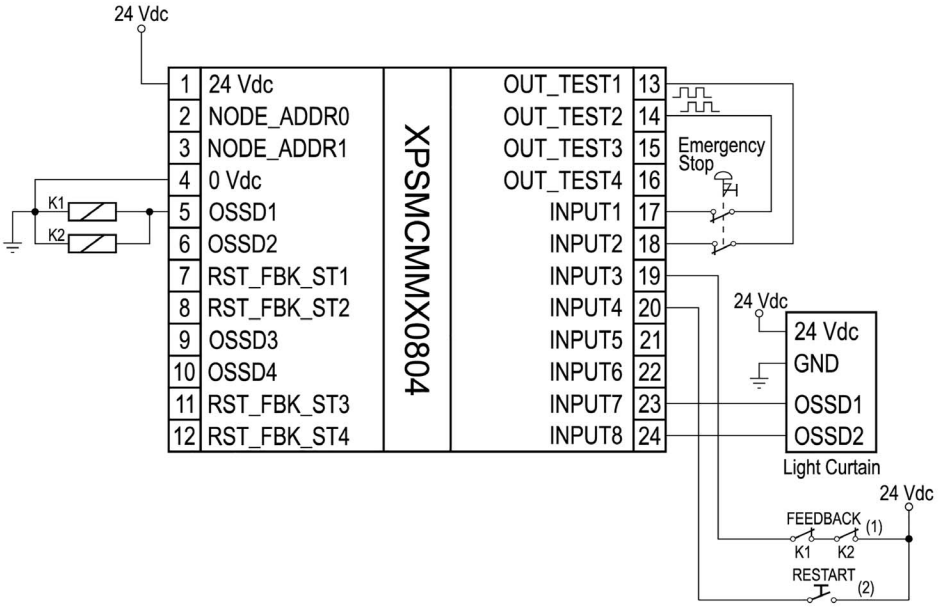


NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

Category 4 wiring for XPSMCMMX0804• with feedback of the contactors K1 and K2:



NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.



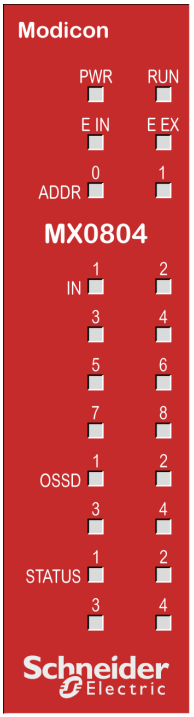
(1) Contacts connected to the `OSSD EDM` functional block

(2) Contacts connected to the `USER RESTART MANUAL, USER RESTART MONITORED` or `MACRO RESTART MANUAL, MACRO RESTART MONITORED` function block

NOTE: Best practice dictates the use of fusing on the incoming 24 Vdc power, and sized appropriately for the requirements of the module.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMMX0804• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	E IN red	E EX red	ADDR 0/1 orange	IN 1-8 yellow	OSSD 1-4 red/ green/yellow	STATUS 1-4 yellow	Meaning
ON	ON	ON	ON	ON	Red	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Encoded Node address *(see page 183)*	Reflect input state	Output state: red = 0 green = 1 yellow on = waiting for restart yellow flashing = no feedback	Reflect status output state	Normal operation
Flashing = no inputs or outputs configured							
ON = inputs or outputs configured							

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMMX0804• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated):

Detected error	RUN green	E IN red	E EX red	ADDR 0-1 orange	IN 1-8 yellow	OSSD 1-4 red/ green/yellow	STATUS 1-4 yellow	Solution
Internal error detected.	OFF	2 or 3 flashes periodically repeated	OFF	Encoded Node address *(see page 183)*	OFF	Red	OFF	Product non serviceable(1).
Compatibility error detected.	OFF	5 flashes	OFF		5 flashes	Red 5 flashes	5 flashes	Firmware version not compatible with controller(1).
0SSD output error detected.	OFF	4 flashes	OFF		OFF	Red 4 flashes (only corresponding LED)	OFF	Verify correct wiring of the safety-related outputs (0SSD)(1).
Error in the communication with controller detected.	OFF	5 flashes	OFF		OFF	OFF	OFF	Restart the system(1).
Expansion module or controller error detected.	OFF	ON	OFF		OFF	OFF	OFF	Restart the system. Identify the expansion module affected by this condition and consult its user guide(1).
Two units of the same module reference detected with the same node address.	OFF	5 flashes	5 flashes		OFF	OFF	OFF	Modify the unit node address *(see page 183)*.
Overload on OSSD / OSSD load connected to 24 Vdc detected.	ON	OFF	ON		Input state	Flashing red (only corresponding LED)	Reflect status output state	Verify correct wiring of the safety-related outputs (0SSD)(1).
Short circuit or overload on status output detected.	ON	OFF	ON		ON	Output state	Flashing	Verify correct wiring of STATUS output(1).
(1) If the condition persists, contact your local Schneider Electric representative.								

XPSMCMMX0804• Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

To achieve Performance Level PL e, according to standard EN 13849-1, the OSSD safety-related outputs must be independent.

Reduce Common Cause Failures (CCF) of OSSD safety-related outputs by separating cable paths (refer to EN 13849-2 for event exclusion).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Run single channel, dual wiring in separate cabling.

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

Module-specific characteristics	
Description	Electronic housing maximum 24-poles, with locking latch mounting
Mounting	DIN rail mounting with locking latch
Safety-related input (number / description)	8 / Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
Restart input (optional to status outputs) (number / description)	4 / EDM (External Device Monitoring) type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ. Possible automatic restart function or manual operation with restart pushbutton.

Module-specific characteristics	
Status outputs (optional to restart input) (number / description)	4 / SIL 1/PL c in accordance with standard EN 61508:2010. Maximum current per output: 100 mA, nominal voltage 24 Vdc.
Test output (number / description)	4 / For cross circuit/short circuit monitoring, maximum current 100 mA, nominal voltage 24 Vdc.
Solid-state safety-related output (OSSD) (number / description)	4 / solid-state safety-related outputs PNP active high ● Interface type C class 3 (ZVEI CB24I Ed.2) ● The outputs are able to supply: ❍ In the ON condition: (Uv-0.6 V)...Uv (24 Vdc ± 20 %) ❍ In the OFF condition: 0...2 Vrms (root mean square) ● The maximum load current of 400 mA (per OSSD) corresponds to a minimum resistive load of 60 Ω. ❍ The maximum capacitive load is 0.82 µF. ❍ The maximum inductive load is 2.4 mH. ● Test pulses are used to detect short circuits and interruptions of wires. The switch-off test pulse interval is every 650 ms, the test pulse duration is 100 µs.
Probability of Dangerous Failure per Hour (PFHd)	1.32E-08
Mean Time to Dangerous Failure (MTTFd) in years	166
Connection to expansion modules	5-way backplane expansion
Weight	0.150 kg (5.29 oz)

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Section 4.15
XPSMCMENx Speed Monitoring Expansion Modules

What Is in This Section?

This section contains the following topics:

Modules and Functional Description

Presentation

The XPSMCMEN0200•, XPSMCMEN0100HT•, XPSMCMEN0200HT•, XPSMCMEN0100SC•, XPSMCMEN0200SC•, XPSMCMEN0100TT•, and XPSMCMEN0200TT• are speed monitoring expansion modules for zero speed, maximum speed, speed range and direction monitoring. In addition, you can configure up to four speed thresholds for each axis being monitored.

The XPSMCMEN0200•, XPSMCMEN0100HT•, XPSMCMEN0200HT•, XPSMCMEN0100SC•, XPSMCMEN0200SC•, XPSMCMEN0100TT•, and XPSMCMEN0200TT• modules are configured with the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller.

The XPSMCMEN0200• module provides two safety-related inputs for proximity sensors. The XPSMCMEN0100HT• and XPSMCMEN0200HT• modules provide two proximity sensor inputs and one or two channels respectively for monitoring of safety-related HTL encoders. The XPSMCMEN0100SC• and XPSMCMEN0200SC• modules provide two proximity sensor inputs and one or two channels respectively for monitoring of safety-related Sin/Cos encoders. The XPSMCMEN0100TT• and XPSMCMEN0200TT• modules provides two proximity sensor inputs and one or two channels respectively for monitoring of safety-related TTL encoders.

NOTE: The encoders must be mounted according to EN 61800-5-2 to the shaft of the motor.

The modules are configured using SoSafe Configurable.

The expansion module supports two inputs `NODE_ADDR0` and `NODE_ADDR1` which are used to set a physical address to the module:

	NODE_ADDR0 (Terminal 2)	**NODE_ADDR1 (Terminal 3)**
NODE 0	0 (or not connected)	0 (or not connected)
NODE 1	24 Vdc	0 (or not connected)
NODE 2	0 (or not connected)	24 Vdc
NODE 3	24 Vdc	24 Vdc

NOTE: Do not use the same physical address for two units of the same module reference.

NOTE: The LEDs **ADDR 1** and **ADDR 0** correspond to the NODE_ADDR1 and NODE_ADDR0 in this table respectively.

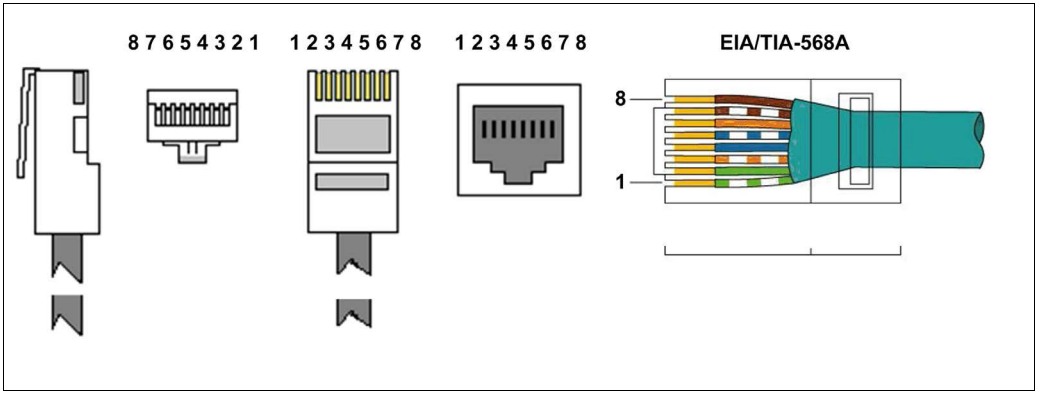
NOTE: The node address wiring must match the configuration settings.

Connector Designations

XPSMCMEN• Modules Connector Designations

Terminal	Signal	LED	Type	Description	Operation
1	24 VDC	PWR	–	24 Vdc power supply	–
2	NODE_ADDR0	ADDR0	Input	Node selection	Input type 3 according to EN 61131-2. Maximum resistance 1.2 kΩ.
3	NODE_ADDR1	ADDR1			
4	0 VDC	PWR	–	0 Vdc power supply	–
5	PROXY1_24V	PROX1	Output	PROXIMITY 1 connections	Maximum current 100 mA
6	PROXY1_REF				Power supply 0 Vdc to PROXY1
7	PROXY1_IN1 (3-wire)		Input		PROXY1 Input_1 for NO or NC contact
8	PROXY1_IN2 (4-wire)				PROXY1 Input_2 for NO or NC contact
9	PROXY2_24V	PROX2	Output	PROXIMITY 2 connections	Maximum current 100 mA
10	PROXY2_REF				Power supply 0 Vdc to PROXY2
11	PROXY2_IN1 (3-wire)		Input		PROXY2 Input_1 for NO or NC contact
12	PROXY2_IN2 (4-wire)				PROXY2 Input_2 for NO or NC contact
13	not connected	–	–	not connected	–
14					
15					
16					

Encoder connections with RJ45 connector (modules XPSMCMEN0100HT•, XPSMCMEN0200HT•, XPSMCMEN0100SC•, XPSMCMEN0200SC•, XPSMCMEN0100TT•, and XPSMCMEN0200TT•):



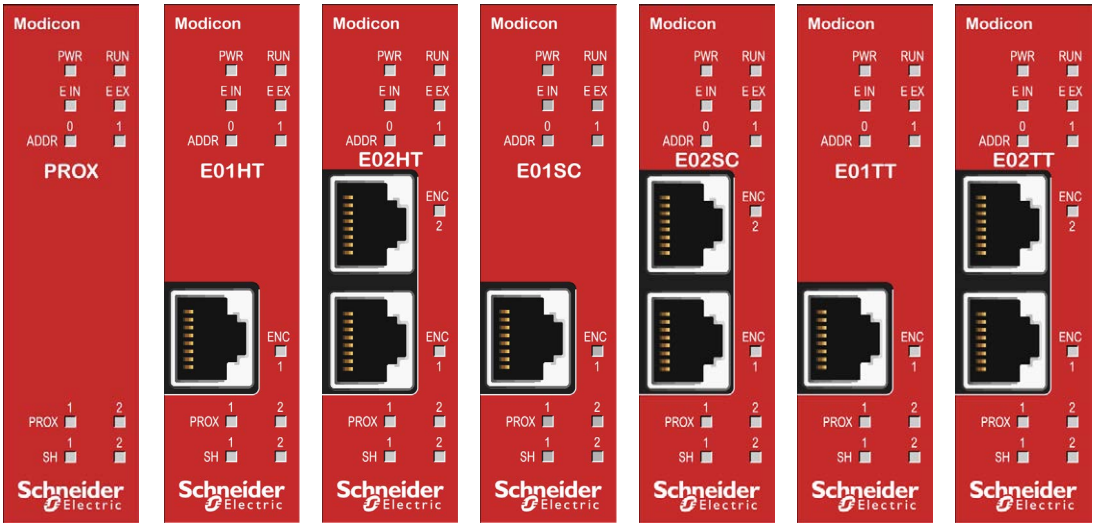
Pin	Color	XPSMCMEN0•00TT	XPSMCMEN0•00HT	XPSMCMEN0•00SC
1	green - white	5 Vdc(1)	not connected	not connected
2	green	0 Vdc	0 Vdc	0 Vdc
3	orange - white	not connected	not connected	not connected
4	blue	A	A	A (Sin+)
5	blue-white	/A	/A	/A (Sin-)
6	orange	not connected	not connected	not connected
7	brown-white	B	B	B (Cos+)
8	brown	/B	/B	/B (Cos-)

(1) This pin is not the power supply of the TTL-encoder, which must be supplied separately. The pin needs to be connected for the speed monitoring module to detect the prescence of a TTL-encoder.

For more information refer to the *Encoder Splitter Cables* *(see page 218)*.

LED Indicators

Front-Face View



Operation States

The following table describes the indication of operation states of the XPSMCMEN• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN green	**E IN red**	**E EX red**	**ADDR 0/1 orange**	**ENC(1) yellow**	**PROX 1/2 yellow**	**SH 1/2 yellow**	**Meaning**
ON	ON	ON	ON	ON	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Encoded Node address *(see page 195)*	ON Encoder connected and operative	ON Proximity sensor connected and operative	OFF = Axis in normal speed range	Normal operation
Flashing = no inputs or outputs configured						Flashing = Axis in overspeed	
ON = inputs or outputs configured						ON = Axis in Standstill	
(1) The **ENC** LED indicator is not present on XPSMCMEN0200 and XPSMCMEN0200G.							

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMEN• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	ADDR 0/1 orange	ENC(1) yellow	PROX 1/2 yellow	SH 1/2 yellow	Solution
Internal error detected.	OFF	2 or 3 flashes	OFF	Encoded Node address *(see page 195)*	OFF			Product non serviceable(2).
Compatibility error detected.	OFF	5 flashes	OFF		OFF			Firmware version not compatible with XPSMCMCP0802•(2).
Encoder configured but not connected.	OFF	ON	3 flashes		OFF			Connect encoder to the module. Verify input frequency is in range.
Proximity sensor inoperative.	OFF	OFF	ON		OFF	Flashes 2 sec.	OFF	Change the proximity sensor.
Proximity sensor configured but not connected.	OFF	OFF	3 flashes		OFF	Flashes 0.5 sec.	OFF	Connect proximity to the module. Verify input frequency is in range.
Two units of the same module reference detected with the same node address.	OFF	5 flashes			OFF			Modify the unit node address *(see page 195)*.
Error detected on node detection circuit.	OFF	OFF	OFF	3 flashes	OFF	OFF	Flashes	Product non serviceable(2).

(1) The **ENC** LED indicator is not present on XPSMCMEN0200 and XPSMCMEN0200G.
(2) If the condition persists, contact your local Schneider Electric representative.

Troubleshooting Speed Monitoring

The following table describes the indication of detected errors by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	ADDR 0/1 orange	ENC(1) yellow	PROX 1/2 yellow	SH 1/2 yellow	Solution
Encoder internal error detected.	OFF	3 flashes	OFF	–	3 flashes	OFF	OFF	Change the encoder(2).
Proximity internal error detected.	–	3 flashes	OFF	–	–	3 flashes	–	Change the proximity sensor (2).
Error detected on node detection circuit.	OFF	3 flashes	OFF	3 flashes	OFF	OFF	OFF	Product non serviceable(2).

(1) The **ENC** LED indicator is not present on XPSMCMEN0200 and XPSMCMEN0200G.
(2) If the condition persists, contact your local Schneider Electric representative.

Module Characteristics

Presentation

⚠ DANGER

FIRE HAZARD

Use only the correct wire sizes for the maximum current capacity of the I/O channels and power supplies.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the characteristics tables.

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Make sure your sensing setup is suitable to generate consistent signals, especially at higher rotational speeds, when using proximity sensors.
- Follow all application guidelines of the sensor manufacturer.

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

Module-specific characteristics	XPSMCMEN0200/ XPSMCMEN0200 G	XPSMCMEN0100HT• XPSMCMEN0200HT•	XPSMCMEN0100SC• XPSMCMEN0200SC•	XPSMCMEN0100TT• XPSMCMEN0200TT•
Encoder interface	none	HTL	Sin/Cos	TTL
Encoder input signals electrically insulated in accordance with EN 61800-1	none	• Rated insulation voltage 250 V • Overvoltage category II • Rated impulse withstand voltage 4.00 kV		
Maximum number of axis	2			
Zero speed / maximum speed frequency gap	> 10 Hz			

Module-specific characteristics	XPSMCMEN0200/ XPSMCMEN0200 G	XPSMCMEN0100HT• XPSMCMEN0200HT•	XPSMCMEN0100SC• XPSMCMEN0200SC•	XPSMCMEN0100TT• XPSMCMEN0200TT•
Minimum gap between thresholds (with threshold >1)	> 5 %			
Maximum number of encoders	0	1 on XPSMCMEN0100TT•, XPSMCMEN0100HT•, XPSMCMEN0100SC• 2 on XPSMCMEN0200TT•, XPSMCMEN0200HT•, XPSMCMEN0200SC•		
Maximum encoder frequency	-	300 kHz	500 kHz	500 kHz
Encoder adjustable threshold range	–	1 Hz to 450 kHz		
Encoder connections	-	RJ45		
Maximum number of proximity sensors	2			
Maximum proximity sensors frequency	5 kHz			
Maximum output current to proximity sensor	100 mA, nominal voltage 24 Vdc (terminals 5 and 9)			
Proximity adjustable threshold range	1 Hz to 4 kHz			
Zero speed/Maximum speed frequency gap	>10 Hz			
Minimum gap between thresholds (with threshold >1)	>5 %			
Proximity sensors connections	Terminal blocks			
Proximity sensors type	2x PNP or NPN - 3/4 wires			
PFHd XPSMCMEN01•	–	6.70-09	7.94E-09	7.08E-09
PFHd XPSMCMEN02•	5.98E-09	7.42-09	9.89E-09	8.18E-09
MeanTime to Dangerous Failure (MTTFd) in years XPSMCMEN0200	424			

Module-specific characteristics	XPSMCMEN0200/ XPSMCMEN0200 G	XPSMCMEN0100HT• XPSMCMEN0200HT•	XPSMCMEN0100SC• XPSMCMEN0200SC•	XPSMCMEN0100TT• XPSMCMEN0200TT•
MeanTime to Dangerous Failure (MTTFd) in years XPSMCMEN0100HT•, XPSMCMEN0100SC•, XPSMCMEN0100TT•	247			
MeanTime to Dangerous Failure (MTTFd) in years XPSMCMEN0200HT•, XPSMCMEN0200SC•, XPSMCMEN0200TT•	180			
Weight	0.12 kg (4.2 oz)			

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

The following table describes the behavior of the system based on the speed monitoring functions:

Speed monitoring function blocks	Maximum speed	Zero speed	Speed range
Defined safe state	If speed exceeds the maximum speed limit resulting in the deactivation of outputs associated with function.	If Zero speed not achieved resulting in outputs associated with function not being activated.	If speed exceeds the upper or lower speed limits resulting in the deactivation of outputs associated with function.

Section 4.16
XPSMCMCO0000Sx Communication Expansion Modules

What Is in This Section?

This section contains the following topics:

Communication Expansion Modules

Presentation

The XPSMCMCO0000S• are communication expansion modules (transmitter and receiver) which allow the connection of XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller with expansion modules placed remotely (≤50 m/≤164 ft). Up to six islands can be created using the communication modules with a total length of 250 m (820.2 ft) and a maximum of 50 m (164 ft) between two communication modules. The system response time does not change with the use of the communication modules.

Using RS-485 shielded cable *(see page 217)*, two XPSMCMCO0000S• modules placed at the desired distance can be linked together thus joining the expansion modules to the controller. Each XPSMCMCO0000S2• module has two independent connection channels; the connection of two XPSMCMCO0000S2• modules can be accomplished by wiring either channel.

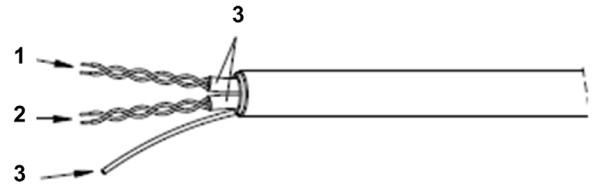
The XPSMCMCO0000S1• module has one channel and must be connected as the first (remote) or last (local) module.

Connector Designations and Cable

XPSMCMCO0000S• Modules Connector Designations

Terminal	Signal		Description	Cable connections
	XPSMCMCO0000S1	XPSMCMCO0000S2		
1	24 VDC		24 Vdc power supply	–
2	not connected		-	
3	Shielding CH1		-	
4	0 VDC		0 Vdc power supply	
5	not connected	not connected	-	
6			-	
7		Shielding CH2	-	
8		not connected	-	
9	CH1-A		Be sure to connect to the corresponding terminals of the remote XPSMCMCO0000S•: ● A <-> A ● B <-> B ● C <-> C ● D <-> D ● SHIELDING <-> SHIELDING You can also connect CH1 with CH2 (XPSMCMCO0000S2).	First pair twisted conductors
10	CH1-B			
11	CH1-C			Second pair twisted conductors
12	CH1-D			
13	not connected	CH2-A		First pair twisted conductors
14		CH2-B		
15		CH2-C		Second pair twisted conductors
16		CH2-D		

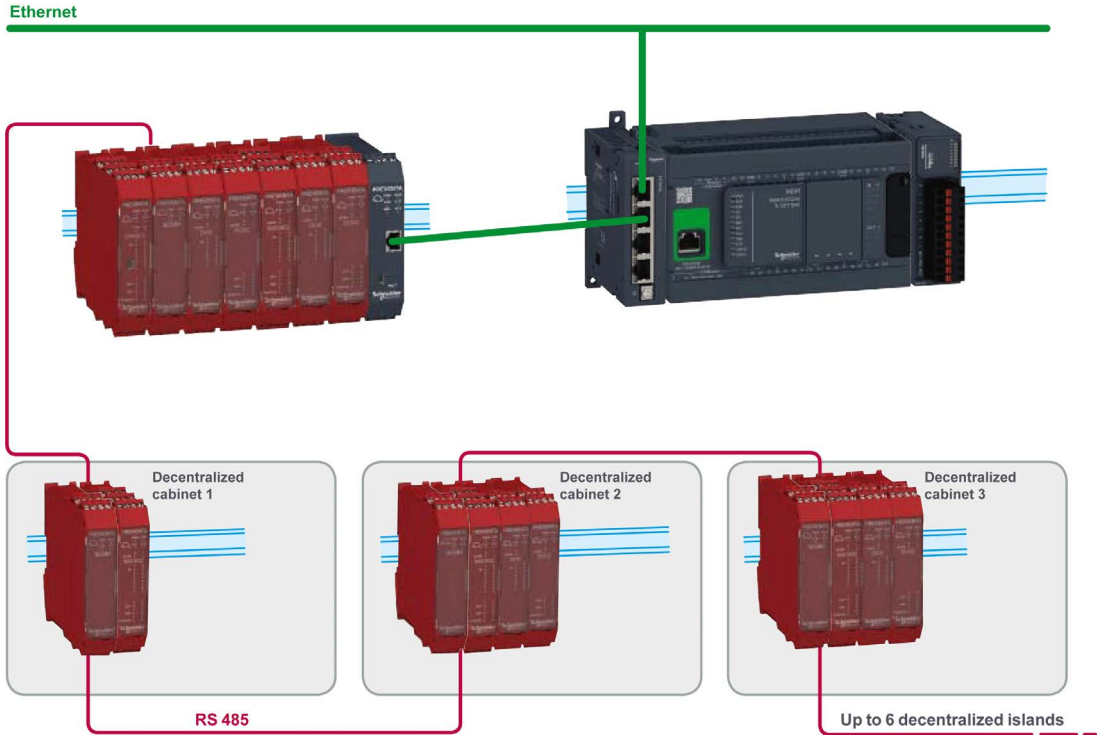
RS485 Cable Technical Data



1 First pair
2 Second pair
3 Shielding

Element	Description/Value
Conductors	2 pairs of twisted conductors with shielding
Nominal impedance	120 Ω
Nominal capacitance	<42 pF/m
Nominal resistance	<95 Ω/m

Wiring Example RS485 Island Expansion



LED Indicators

Front-Face View

Operation States

The following table describes the indication of operation states of the XPSMCMCO0000S• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

RUN **green**	**E IN** **red**	**E EX** **red**	**Meaning**
ON	ON	ON	Power on - initial test
OFF = awaiting initialization	OFF	OFF	Normal operation
Flashing = no inputs or outputs configured			
ON = inputs or outputs configured			
[1] For more information, refer to Error Codes *(see Modular Safety Controller, Library and Programming Guide)*.			

Troubleshooting

The following table describes the indication of detected errors of the XPSMCMCO0000S• by means of the LEDs. The description assumes that the power LED (**PWR**) is illuminated:

Detected error	RUN green	E IN red	E EX red	Solution
Internal error detected	OFF	Flashing	OFF	Refer to Error Codes *(see Modular Safety Controller, Library and Programming Guide)*.
External wiring error detected	OFF	OFF	ON	Verify connections.

Module Characteristics

Presentation

Module-specific characteristics	XPSMCMCO0000S1	XPSMCMCO0000S2
Reference description	Electronic housing maximum 8-poles, with locking latch mounting	Electronic housing maximum 16-poles, with locking latch mounting
Connection channels	1	2
Maximum connections	6	
Maximum cable length between communication modules	<50 m (164 ft) per section	
Weight	0.12 kg (4.2 oz)	
Probability of a dangerous failure per hour (PFHd)	1.13×10^{-8}	1.31×10^{-8}

NOTE: For the characteristics common to all modules, refer to General Characteristics *(see page 30)*.

Chapter 5
Accessories

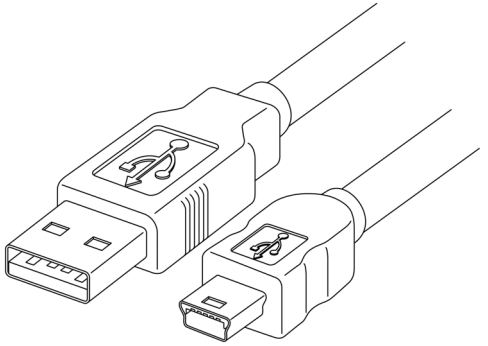
What Is in This Chapter?

This chapter contains the following topics:

USB/Mini B USB Configuration Cable

Presentation

The XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller and Fieldbus communication modules have a dedicated USB 2.0 port for connection to a PC and SoSafe Configurable software.



A USB/Mini B USB configuration cable is available as an accessory under the reference **TCSXCNAMUM3P**.

Configuration Memory Card

XPSMCMME0000 Memory Card Presentation

The XPSMCMME0000 memory card can be installed in the Modular Safety Controller and is used to save/restore the hardware/software configuration.

The XPSMCMME0000 memory card is specific to the XPSMCMCP0802• or XPSMCMC10804• controller, and therefore, only this reference can be used within the controller.

The memory card is only written to using SoSafe Configurable software during download of the configuration.

If the memory card is inserted without any configuration, the XPSMCMCP0802• or XPSMCMC10804• controller continues to operate with the previously loaded configuration held in its non-volatile memory.

If a memory card is inserted with a configuration which does not match the one contained in the controller, the configuration on the memory card will overwrite that which is in the controller, erasing definitively the previous configuration therein. That is, all data (password included) previously contained in XPSMCMCP0802• or XPSMCMC10804• controller will be overwritten.

NOTICE
LOSS OF DATA Ensure that the existing configuration in the controller is saved before inserting a memory card. **Failure to follow these instructions can result in equipment damage.**

Multiple load function: To perform the configuration of several XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controllers without using a PC and the USB connector, you can save the desired configuration on a single memory card and then use it to download data on the XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controllers.

Restore function: If the XPSMCMCP0802• or XPSMCMC10804• controller is damaged, replace it with a new XPSMCMCP0802• or XPSMCMC10804• Modular Safety Controller. When the memory card has been used, remove the memory card from the damaged controller, insert the memory card in the new XPSMCMCP0802• controller, and power the Modular Safety Controller. The configuration of the memory card is automatically loaded into the new controller.

XPSMCMME0000 Memory Card Insertion

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- First remove power from the Modular Safety Controller before attempting to insert or remove the memory card.
- Each time the memory card is used, carefully verify that the loaded configuration is the one that was intended for the particular system.
- Conduct a full functional test (see *Validation* in the *Modular Safety Controller User Guide*) of the system, composed of the Modular Safety Controller plus all input and output hardware connected to it, after using the memory card to overwrite your safety-related application.

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

The memory card can be inserted into the rear of the XPSMCMCP0802• Modular Safety Controller.

Step	Action
1	Remove all power from the controller before inserting or removing the memory card. **NOTE:** Before you insert the memory card for the first time, remove the protective label on the rear side of the controller. (See item 1 in graphic below).
2	Insert the memory card with the product label facing to the right. (See item 2 in graphic below). **NOTE:** If the memory card is oriented incorrectly, the memory card may be damaged or will not be identified.
3	Insert the card in the slot in the rear panel of the controller. 

XPSMCMME0000 Memory Card Characteristics

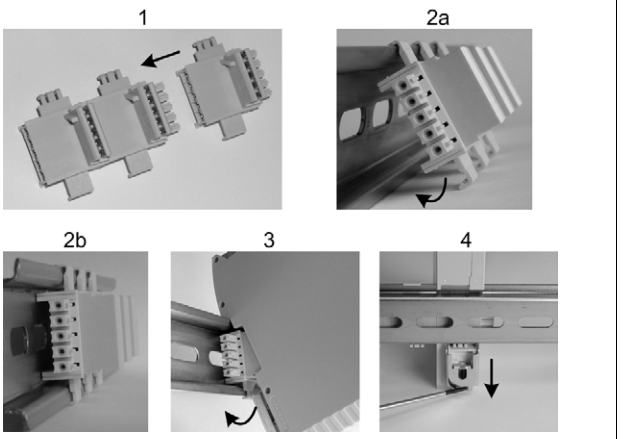
Memory card-specific characteristics	
Description	8-poles connector
Memory card size	250 MB
Ambient operating temperature	-10...+55 °C (14...131 °F)
Storage temperature	-20...+85 °C (-4...185 °F)
Relative humidity	10...95%
Maximum operation altitude	2000 m (6562 ft)
Dimensions	21.5 x 18 x 2 mm (0.85 x 0.7 x 0.079 in.)
Weight	0.12 kg (4.2 oz)

Backplane Expansion Connector

Overview

The XPSMCMCN0000SG backplane expansion connector allows you to add expansion input/output and communication modules to the XPSMCM• Modular Safety Controller. The expansion modules that require one XPSMCMCN0000SG connector are delivered with the connector. If, for the purposes of your system, you need to add expansion modules to the controller, you need to order an extra XPSMCMCN0000SG connector for the XPSMCM• controller.

To connect the Modular Safety Controller and expansion modules:

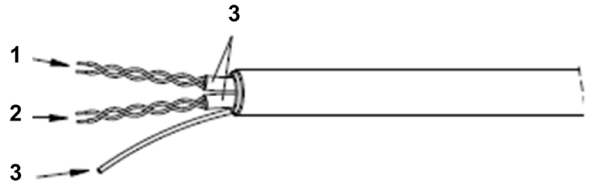
1. Connect the same number of backplane expansion connectors as the number of modules to be installed.	
2. Fix the connectors to the DIN 35 mm (EN ISO 5022) rail, connecting them on to the rail at the top first).	
3. Fasten the modules to the rail, arranging the contacts on the base of the module on the respective connector. Carefully press the module until it snaps into place.	
4. To remove a module, use a screwdriver to pull down the locking latch on the back of the module; then lift the module upwards and pull.	

Backplane expansion connector-specific characteristics	
Connection to expansion modules	5-way backplane expansion
Ambient operating temperature	-10...+55 °C (14...131 °F)
Storage temperature	-20...+85 °C (-4...185 °F)
Relative humidity	10...95%
Maximum operation altitude	2000 m (6562 ft)
Dimensions	36.5 x 29.2 x 20.5 mm (1.44 x 1.15 x 0.8 in.)
Weight	5.2 g (0.18 oz)

RS485 Cable

RS485 Cable Characteristics

RS485 serial interface shielded cables are used between the Bus expansion communications modules to create up to six decentralized safety-related islands with a maximum of 50 meters (164.04 ft) between each island.



1 First pair
2 Second pair
3 Shielding

Element	Description/Value
Conductors	2 pairs of twisted conductors with shielding
Nominal impedance	120 Ω
Nominal capacitance	<42 pF/m
Nominal resistance	<95 Ω/m

The following cables are compatible with the Modular Safety Controller system:

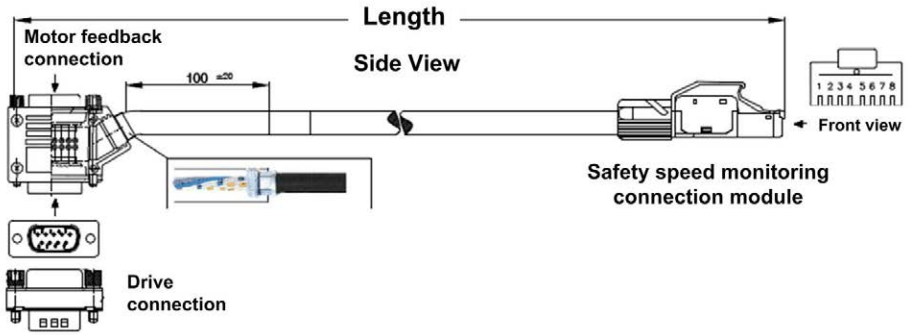
Reference	Length
TSXSCMCN010	10 m / 32.81 ft
TSXSCMCN025	25 m / 82.02 ft
TSXSCMCN050	50 m / 164.04 ft

Encoder Splitter Cables for PacDrive M

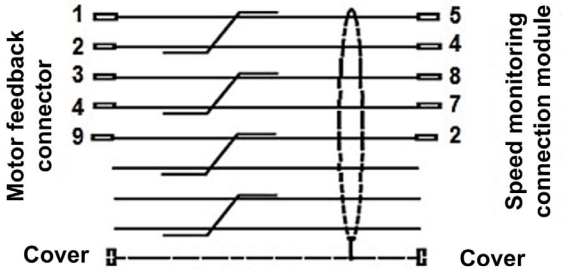
Description

An encoder splitter cable is used to split the motor encoder feedback signal. One signal is directed to the drive and one to the RJ45 connection of the safety-related speed monitoring module. The cables are unique to the specific drive system due to the wiring used. Encoder splitter cables are available in 1, 3 and 5 meters (3.28, 9.84 and 16.40 ft) lengths.

Encoder Splitter Cable



Encoder Splitter Terminal Designation



Motor feedback connector:

Pin	Wire color
1	Blue/White
2	Blue
3	Brown
4	White/Brown
9	Green
Not connected	White/Green
Not connected	Orange
Not connected	White/Orange
Cover	Shield

Speed monitoring connection module:

Pin	Wire color	Function
5	Blue/White	/A (Sin-)
4	Blue	A (Sin+)
8	Brown	/B (Cos-)
7	White/Brown	B (Cos+)
2	Green	0 V
Not connected	White/Green	Not used
Not connected	Orange	Not used
Not connected	White/Orange	Not used
Cover	Shield	GND

Encoder Splitter Characteristics

Encoder splitter cable characteristics:

Parameter	Value
Ambient operating temperature	-10…+55 °C (14…131 °F)
Storage temperature	-20…+85 °C (-4….185 °F)
Relative humidity	10...95%
Maximum operation altitude	2000 m / 6562 ft

Encoder Splitter Cable References

Encoder splitter cable references:

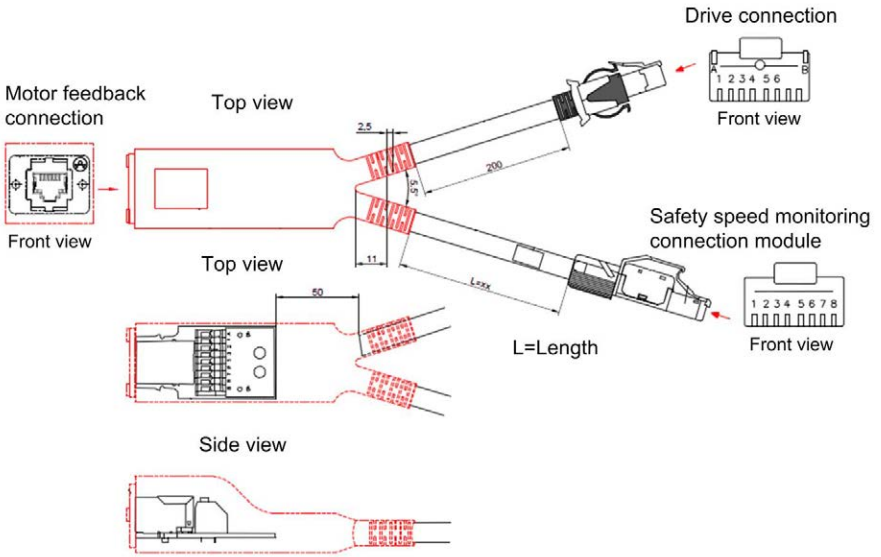
Reference	Length
TSXESPPM001	1 m / 3.28 ft
TSXESPPM003	3 m / 9.84 ft
TSXESPPM005	5 m / 16.40 ft

Encoder Splitter Cables for Lexium 32, Lexium 52 and Lexium 62

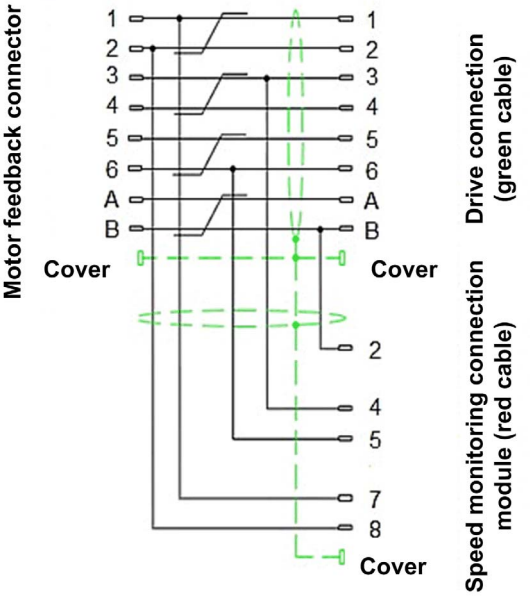
Description

An encoder splitter cable is used to split the motor encoder feedback signal. One signal is directed to the drive and one to the RJ45 connection of the safety-related speed monitoring module. The cables are unique to the specific drive system due to the wiring used. Encoder splitter cables are available in 1, 3 and 5 meters (3.28, 9.84 and 16.40 ft) lengths.

Encoder Splitter Cable



Encoder Splitter Cable - Terminal Designation



Motor feedback connector:

Pin	Wire color
1	Green
2	Yellow
3	White
4	Gray
5	Pink
6	Brown
A	Red
B	Blue
Cover	Shield

Drive connection (green cable):

Pin	Wire color	Function
1	Green	B (Cos+)
2	Yellow	/B (Cos-)
3	White	A (Sin+)
4	Gray	RS 485+
5	Pink	RS 485-
6	Brown	/A (Sin-)
A	Red	7-12 V
B	Blue	0 V
Cover	Shield	GND

Speed monitoring connection module (red cable):

Pin	Wire color	Function
1	Not connected	Not connected
2	Green	0 V
3	Not connected	Not connected
4	Blue	A (Sin+)
5	Blue/white	/A (Sin-)
6	Not connected	Not connected
7	White/brown	B (Cos+)
8	Brown	/B (Cos-)
Cover	Shield	GND

Lexium 32, Lexium 52 and Lexium 62 Splitter Cable Characteristics

Encoder splitter cable characteristics for Lexium 32, Lexium 52 and Lexium 62:

Parameter	Value
Ambient operating temperature	-10…+55 °C (14…131 °F)
Storage temperature	-20…+85 °C (-4….185 °F)
Relative humidity	10...95%
Maximum operation altitude	2000 m / 6562 ft

Lexium 32, Lexium 52 and Lexium 62 Splitter Cable References

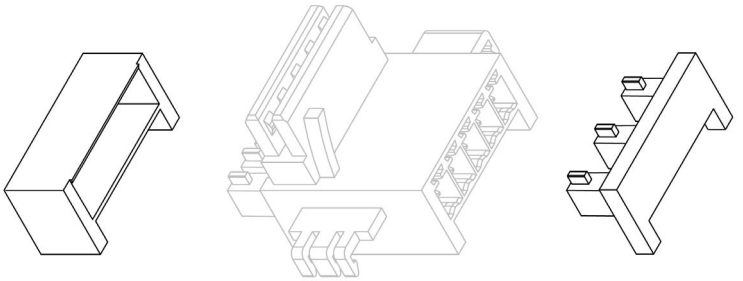
Lexium 32, Lexium 52 and Lexium 62 splitter cable references:

Reference	Length
TSXESPP3001	1 m / 3.28 ft
TSXESPP3003	3 m / 9.84 ft
TSXESPP3005	5 m / 16.40 ft

Covers for Backplane Connectors

Description

It allows you to cover the backplane connector:



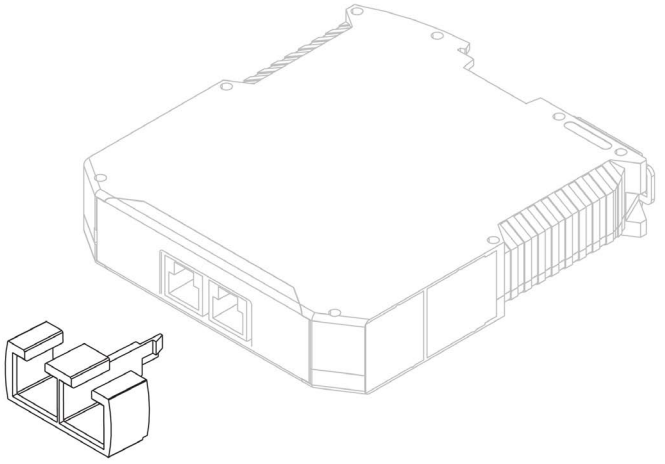
Covers for backplane connectors-specific characteristics:

Parameter	Value
Ambient operating temperature	-10...+55 °C (14...131 °F)
Storage temperature	-20...+85 °C (-4...185 °F)
Relative humidity	10...95%

Encoder Modules RJ45 support

Description

It is a plastic support for RJ45 encoder connector:



Encoder modules RJ45 support-specific characteristics:

Parameter	Value
Ambient operating temperature	-10...+55 °C (14...131 °F)
Storage temperature	-20...+85 °C (-4...185 °F)
Relative humidity	10...95%

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