

Modicon X80

Racks and Power Supplies

Hardware Reference Manual

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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
<ul style="list-style-type: none">• 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

PlantStruxure is a Schneider Electric program designed to address the key challenges of many different types of users, including plant managers, operations managers, engineers, maintenance teams, and operators, by delivering a system that is scalable, flexible, integrated, and collaborative.

This document provides detailed information about the Modicon X80 racks and power supplies used for M340 station, M580 system, and X80 drops.

Validity Note

This document is valid for EcoStruxure™ Control Expert 14.0 or later.

The technical characteristics of the devices described in the present document also appear online. To access the information online:

Step	Action
1	Go to the Schneider Electric home page www.schneider-electric.com .
2	In the Search box type the reference of a product or the name of a product range. <ul style="list-style-type: none">• Do not include blank spaces in the reference or product range.• To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the Product Datasheets search results and click on the reference that interests you. If you entered the name of a product range, go to the Product Ranges search results and click on the product range that interests you.
4	If more than one reference appears in the Products search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click Download XXX product datasheet .

The characteristics that are presented 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

Title of documentation	Reference number
General Safety Instructions	35014153 (English, French, German, Italian, Spanish, Chinese)
Control Panel Technical Guide How to protect a machine from malfunctions due to electromagnetic disturbance	CPTG003_EN (English), CPTG003_FR (French)
Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications	EIO0000002726 (English), EIO0000002727 (French), EIO0000002728 (German), EIO0000002730 (Italian), EIO0000002729 (Spanish), EIO0000002731 (Chinese)
EcoStruxure™ Control Expert, Operating Modes	33003101 (English), 33003102 (French), 33003103 (German), 33003104 (Spanish), 33003696 (Italian), 33003697 (Chinese)
Modicon M580 Standalone, System Planning Guide for Frequently Used Architectures	HRB62666 (English), HRB65318 (French), HRB65319 (German), HRB65320 (Italian), HRB65321 (Spanish), HRB65322 (Chinese)
Modicon M580, RIO Modules, Installation and Configuration Guide	EIO0000001584 (English), EIO0000001585 (French), EIO0000001586 (German), EIO0000001587 (Italian), EIO0000001588 (Spanish), EIO0000001589 (Chinese),
Grounding and Electromagnetic Compatibility of PLC Systems, Basic Principles and Measures, User Manual	33002439 (English), 33002440 (French), 33002441 (German), 33003702 (Italian), 33002442 (Spanish), 33003703 (Chinese)

You can download these technical publications and other technical information from our website at www.schneider-electric.com/en/download.

Product Related Information

 **WARNING**

UNINTENDED EQUIPMENT OPERATION

The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise are allowed to program, install, alter, and apply this product.

Follow all local and national safety codes and standards.

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

Chapter 1

Modicon X80 Racks Description

Introduction

This chapter describes the Modicon X80 racks used for Modicon M580 PAC, M340 PLC stations and X80 remote drops in M580 and Quantum architectures.

References for Modicon X80 racks are BMXXBP**** and BMEXBP****.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Introduction to the Modicon X80 Racks	14
Modicon X80 Rack Description	17
Module Addressing	21
Standards and Certifications	22
Electrical Characteristics	23
Modicon X80 Rack Dimensions	24
Rack Firmware Update	27

Introduction to the Modicon X80 Racks

Introduction

The Modicon X80 racks serve as a common base for automation platforms by adding a dedicated processor (M580 or M340).

It may also part of a Quantum or M580 Ethernet I/O architectures as an Ethernet remote I/O drop.

Functionalities

The Modicon X80 racks have the following functions:

Mechanical function

The racks enable all PLC station modules to be fastened (power supply module, processor, discrete/analog input/output modules, application-specific modules). These racks may be fastened on various mountings:

- In cabinets.
- In the machine housings.
- On panels.

Electrical function

The racks provide:

- The required power supply for each module on a single rack.
- Buses for communication.
- Service signals and data for the entire PLC station.

Types of Racks and Terminology

One key role of a rack is to provide a communication bus for the modules installed on the rack.

The **X bus backplane** is present on all Modicon X80 racks and all module slots have connections to the X bus backplane.

A subset of the Modicon X80 racks contains an additional **Ethernet backplane**. The number of module slots with connection to the Ethernet backplane is limited to 8. So, for the racks with more than eight module slots, some module slots have only connection to the X bus backplane.

Ethernet backplane is used for:

- eX80 I/O modules, which require an Ethernet bus on the rack in order to exchange data (for example, X80 HART modules)
- Third-party modules that require Ethernet
- Ethernet communication modules (interlinked to the CPU)

For any of these cases, use a Modicon X80 rack with dual Ethernet and X bus backplane. In other cases, a rack with only an X bus backplane is allowed. If you use an X Bus rack for any of the cases above, the Ethernet capabilities of the modules do not work, and the modules do not perform as expected.

A second key role of a rack is to provide power to the modules in the rack. A subset of the Modicon X80 racks contains an additional power supply slot to provide **power redundancy**.

Based on these distinct characteristics, three types of racks are available:

X80 Rack	X bus backplane	Ethernet backplane	Power redundancy
BMXXBP**** (X bus racks)	Yes	No	No
BMEXBP**00 (Dual Ethernet and X bus racks)	Yes	Yes	No
BMEXBP**02 (Redundant power supply racks)	Yes	Yes	Yes

Modicon X80 Racks References

NOTE: The racks are available in standard or industrially hardened versions. A hardened version has the letter **H** appended to the reference.

This table shows the number of available slots for the power supply modules (CPS) and modules (CPU and Modicon X80 modules) for each rack reference:

Reference		CPS slots	Module slots		
			Total	Ethernet and X bus	X bus (only)
X bus racks	BMXXBP0400(H)	1	4	–	4
	BMXXBP0600(H)	1	6	–	6
	BMXXBP0800(H)	1	8	–	8
	BMXXBP1200(H)	1	12	–	12
Dual Ethernet and X bus racks	BMEXBP0400(H)	1	4	4	0
	BMEXBP0800(H)	1	8	8	0
	BMEXBP1200(H)	1	12	8	4 ⁽¹⁾
Redundant power supply racks	BMEXBP0602(H)	2	6	6	0
	BMEXBP1002(H)	2	10	8	2 ⁽²⁾
1 X bus connector only for the module slot number 02 , 08 , 10 , and 11 .					
2 X bus connector only for the module slot number 02 , and 08 .					

Compatibilities

The compatibility rule for Modicon X80 racks is platform and/or module dependent:

M340 platforms Preferentially the BMXXBP**** racks because Ethernet backplane is not used, but all references are possible.

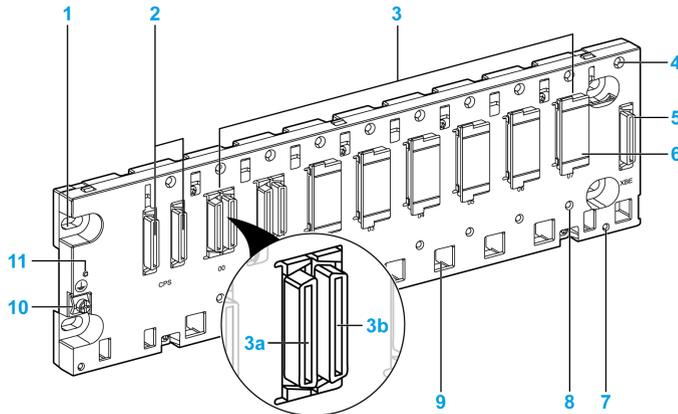
M580 platforms BMEXBP**** racks (dual Ethernet and X bus racks and redundant power supply racks).

NOTE: If the Ethernet backplane is not necessary, use the BMXXBP**** with PV:02 or later. The earlier versions do not work with M580 CPUs.

Modicon X80 I/O Drop (Quantum or M580 architectures) All Modicon X80 rack references depending on the adapter module (CRA module).

Modicon X80 Rack Description

Front View

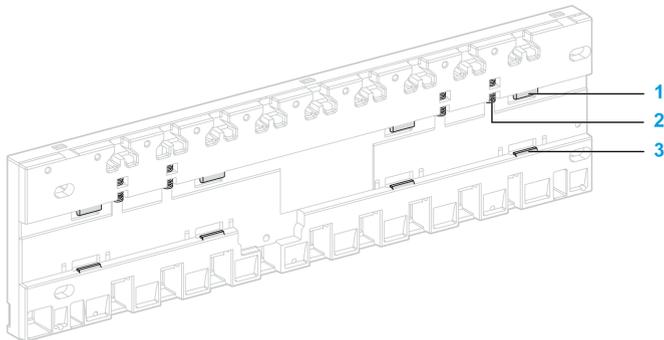


- 1 Panel mounting hole (x4)
- 2 Power supply module slot connectors
- 3 Module slot connectors
- 3a Ethernet connector (depending on reference)
- 3b X bus connector
- 4 Tapped hole for locking screw on each module
- 5 40-pin female connector for a rack extender module
- 6 Protective cap
- 7 Screw hole (X2) for shielding connection kit
- 8 Keying hole for Ethernet module (depending on reference)
- 9 Holes for anchoring the module pins
- 10 Protective earth screw
- 11 Rack status LED (depending on reference)

NOTE: The rack is supplied with covers that protect the connectors against moisture and dust. The covers must be removed before installing the modules.

Rear View

The following figure shows the DIN-rail locking mechanism at the rear of the Modicon X80 racks:



- 1 Upper locking
- 2 Spring
- 1 Lower locking

NOTE: The 10-slot (BMEXBP1002(H)) and 12-slot (BMXXBP1200(H) and BMEXBP1200(H)) racks do not have springs like the ones shown in the legend (item 2). These racks cannot be mounted on a DIN rail.

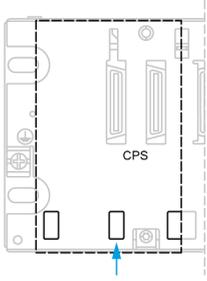
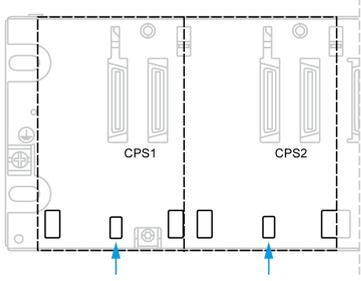
Power Supply Slots

The power supply slots are located the furthest left on the Modicon X80 racks.

Each power supply slot has two connectors marked:

- **CPS** on standalone power supply racks (BMXXBP**** and BMEXBP**00)
- **CPS1** and **CPS2** on redundant power supply racks (BMEXBP**02)

The size of the center hole for anchoring the power supply modules on the racks is different depending on type of rack. This mechanical keying prevents from inserting standalone power supply module on redundant power supply racks. Conversely, you can install a redundant power supply module on standalone power supply racks.

Standalone power supply racks:	Redundant power supply racks:
<ul style="list-style-type: none"> ● BMXXBP**** ● BMEXBP**00 	<ul style="list-style-type: none"> ● BMEXBP**02 

NOTE: Power supply slots are reserved for the power supply modules, and no other module types can be installed here.

Exception: You can install BMXCPS4002 power supply modules only on the following dual-bus racks (Ethernet and X bus):

- BMEXBP0602
- BMEXBP1002

Module Slots

The module slots, which are to the right of one or two power supply slots, are labeled numerically starting at **00**.

The number of module slots, and the presence or absence of an Ethernet connector at each module slot, depends on the Modicon X80 rack reference ([see page 15](#)).

A keying hole (item 10 of the front view ([see page 17](#))) is present on each module slot for the following rack references:

- BMXXBP**** (PV0.2 or later)
- BMEXBP**00
- BMEXBP**02

Some modules (such as M580 CPUs, eX80 modules, and so on) have a pin at the rear side to prevent from inserting it in an unsupported Modicon X80 rack. For example, installing an M580 CPU on an X bus rack requires a BMXXBP**** (PV0.2 or later) rack.

Refer to the documentation of the module to check module and rack compatibility.

Rack Extender Module Slot

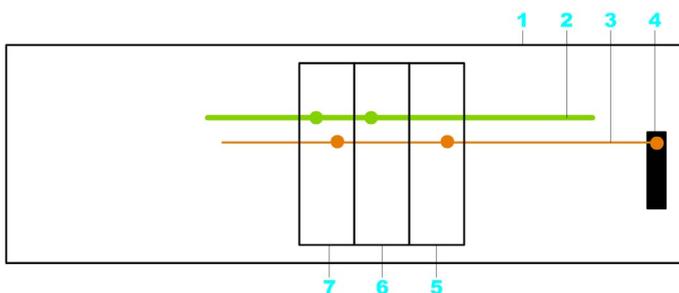
The module slot labeled **XBE** (rightmost module slot of the rack) is not a standard module slot. It is reserved for a BMXXBE1000 rack extender module. No other module type can be installed in the **XBE** slot.

Ethernet and X bus Connections

All Modicon X80 racks have an X bus connector at every module slot. Many X80 I/O modules need only X bus to support communication across the backplane.

An Ethernet communication bus is embedded in the backplane of the BMEXBP••00 and BMEXBP••02 racks.

This illustration shows an example of module connections with a BMEXBP•••• rack:



- 1 Rack
- 2 Ethernet communication bus on the backplane
- 3 X bus communication bus on the backplane
- 4 X bus extender connector
- 5 Modicon X80 module
- 6 Ethernet only module
- 7 Module with Ethernet and X bus connectors

NOTE: The X bus extender connector is only linked to the X bus backplane.

Ethernet Rack Status LED

A green status LED marked **OK** is present on Ethernet racks but not on X bus racks. The LED indicates if the rack is working properly.

When this LED is ON, these conditions (which are internal to the rack) have been fulfilled:

- The power rail voltages are in the rated range.
- The X bus diagnostic is working properly.
- The Ethernet switch diagnostic is working properly.

When the LED is OFF, the backplane is not operational.

Module Addressing

Introduction

For all racks, the module address is geographic. It is based on its position on the rack.

Module Addressing

The following table shows the module addresses depending on the rack used.

Rack reference	Number of slots available for the modules	Module address
BMXXBP0400(H) BMEXBP0400(H)	4	00 - 03
BMXXBP0600(H) BMEXBP0602(H)	6	00 - 05
BMXXBP0800(H) BMEXBP0800(H)	8	00 - 07
BMEXBP1002(H)	10	00 - 09
BMXXBP1200(H) BMEXBP1200(H)	12	00 - 11

Standards and Certifications

Online Help

From the Control Expert online help, you can access the standards and certifications that apply to the modules in this product line by referring to the *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications* guide.

Download

Click the link that corresponds to your preferred language to download the standards and certifications (PDF format) that apply to the modules in this product line:

Language	
English	<i>Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications</i>
French	<i>Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications</i>
German	<i>Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications</i>
Italian	<i>Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications</i>
Spanish	<i>Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications</i>
Chinese	<i>Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications</i>

Electrical Characteristics

Introduction

The power supply modules (*see page 60*) installed in the X80 rack delivers 2 voltages (3.3 Vdc and 24 Vdc) to supply the backplane and connected modules.

Rack Power Consumption

Rack Reference	Rack Average Current Consumption	
	3.3 Vdc Supply Power	24 Vdc Supply Power
BMXXBP0400(H)	304 mA (1 W)	–
BMXXBP0600(H)	455 mA (1.5 W)	–
BMXXBP0800(H)	607 mA (2 W)	–
BMXXBP1200(H)	225 mA (0.74 W)	–
BMEXBP0400(H)	49 mA (162 mW)	118 mA (2.8 W)
BMEXBP0800(H)	64 mA (211 mW)	164 mA (3.9 W)
BMEXBP1200(H)	86 mA (283 mW)	164 mA (3.9 W)
BMEXBP0602(H)	58 mA (191 mW)	152 mA (3.6 W)
BMEXBP1002(H)	76 mA (251 mW)	162 mA (3.9 W)

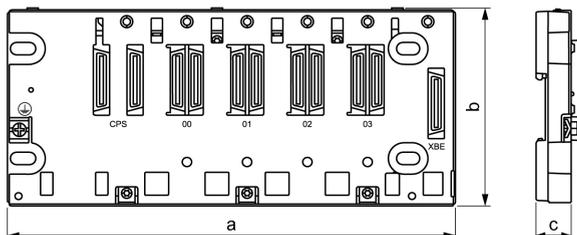
Mean Time Between Failures

The rack MTBF is a component of the global system MTBF:

Rack Reference	MTBF (Hours at 30 °C Continuous)
BMXXBP0400(H)	
BMXXBP0600(H)	
BMXXBP0800(H)	
BMXXBP1200(H)	
BMEXBP0400(H)	2000000
BMEXBP0800(H)	1700000
BMEXBP1200(H)	1500000
BMEXBP0602(H)	1770000
BMEXBP1002(H)	201000

Modicon X80 Rack Dimensions

Height, Width, and Depth

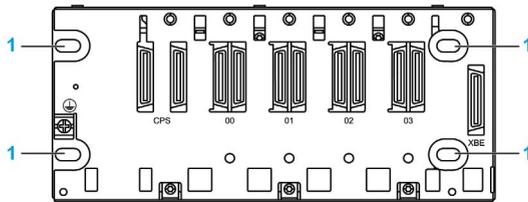


Rack Type		a	b	c
X bus racks	BMXXBP0400(H)	242.4 mm (9.543 in.)	103.7 mm (4.08 in.)	19 mm (0.748 in.)
	BMXXBP0600(H)	307.6 mm (12.11 in.)		
	BMXXBP0800(H)	372.8 mm (14.677 in.)		
	BMXXBP1200(H)	503.2 mm (19.811 in.)		
Ethernet and X bus racks	BMEXP0400(H)	242.4 mm (9.543 in.)	105.11 mm (4.138 in.)	19 mm (0.748 in.)
	BMEXP0800(H)	372.8 mm (14.677 in.)		
	BMEXP1200(H)	503.2 mm (19.811 in.)		
Redundant power supply racks	BMEXP0602(H)	375.8 mm (14.795 in.)		
	BMEXP1002(H)	506.2 mm (19.929 in.)		

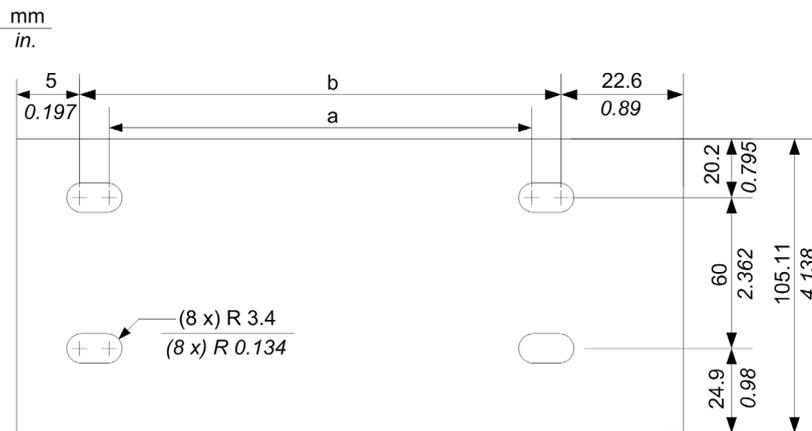
NOTE: Depending on the modules installed on the rack, the overall size of the Modicon X80 I/O platforms (rack with modules installed) may be higher than dimension of the rack itself. Refer to the section *Planning the Installation of Modicon X80 Racks* (see page 30) to estimate the overall size.

Panel Fastening Holes Dimension and Location

Fastening holes are located at the 4 corners of the rack.



1 Fastening holes



NOTE: You can use M4, M5, M6, or UNC #6 screws in the fastening holes.

This table shows the values that correspond to measurements **a** and **b** in the illustration above:

Rack Type		a	b
X bus racks	BMXXBP0400(H)	202.1 mm (7.957 in.)	214.8 mm (8.457 in.)
	BMXXBP0600(H)	267.5 mm (10.50 in.)	280 mm (10.99 in.)
	BMXXBP0800(H)	332.5 mm (13.09 in.)	345.2 mm (13.59 in.)
	BMXXBP1200(H)	462.9 mm (18.224 in.)	475.6 mm (18.724 in.)

Rack Type		a	b
Ethernet and X bus racks	BMEXBP0400(H)	202.1 mm (7.957 in.)	214.8 mm (8.457 in.)
	BMEXBP0800(H)	332.5 mm (13.09 in.)	345.2 mm (13.59 in.)
	BMEXBP1200(H)	462.9 mm (18.224 in.)	475.6 mm (18.724 in.)
Redundant power supply racks	BMEXBP0602(H)	332.5 mm (13.09 in.)	345.2 mm (13.59 in.)
	BMEXBP1002(H)	462.9 mm (18.224 in.)	475.6 mm (18.724 in.)

Rack Firmware Update

Introduction

You can update the firmware of the Ethernet racks (BMEXBP**00 and BMEXBP**02) by downloading a new firmware version with Unity Loader.

Download the firmware by connecting to any of these modules installed on the rack:

- M580 CPU
- BMECRA312*0 (e)X80 adapter module

Preparation

Before performing the update:

- check that the service (**FTP Service** or **Service Port**) is enabled.
- stop the PLC.
- open Unity Loader on your PC (**Start** → **Programs** → **Schneider Electric** → **Unity Loader**).

WARNING

UNKNOWN OPERATIONAL STATE OF EQUIPMENT

Evaluate operational state of equipment before stopping the PLC.

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

NOTE: If you do not stop the PLC before trying to transfer firmware, you are informed by Unity Loader that the PLC must be stopped. After confirming this message, Unity Loader stops the PLC automatically.

Firmware

The firmware file is included in an **.dx* file.

Troubleshooting

If the rack power supply is turned off during the update procedure, the backplane firmware remains on the version embedded before the update procedure.

Chapter 2

Modicon X80 Racks Installation

Overview

This chapter explains how to install Modicon X80 racks.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Planning the Installation of the Local Rack	30
Mounting the Racks	35
BMXXEM010 Protective Cover for Unused Module Slots	38
Shielding Connection Kit	39

Planning the Installation of the Local Rack

Introduction

The size and number of racks and the kinds of modules installed on the racks are significant considerations when you are planning an installation. That installation may be either inside or outside an enclosure. The height, width, and depth of the installed system head as well as the spacing between the local and the extender racks need to be well understood.

Modules such as the power supply, CPU, and I/O are cooled by natural convection.

To maintain the necessary thermal cooling, respect the:

- Mounting position
- Clearance around the racks
- Ambient temperature for each rack

Correct Mounting Position

The Modicon X80 racks must be mounted horizontally on a vertical plane to facilitate ventilation.

 WARNING
UNEXPECTED EQUIPMENT OPERATION
Install the Modicon X80 racks horizontally on a vertical plane.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

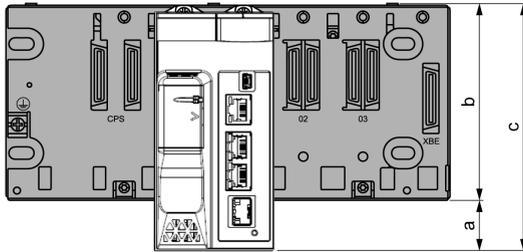
NOTE: Other rack mounting positions may cause overheating and unexpected equipment operation.

Clearance Around the Racks

When you are planning the clearance around the racks, you need to consider the overall size of your Modicon X80 I/O platform.

Add additional clearance at the bottom of the rack to accommodate the height of modules higher than the racks such as M580 CPU or redundant power supplies.

The following figure shows an example with an M580 CPU:



- a Additional space below the rack to accommodate the height of the CPU.
- b The height of the rack.
- c Overall height is 134.6 mm (5.299 in.).

NOTE: Add additional clearance of 1.2 mm (0.05 in.) at the right of the rack if you plan to install a rack extender module.

Thermal Considerations Inside an Enclosure

For non-vented equipment mounted inside a cabinet, cooled by natural air convection, the ambient temperature is the air temperature at a point not more than 50 mm (1.97 in.) and not less than 25 mm (0.98 in.) away from the equipment, on a horizontal plane located at the vertical mid-point below the equipment.

Spacing Requirements

⚠ WARNING

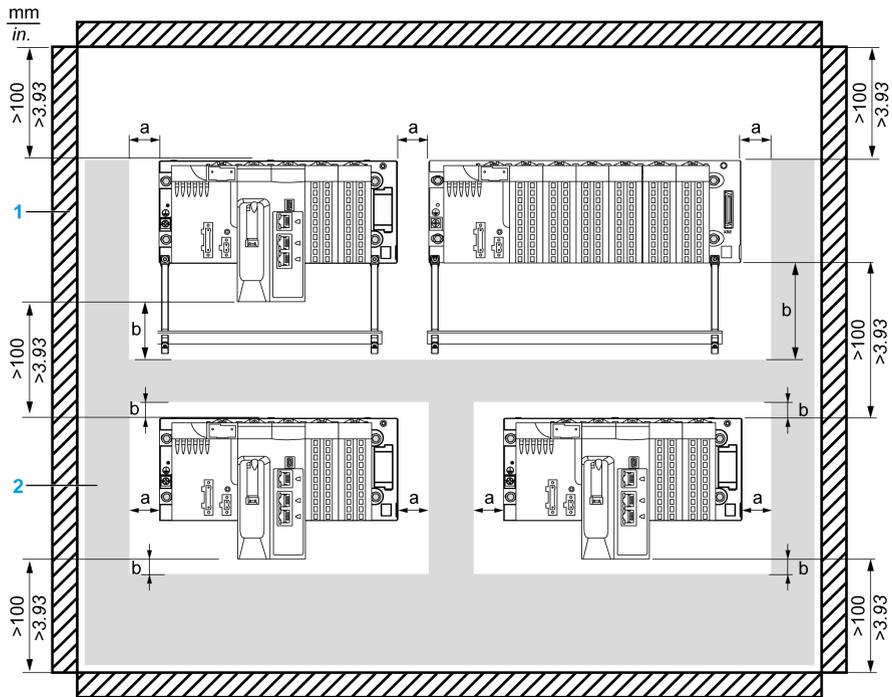
OVERHEATING AND UNEXPECTED EQUIPMENT OPERATION

Maintain proper thermal clearances when installing the racks.

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

For optimal cooling and air circulation, an adequate clearance must be respected between your Modicon X80 I/O platform and surrounding objects (such as wire ducts, inside surface of an enclosure, machinery).

This illustration shows the rules of a typical installation in a cabinet with ducts:



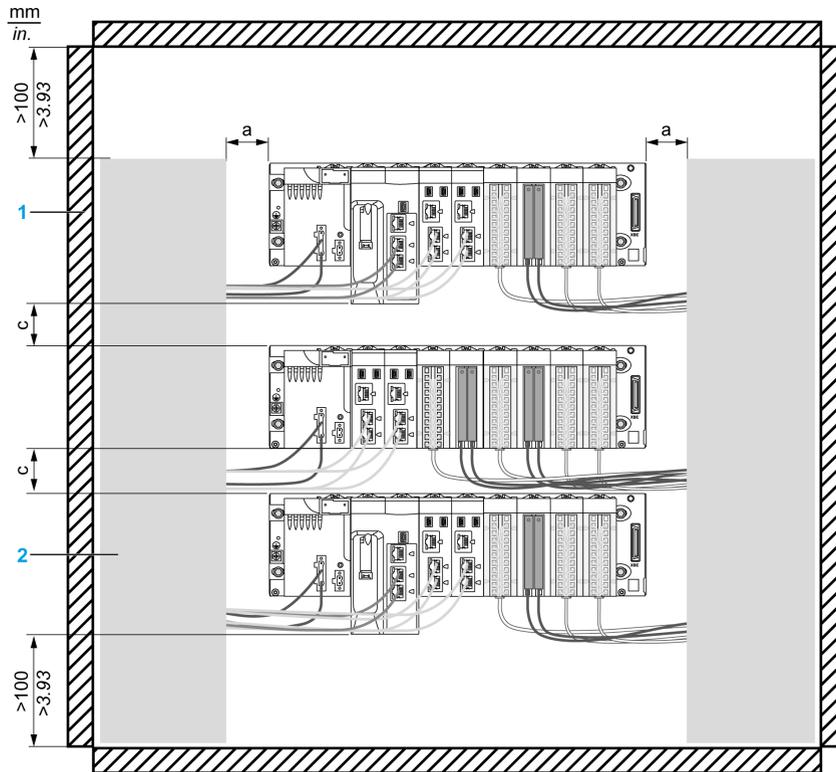
- 1 installation or casing
- 2 wiring duct or tray
- a side clearance: > 40 mm (1.57 in.)
- b top and bottom clearance with surrounding objects: > 20 mm (0.79 in.)

NOTE:

In order to rise the density, a lower spacing between racks is acceptable if:

- there is no shielding bar, nor ducts between racks
- the spacing between racks is not lower than 40 mm (1.57 in.)
- you apply a 5 °C (9 °F) derating to the maximum ambient temperature allowed. That is 55 °C (131 °F) for standard and coated modules versions and 65 °C (149 °F) for hardened modules.

This illustration shows the rules of an installation in a cabinet without horizontal ducts between two racks:



- 1 installation or casing
 - 2 wiring duct or tray
- a side clearance: > 40 mm (1.57 in.)
 c top and bottom clearance between two racks: > 40 mm (1.57 in.)

The cables pass by the front of the PLC to join the vertical ducts on the side of the cabinet.

NOTE: As the shielding bar accessory is removed, the EMC protection (shields of cables clamping to earth) shall be done on copper bars located at the arrival of cables from field, usually at the bottom of the cabinet.

Clearance for Cable Installation

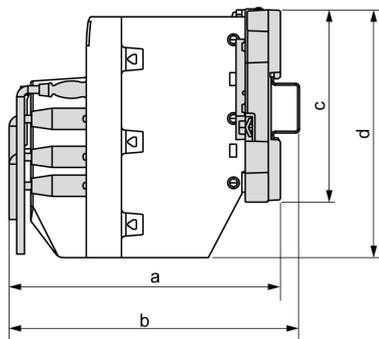
When you plan to install the racks inside an enclosure, leave a minimum space in front of the modules.

The minimum depth of the enclosure is:

- 200 mm (7.874 in.) if the rack is fastened to a plate
- 210 mm (8.268 in.) if the rack is mounted on a 15 mm (0.59 in.) DIN rail

NOTE: If BMXXBE1000 rack extender modules are connected, the use of BMXXBC•••K cables with connectors angled at 45° is recommended.

Here is a side view of a rack on a DIN rail with modules and cables mounted in an enclosure:



- a** wiring + module + backplane depth: > 200 mm (7.874 in.)
- b** wiring + module + backplane + DIN rail depth: > 210 mm (8.268 in.)
- c** rack height
- d** module height

Mounting the Racks

Introduction

Modicon X80 racks can be mounted inside or outside of an enclosure on a:

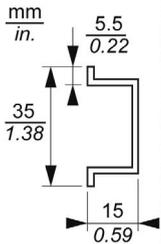
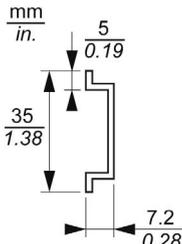
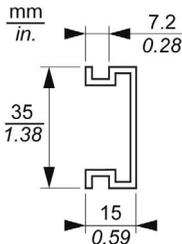
- 35 mm (1.38 in) wide DIN rail
- Panel or mounting plate

When mounted on a DIN rail, the system is more susceptible to mechanical stress (*see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications*).

NOTE: Mount the racks on a properly grounded metallic surface to allow the PAC to operate correctly in the presence of electromagnetic interference.

DIN Rail

You can mount the Modicon X80 rack on one of the following DIN rails:

Symmetric DIN rail		Double-profile DIN rail
Type A	Type B	
 <p>Diagram of Type A Symmetric DIN rail showing dimensions: 35 mm (1.38 in) height, 15 mm (0.59 in) width, and 5.5 mm (0.22 in) offset.</p>	 <p>Diagram of Type B Symmetric DIN rail showing dimensions: 35 mm (1.38 in) height, 7.2 mm (0.28 in) width, and 5 mm (0.19 in) offset.</p>	 <p>Diagram of Double-profile DIN rail showing dimensions: 35 mm (1.38 in) height, 15 mm (0.59 in) width, and 7.2 mm (0.28 in) offset.</p>

NOTE: When mounted on a type B symmetric DIN rail, the rack withstands less mechanical stress.

Mounting on a DIN Rail

Racks longer than 400 mm (15.75 in.) that support more than 8 module slots are not compatible with DIN rail mounting.

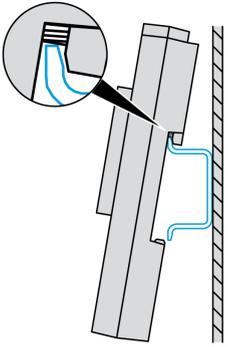
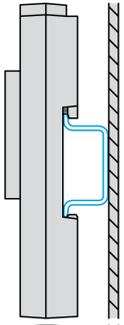
NOTICE

EQUIPMENT DAMAGE

Do not mount BMXXBP1200(H), BMEXBP1200(H), and BMEXBP1002(H) racks on a DIN rail.

Failure to follow these instructions can result in equipment damage.

Mounting a rack on a DIN rail:

Step	Action	Illustration
1	Position the upper DIN-rail locking mechanism at the rear of the rack as illustrated. Press down on the rear section of the rack in order to compress the springs.	
2	Rotate the rack to the DIN rail until it clicks.	

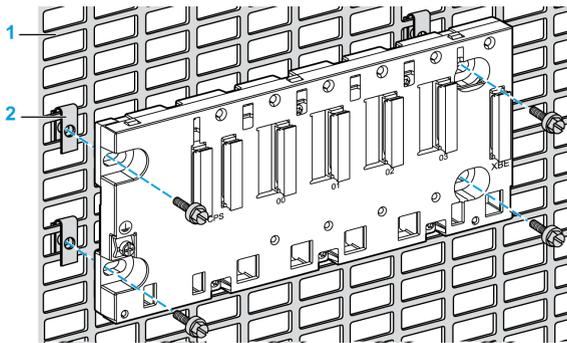
To remove a rack from a DIN rail:

Step	Action
1	Press down the top of the rack to compress the springs in contact with the DIN rail.
2	Tilt the bottom of the rack forward to disengage it from the DIN rail.
3	Release the freed rack.

Mounting on a Panel or Mounting Plate

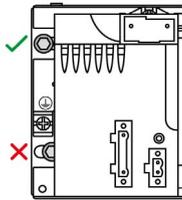
You can mount the rack on a panel or a plain mounting plate with M4, M5, M6, or UNC #6-32 screws inserted in the fastening holes (*see page 25*).

You can also mount a rack on a Telequick mounting plate NSYMR•• using clip-on nuts:



- 1 Telequick plate
- 2 Clip-on nuts (references AF1EA4 to AF1EA6)

Place the two left side screws (near the power supply) as close as possible to the left edge of the rack. This enables you to access the screws after the power supply is mounted.



NOTE: The two right side screws are accessible until there is no rack extender module installed.

BMXXEM010 Protective Cover for Unused Module Slots

Introduction

If a rack has unused module slots, install a BMXXEM010 cover to keep dust and other objects out of the slots and to comply with IP20 ingress protection requirements.

BMXXEM010 covers are sold in sets of 5.

Installation

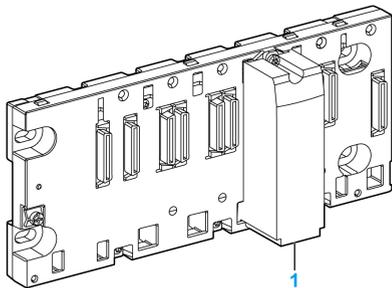
Position the locating pin at the rear of the protective cover (lower part of the module) in the centering hole of the unused module slot.

Swivel the protective cover towards the top of the rack so that it sits flush with the rack.

Tighten the mounting screw to hold the protective cover in place on the rack.

Maximum tightening torque: 1.5 N•m (1.10 lb-ft)

Here a cover is placed in an unused module slot in a Modicon X80 rack:



1 BMXXEM010 cover

Shielding Connection Kit

Introduction

The BMXXSP•••• shielding connection kit allows to connect the cable shielding directly to the ground and not to the module shielding to help protect the system from electromagnetic perturbations.

Connect the shielding on the cordsets for connecting:

- Analog module,
- Counter module,
- Encoder interface module,
- Motion control module,
- An XBT console to the processor (via shielded USB cable).

Kit References

Each shielding connection kit includes the following components:

- A metal bar
- Two sub-bases

The reference is dependent on the number of slots on the Modicon X80 rack:

Modicon X80 rack	Number of slots	Shielding Connection Kit
BMXXBP0400(H) BMEXBP0400(H)	4	BMXXSP0400
BMXXBP0600(H) BMEXBP0600(H)	6	BMXXSP0600
BMXXBP0800(H) BMEXBP0800(H) BMEXBP0602(H)	8	BMXXSP0800
BMXXBP1200(H) BMEXBP1200(H) BMEXBP1002(H)	12	BMXXSP1200

Clamping Rings

Use clamping rings to connect the shielding on cordsets to the metal bar of the kit.

NOTE: The clamping rings are not included in the shielding connection kit.

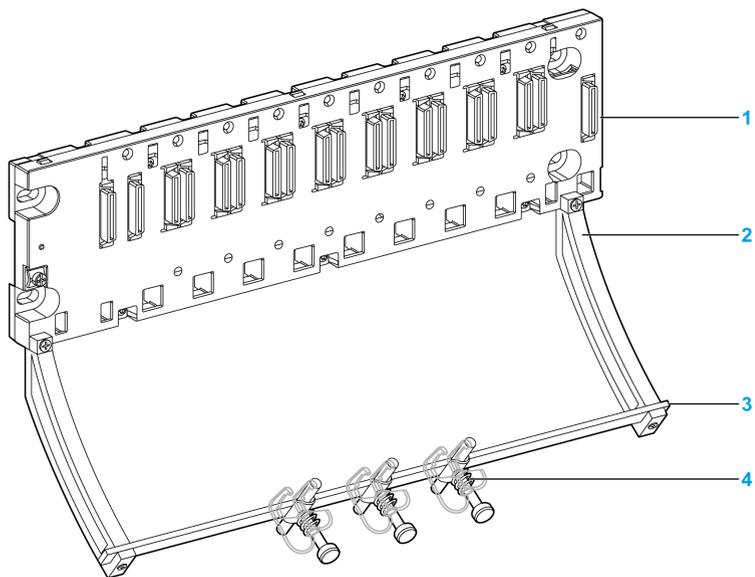
Depending on the cable diameter, the clamping rings are available under the following references:

- STBXSP3010: small rings for cables with cross-section 1.5...6 mm² (AWG16...10).
- STBXSP3020: large rings for cables with cross-section 5...11 mm² (AWG10...7).

Kit Installation

Installation of the shielding connection kit to the rack can be done with module already installed on the rack except for the BMXXBE0100 rack extender module.

Fasten the sub-bases of the kit at each end of the rack to provide a connection between the cable and the ground screw of the rack:



- 1 rack
- 2 sub-base
- 3 metallic bar
- 4 clamping ring

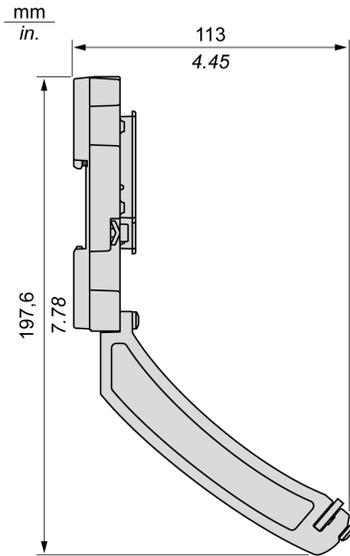
Tightening torques to install the shielding connection kit:

- For the screws fixing the sub-base to the Modicon X80 rack: Max. 0.5 N•m (0.37 lb-ft)
- For the screws fixing the metallic bar to the sub-bases: Max. 0.75 N•m (0.55 lb-ft)

NOTE: A shielding connection kit does not modify the volume required when installing and uninstalling modules.

Kit Dimensions

The following figure gives the dimensions (height and depth) of a Modicon X80 rack with its shielding connection kit:



NOTE: The overall width equals to the width of the Modicon X80 rack.

Chapter 3

BMXXBE1000 Rack Extender Module

Introduction

This chapter describes the multi-rack configuration and its components.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Modicon X80 Extended Racks	44
X80 Rack Extender Module	47
Rack Extender Module Accessories	50
Modicon X80 Rack Extender Module Installation	55

Modicon X80 Extended Racks

Overview

You may extend the number of racks in order to:

- increase the number of modules,
- extend the area covered by the rack so that I/O modules can be installed closer to the different machines they are controlling.

NOTE: Only the X bus is extended across extended racks connected in a daisy chain. Modules that requires connection to the Ethernet bus do not operate when installed in extended racks.

You can use any of the Modicon X80 racks as an extended rack. For X80 racks with Ethernet backplane (BMEXBP••00 and BMEXBP••02) the Ethernet connections of the module slots are disabled.

M580 Local Rack Extension

NOTE: Extension of the M580 local rack in hot-standby configuration is not allowed.

The number of extended racks allowed in the M580 local rack depends on the CPU that you select:

CPU	Maximum number of X80 extended racks
BMEP581020	3
BMEP582020	
BMEP582040	
BMEP583020	7
BMEP583040	
BMEP584020	
BMEP584040	
BMEP585040	
BMEP586040	

In a M580 multi-rack configuration, the racks (main local rack and extended racks) are connected each other in a daisy chain using X bus extension cables ([see page 51](#)), connected to the BMXXBE1000 rack expansion modules.

NOTE: In the daisy chain of X80 racks, the maximum cumulative length of X bus cables is 30 m (98,42 ft).

In addition to the Modicon X80 extended racks, M580 local rack supports also Premium extended racks TSXRKY••EC. For more detailed information on M580 architectures with mixed X80 and Premium racks, refer to chapter *Using Premium Racks in an M580 System* ([see Modicon M580 Standalone, System Planning Guide for, Frequently Used Architectures](#)).

X80 Drop Extension

Only one X80 extended rack can be added to an Ethernet RIO drop. The maximum length of the X bus cable in an Ethernet RIO drop is 30 m (98,42 ft).

NOTE: You cannot install Premium I/O modules in an Ethernet RIO drop.

For more information on extended racks in M580 RIO drops, refer to the *Modicon M580, RIO Modules, Installation and Configuration Guide*.

M340 Local Rack Extension

The number of extended racks allowed in the M340 station (local rack) depends on the CPU that you select:

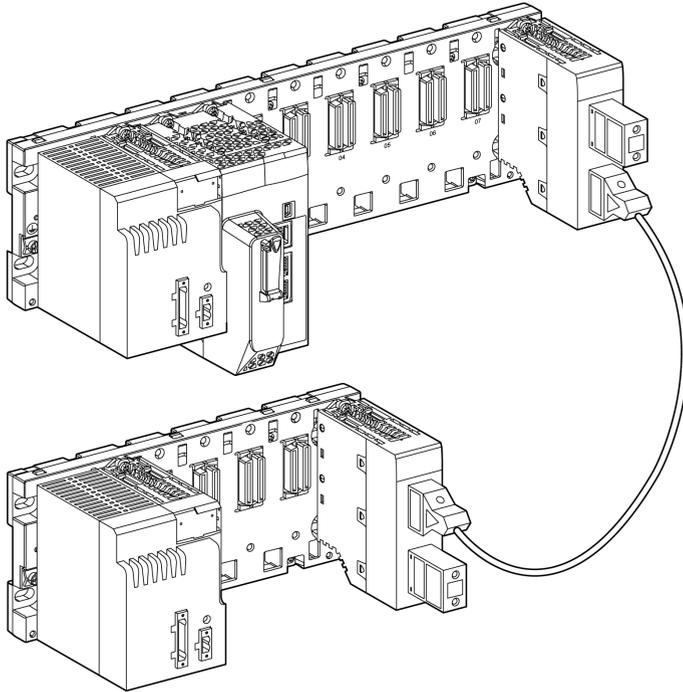
Station		Maximum number of X80 extended racks
Processor	OS Version	
BMXP341000	01.00	1
	>= 02.00	2
BMXP342000	>= 02.00	4
BMXP342010	01.00	1
	>= 02.00	4
BMXP3420102	01.00	1
	>= 02.00	4
BMXP342020	01.00	1
	>= 02.00	4
BMXP342030	01.00	1
	>= 02.00	4
BMXP3420302	01.00	1
	>= 02.00	4
BMXPRA0100	–	3

In a M340 multi-rack configuration, the racks (main local rack and extended racks) are connected each other in a daisy chain using X bus extension cables ([see page 51](#)), connected to the BMXXBE1000 rack expansion modules.

NOTE: In the daisy chain, the maximum cumulative length of X bus cables is 30 m (98,42 ft).

Example of Topology

This is an example of a main local rack with one extended local rack:



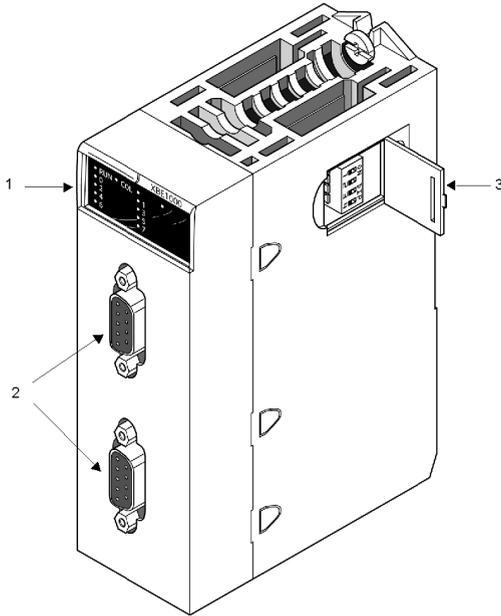
NOTE:

- Each rack has a power supply and a BMXXBE1000 extender module.
- An extender cable (in this case a BMXXBC•••K cable) connects the two extender modules.
- The unused ports on the two extender modules are terminated, with a TSXTLYEX line terminators.

X80 Rack Extender Module

Physical Description

A BMXXBE1000(H) rack extender module contains a LED diagnostic panel, a pair of connectors for the X bus extender cables, and a set of switches for addressing the X80 extended racks.



- 1 rack extender module LEDs
- 2 female 9-pin SUB-D connectors for bus cables
- 3 rack address switches

Rack Address Switches

Assign a unique address to each X80 extended rack. Use the 4 microswitches on the side of the rack extender module to set each rack address.

Switch	Rack Address							
	0	1	2	3	4	5	6	7
1	OFF	OFF	OFF	OFF	ON	ON	ON	ON
2	OFF	OFF	ON	ON	OFF	OFF	ON	ON
3	OFF	ON	OFF	ON	OFF	ON	OFF	ON
4	Not used							

By default, the rack extender module is set to address **0** (all switches **OFF**). Address **0** is reserved for the main rack, which contains the CPU or an adapter module (CRA module) in the case of X80 RIO drops. You can assign addresses **1** through **7** to the X80 extended racks in any order. Assign a unique rack address to each extended rack.

NOTE:

A *collision* can occur if you assign:

- the same rack address to more than one X80 extended rack
- address **0** to any rack other than the main local rack

When a collision happens, one of the racks with the duplicate rack address does not operate.

To recover from a collision:

Step	Action
1	Turn OFF the power supplies in the racks that have an address mismatch.
2	Set unique, correct rack addresses via the address switches on the rack extender module.
3	Reapply power to the racks.

Rack Extender Module LEDs

The LEDs on the rack extender module provide information about the rack in which it resides:



LED	Pattern	Indication
RUN (green)	ON	Module is functioning normally.
	OFF	<ul style="list-style-type: none"> • The power supply is no longer present. • An error has been detected in the extender module.
COL (red)	ON	Rack address collision detected: <ul style="list-style-type: none"> • Two or more racks have been assigned the same rack address. • A rack that does not contain the CPU has been assigned address 0.
	OFF	Each extended rack has a unique address.
0 to 7 (green):	ON or OFF	Rack address. Confirm that each extender module has only one address LED set to ON.

Module Consumption

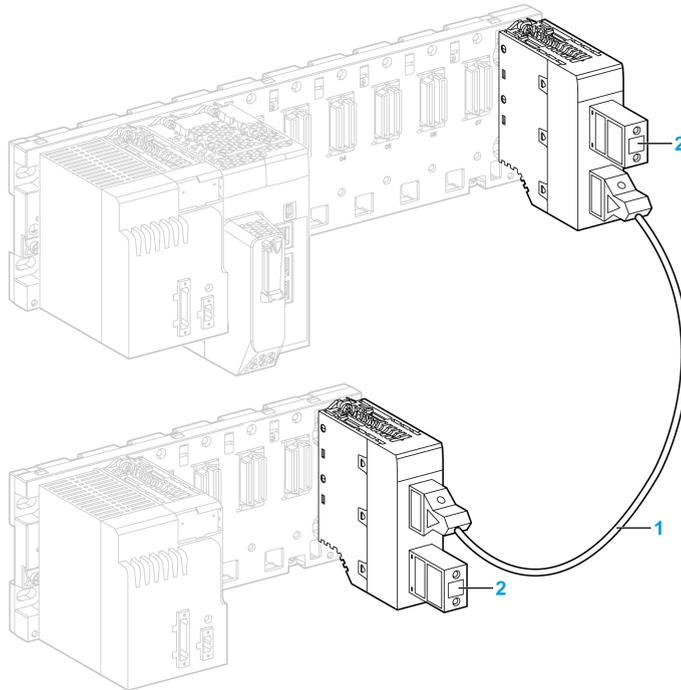
This table shows the power consumed by the BMXXBE1000 extender module:

Consumption/Power Type	Description
consumption on 3.3 Vdc power supply	22 mA
dissipated power on the 3.3 Vdc rack power supply	73 mW
consumption on 24 Vdc rack power supply	160 mA
dissipated power on the 24 Vdc rack power supply	3.84 W

Rack Extender Module Accessories

Introduction

The following figure illustrates accessories used to connect BMXXBE100 modules of a main local rack and an extended rack:



- 1 extension cable
- 2 line terminators

Extension Cables

⚠ CAUTION

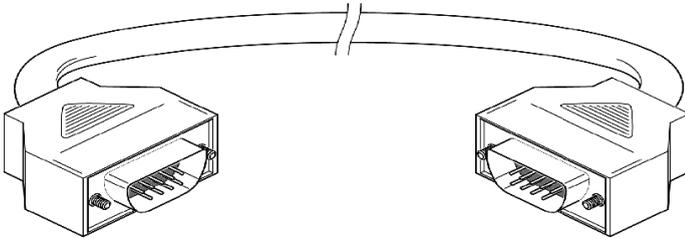
INRUSH CURRENT

Insertion and extraction of an extension cable must only be done with all the station elements switched off (racks, PC, etc.)

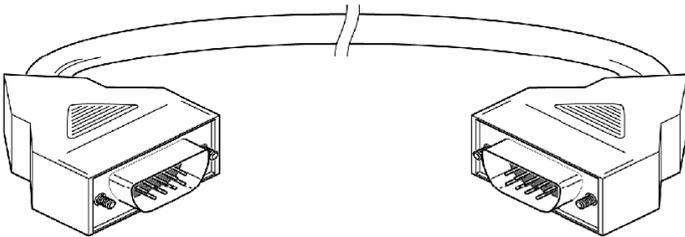
Failure to follow these instructions can result in injury or equipment damage.

The extension cables TSXCBY•••K or BMXXBC•••K are equipped at each end with a male 9-pin SUB D connector, which connects to the female 9-pin SUB D connector on the rack extender modules.

The TSXCBY•••K cables use straight connectors:



The BMXXBC•••K cables use connectors angled at 45°:



NOTE: To connect two rack extender modules located in an enclosure, the use of BMX XBC •••K cables with connectors angled at 45° is recommended.

The predetermined length of extension cables is given by the 3 figures in the cable reference:

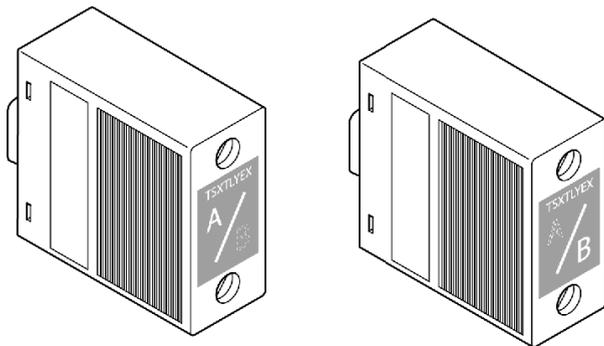
Cable reference		Length
Straight connectors	TSXCBY010K	1 m (3.28 ft)
	TSXCBY030K	3 m (9.84 ft)
	TSXCBY050K	5 m (16.40 ft)
	TSXCBY120K	12 m (39.37 ft)
	TSXCBY180K	18 m (59.05 ft)
	TSXCBY280KT	28 m (91.86 ft)
Angled connectors	BMXXBC008K	0.8 m (2.63 ft)
	BMXXBC015K	1.5 m (4.92 ft)
	BMXXBC030K	3 m (9.84 ft)
	BMXXBC050K	5 m (16.40 ft)
	BMXXBC120K	12 m (39.37 ft)

Line Terminators TSXTLYEX

The extended bus must be fitted with a line terminator at each end.

Line terminators are made up of a 9-pin SUB D connector and a cover containing the adaptation components. They are mounted on the 9-pin SUB D connector on the extension module at each end of the line.

Illustration



⚠ CAUTION

INRUSH CURRENT

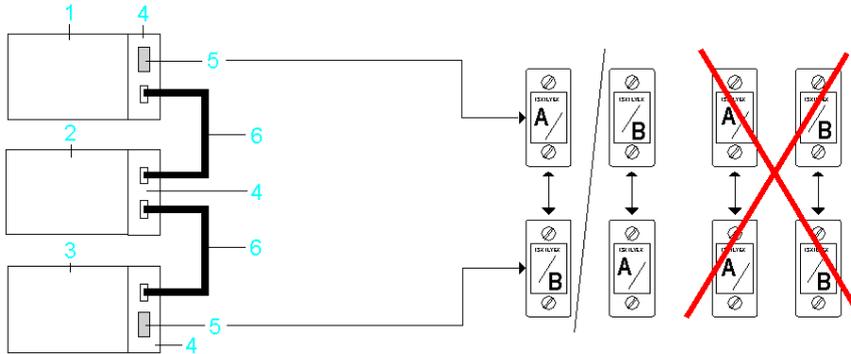
Insertion or extraction of a line terminator must only be done with all the station racks switched off.

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

Line terminators are labeled **A/** or **/B**. An extended rack needs to use one line terminator labeled **A/** and one labeled **/B**. If you terminate the unused connector in the main rack with an **A/** terminator, then you need to terminate the unused connector in the last rack with a **/B** terminator.

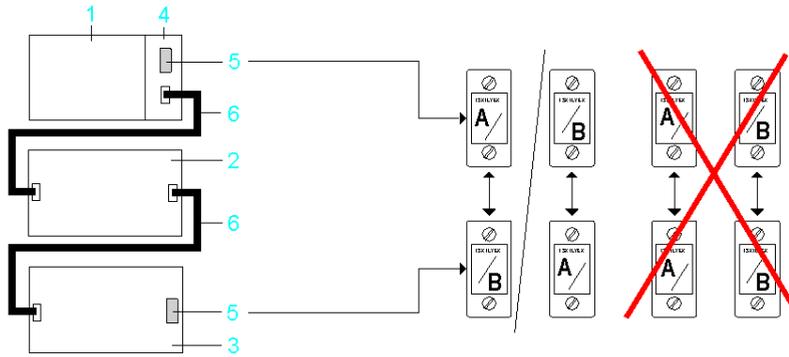
The following figures illustrates the possible choices to install the TSXTLYEX line terminators according to their label in different bus extensions.

Line terminators with Modicon X80 racks only:



- 1 X80 main rack
- 2 first X80 extended rack
- 3 last X80 extended rack
- 4 BMXXBE1000 modules in each rack
- 5 TSXTLYEX line terminator in the main rack and the last rack
- 6 BMXXBC...K or TSXCBY...K extension cables between each rack

Line terminators with both Modicon X80 and Premium extended racks:



- 1 X80 main rack
- 2 first Premium extended rack
- 3 last Premium extended rack
- 4 BMXXBE1000 module
- 5 TSXTLYEX line terminator in the main rack and the last rack
- 6 BMXXBC•••K or TSXCBY•••K extension cables between each rack

Modicon X80 Rack Extender Module Installation

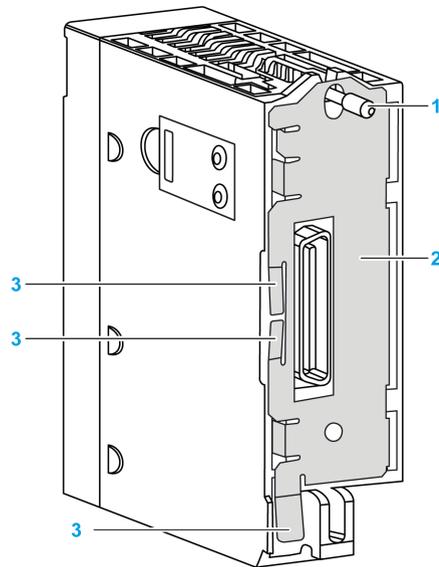
Introduction

The BMXXBE1000 rack extender module is installed similarly to the other modules in the rack with these special considerations:

- The BMXXBE1000 rack extender module cannot be installed in any slot other than the **XBE** slot.
- If a BMXXBE1000 rack extender module is not present in the main extended rack, none of the extended racks are operational.
- If a BMXXBE1000 rack extender module is not present in an extended rack, that rack is not operational.

Rack Extender Module Grounding

The BMXXBE1000 rack extender module is equipped with a grounding plate at the rear for grounding purposes:



- 1 Mounting screw
- 2 Grounding plate
- 3 Contact strips

When the module is correctly installed on the rack, the contact strips connect the grounding bus of the module to the grounding bus of the rack (*see page 108*).

 **DANGER**

HAZARD OF ELECTRIC SHOCK

Check that ground contact strips are available and not bent out of shape.

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

NOTE: If ground contacts strips are bent or not available, do not use the module and contact your Schneider Electric representative.

Extender Module Installation

 **DANGER**

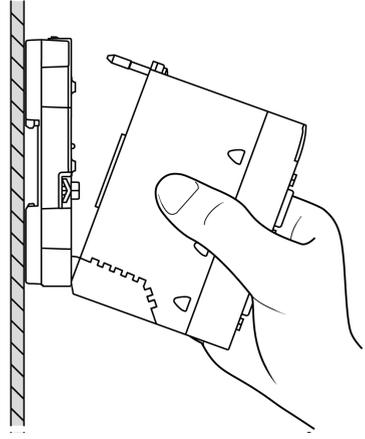
HAZARD OF ELECTRIC SHOCK

Remove all power sources before installing the rack extender module.

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

Install a rack extender module in a rack:

Step	Action
1	Remove all power sources to the rack.
2	Using the microswitches on the side of the rack extender module, set a unique address for that rack from 00 to 08 (<i>see page 47</i>). Confirm that the address assigned to each extended rack is unique with respect to all other extended racks.
3	Remove the protective cover from the connector of the module slot labeled XBE (rightmost module slot of the rack).

Step	Action
4	<p>Position the locating pin at the rear of the module (lower part of the module) in the centering hole of the module slot labeled located XBE.</p> <p>Swivel the module towards the top of the rack so that the module sits flush with the rack.</p> <p>Tighten the mounting screw to hold the module in place on the rack.</p> <p>Tightening torque: 0.4...1.5 N•m (0.29...1.10 lb-ft)</p> 
 WARNING	
<p>UNINTENDED EQUIPMENT OPERATION</p> <p>Check that the mounting screw is securely tightened to ensure the module is firmly attached to the rack.</p> <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>	
5	<p>Connect each extended rack to the rack immediately before it and immediately after it using the appropriate extension cable.</p>
6	<p>Terminate the unused connector on the extender module in the main extended rack and the unused connector on the last extended rack. Use a line terminator labeled A/ on one end of the extended rack and a line terminator labeled /B on the other end of the extended rack.</p>

Chapter 4

Modicon X80 Power Supply Modules Description

Introduction

This chapter describes the Modicon X80 power supply modules used to power the Modicon X80 racks.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Power Supply Modules	60
Physical Description	62
Power Supply Redundancy Mode	66
How to Get X80 Redundant Power supply Management Library?	69
Alarm Relay	70
Power Supply LED Display	73
Reset Button	75

Power Supply Modules

Introduction

The BMXCPS**** power supply modules convert the primary power line into voltages distributed through the backplane to supply the rack and the modules plugged in it:

- 24 Vdc so called 24V_BAC
- 3.3 Vdc so called 3V3_BAC

In addition to these voltages some power supply modules provide a 24 Vdc voltage for sensors connected to modules installed on the rack:

- 24 Vdc for sensors so called 24V_SENSORS

Power Supply References

The choice of power supply module depends on the distributed network (alternating or direct current) and the power required.

A subset of the power supply modules has the redundancy functionality.

Some power supply modules are available in standard and industrially hardened versions:

- The standard version is designed to operate at standard temperature range 0...60 °C (32...140 °F).
- The hardened version is designed to operate at extended temperature range -25...70 °C (-13...158 °F). The hardened version of the device has a letter H appended to the reference.

NOTE: The power supply modules has no thermal disjunction capability.

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Do not operate Modicon X80 power supply module outside of its specified temperature range.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Based on these distinct functionalities, the following table takes an inventory of power supply module references:

–	Alternating Current	Direct Current		
	(100...240 Vac)	(24 Vdc)	(24...48 Vdc)	(125 Vdc)
Standalone Power Supply	BMXCPS2000 BMXCPS3500 BMXCPS3500H	BMXCPS2010	BMXCPS3020 BMXCPS3020H	BMXCPS3540T ⁽¹⁾
Redundant Power Supply	BMXCPS4002 BMXCPS4002H	–	BMXCPS4022 BMXCPS4022H	BMXCPS3522 BMXCPS3522H

(1) This power supply module is specially designed for extended temperature -25...70 °C (-13...158 °F) and the product reference include the suffix "T".

Product Temperature Monitoring

NOTE: The product temperature monitoring is only available for redundant power supply modules. To measure the product temperature of a redundant power supply:

- Install the redundant power supply module in a redundant power supply rack BMEXBP•••2, and
- Use internal diagnostic via the PWS_DIAG function block in your application. This function block is available in the X80 redundant power supply management library (*see page 69*).

Physical Description

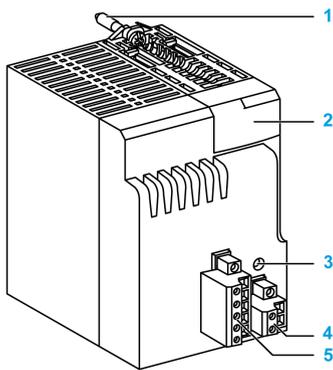
Introduction

The general shape of the power supply modules is almost similar between standalone and redundant modules.

The redundant power supply modules are wider and higher than the standalone power modules. Anyway the physical features described below are located at the same place.

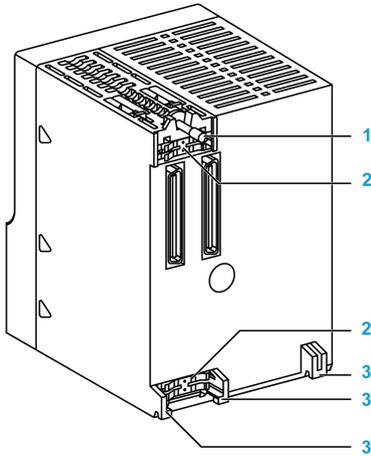
The power supply modules is delivered with two removable terminal blocks.

Front View



- 1 Mounting screw
- 2 LED display
- 3 **RESET** button
- 4 Input/output 5-pin removable terminal block
- 5 Alarm relay 2-pin removable terminal block

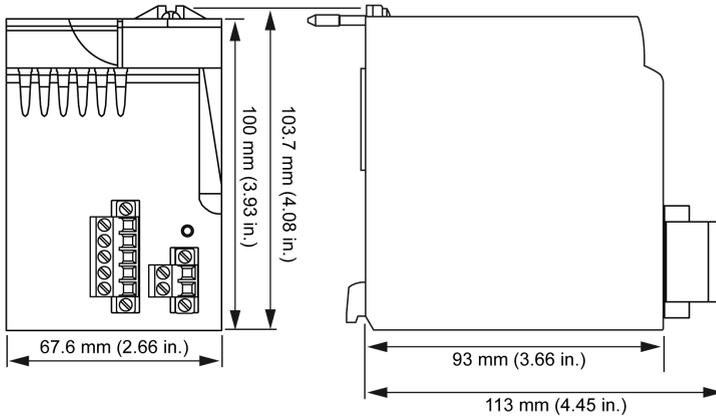
Rear View



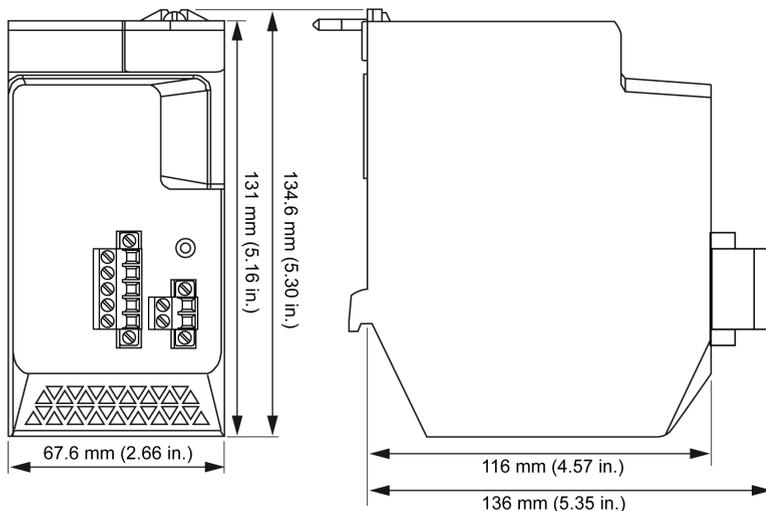
- 1 Mounting screw
- 2 Contact strips for EMC
- 3 Locating pins

Modules Dimensions

This figure shows the dimensions of a standalone power supply module:



This figure shows the dimensions of a redundant power supply module:



Terminal Blocks

The power supply module removable terminal blocks allow the following elements to be connected:

5-pin terminal block

- Main input voltage
- Functional Ground (FG)
- 24 Vdc sensor supply (depending on power supply module reference).

2-pin terminal block Alarm relay

NOTE: The power supply module is delivered with caged clamp terminal blocks. Spring terminal blocks type can be ordered separately with a removable connector kit ([see page 131](#)).

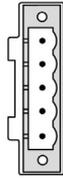
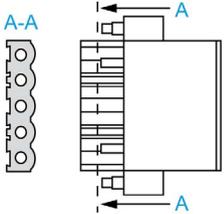
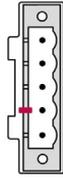
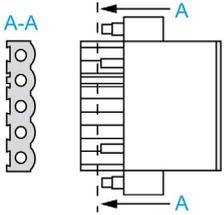
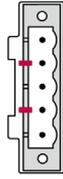
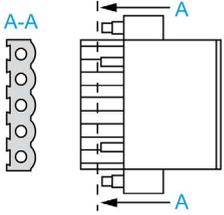
Characteristics:

screw tightening torque	0.5 N•m (0.37 lb-ft)
wire capability	0.2...4.0 mm ² (AWG24....AWG12) Refer to the chapter Wiring Rules (see page 113).
temperature range of wires	Use 60/75 or 75 °C copper (CU) wire.

Guidance System

The connector and associated 5-pin terminal block shipped with the product are keyed at the factory. This guidance system helps to prevent from inserting the 5-pin terminal block wired for a power line to a power supply module designed for another current network voltage.

To illustrate the guidance system, the following table presents the placement of the keys on the connectors and a cross-section view of the associated terminal blocks:

Power line	Power supply module reference	Power supply connector	Terminal block (cross-section view)
Alternating current (100...240 Vac)	BMXCPS2000 BMXCPS3500 BMXCPS3500H BMXCPS4002 BMXCPS4002H		
Direct current (125 Vdc)	BMXCPS3540T BMXCPS3522 BMXCPS3522H		
Direct current (24 Vdc) and (24...48 Vdc)	BMXCPS2010 BMXCPS3020 BMXCPS3020H BMXCPS4022 BMXCPS4022H		

NOTE: If you use terminal blocks from a removable connector kit ([see page 131](#)), you need to key them yourself.

Power Supply Redundancy Mode

Introduction

To create redundancy, install two redundant power supply modules in the first two slots of a BMEXBP••02 rack.

All other cases are considered as degraded mode.

Configuration	Monitor and save power supply data	Manage redundancy (power control and LED diagnostic)	Provide data to the application
Two redundant power supplies in a main rack including a M580 CPU or a CRA module	✓	✓	✓
Two redundant power supplies in an extension rack	✓	✓	–
One redundant power supply	✓	–	–
✓ Yes – No			

Redundancy Principle

The redundancy principle is based on:

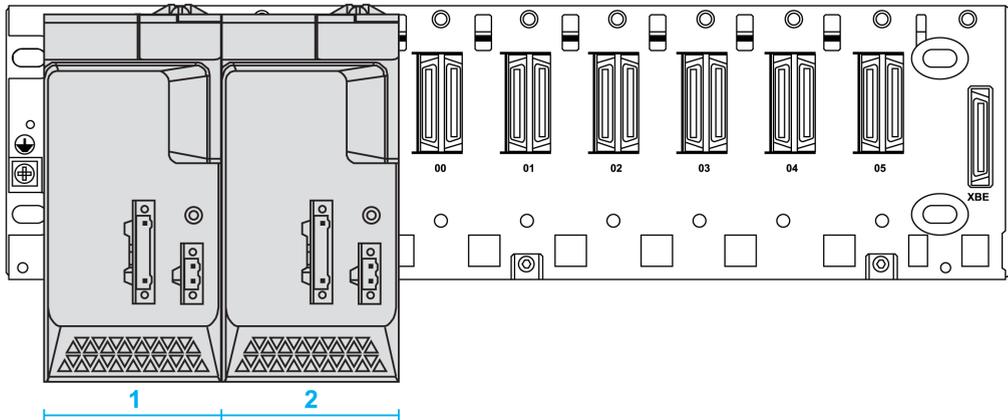
- Each of the two redundant power supply modules in a rack is either the master or the slave.
- An internal diagnostic (voltage and current) for each of the power supply modules.
- An inter-communication between the two redundant power supply modules in a rack to increase the diagnostic level.
- A redundancy status sends to the M580 CPU or CRA module.

Master and Slave Positions

Each of the two redundant power supply modules in a rack is either the master or the slave:

Mode	Description
Master	The master power supply module provides power to the backplane for both voltages (24Vdc and 3.3Vdc).
Slave	The other power supply module (not the master) is the slave.

After an initial power-up, the left-most power supply is the master:



- 1 Redundant power supply in the master position (after power-up).
- 2 Redundant power supply in the slave position (after power-up).

After the slave power supply assumes the role of master, it keeps the master configuration even if the other power supply is physically replaced. When a current master stops performing the role of master, the other power supply retrieves the master role. That is, the slave becomes the master when the original master stops providing power to the backplane. (Power is continuously supplied to the rack during this transition.)

NOTICE

EQUIPMENT DAMAGE

Power off the redundant power supply module before you plug it in to or remove it from the backplane.

Failure to follow these instructions can result in equipment damage.

Detecting Lost Redundancy

This Redundancy_Lost_N signal associated with the redundant power supply module is set to low when one of these conditions is true:

- Master 24 Vdc is out of range.
- Master 3.3 Vdc is out of range.
- Slave 24 Vdc is out of range.
- Slave 3.3 Vdc is out of range.
- Master is not powered or absent.
- Slave is not powered or absent.
- Master current capability is insufficient.
- Slave current capability is insufficient.

auto-test: An automatic test checks that the redundant power supply module is configured as the slave (S) power supply. During the test, the ACTIVE and RD LEDs (*see page 73*) flash continuously.

NOTE: Each redundant power supply module monitors whether the 24 Vdc and 3.3 Vdc supplies are within the acceptable range before providing power to the backplane. If either supply is not in the acceptable range, the Redundancy_Lost_N signal is sent from the backplane to the CPU or the BMECRA312•0 module. The Redundancy_Lost_N signal describes the redundancy status of redundant power supply module when two such modules are connected on the backplane. This signal is active low and only used for CPU modules or BMECRA312•0 modules.

If the redundant power supply module is on a remote rack using an (e)x80 BM•CRA312•0 adapter module, the redundancy information is in the REDUNDANT_POWER_SUPPLY_STATUS field of T_M_CRA_EXT_IN. If the power supply is on a local rack, the redundancy information is reflected in %S124 and it is accounted for in %S10.

NOTE:

- The power converter remains on after you press the **RESET** button.
- Extract more diagnostics from the power supply with the PWS_DIAG function block. You can send commands to the power supply with the PWS_CMD function block. These function blocks are available in the X80 redundant power supply management library (*see page 69*).

How to Get X80 Redundant Power supply Management Library?

Getting X80 Redundant Power supply Management Library

The library is available for download on Schneider Electric website:

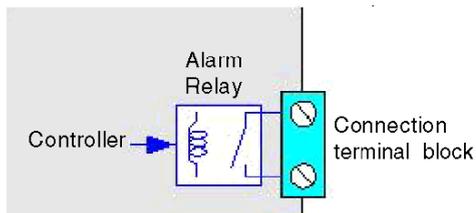
Step	Action
1	Connect to www.schneider-electric.com global website.
2	Click PRODUCTS → PLC, PAC and Dedicated Controllers .
3	Click the product range Control Expert .
4	In the Documents & Downloads tab, click See More Documents . A new page with a menu on the left side appears.
5	In the left side menu, under Document Type Group category, click Software/Firmware . The page content is refreshed.
6	In the left side menu, under Document Type category, click Software - Updates . The page content is refreshed and presents the available software updates to download.
7	Enter <i>X80 redundant power supply</i> in the Search field to reduce the number of available software updates to download.
8	Select the X80 REDUNDANT POWER SUPPLY LIBRARY for download.

NOTE: In case of Schneider Electric website evolution, the menu names and paths may slightly differ.

Alarm Relay

Description

The alarm relay located in each power supply module has a potential free contact accessible on a 2-pin removable terminal block:



Relay Alarm Operation

⚠ DANGER

LOSS OF ABILITY TO PERFORM SAFETY FUNCTIONS

Always use a redundant device when using the alarm relay in a functional safety application.

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

Relay Status	Conditions
closed: The alarm relay is closed when <i>all</i> of these conditions are met.	24V_BAC is OK.
	3V3_BAC is OK.
	ALARM_CPU_N is high ⁽¹⁾ or there is no CPU.
	The RESET button is not activated.
open: The alarm relay is open when <i>any</i> of these conditions is met:	24V_BAC is not OK.
	3V3_BAC is not OK.
	ALARM_CPU_N is low. ⁽²⁾
	The RESET button is activated.
(1) No CPU blocking errors are detected and the PLC is in RUN mode.	
(2) A CPU blocking error is detected or the PLC is in STOP mode.	

Alarm Relay Characteristics

Characteristic	Description
rated switching voltage/current	24 Vdc 2 A (resistive load)
	240 Vac 2 A (cos Φ = 1) point
minimum switching load	5 Vdc 1 mA
maximum switching voltage	62.4 Vdc
	264 Vac
contact type	normally open
contact time	OFF → ON : 10 ms or less
	ON → OFF : 12 ms or less
built-in protection against overload or short circuits:	none
	NOTE : Fit a fast-blow fuse.
built-in protection against inductive overvoltage in alternating current:	none
	NOTE : Fit an RC circuit or a MOV [ZNO] suppressor that is appropriate to the voltage in parallel to the terminals of each pre-actuator.
built-in protection against inductive overvoltage in direct current:	none
	NOTE : Fit a discharge diode to the terminals of each pre-actuator.
dielectric strength	contact vs. ground: 3000 Vrms, 50 Hz, 1 min.(altitude = 0...2000 m)
insulation resistance	100 M Ω or more under 500 Vdc

Alarm Relay Service Life

Electrical	Alternating current	200 Vac / 1.5 A 240 Vac / 1 A cos Φ = 0.7	$\geq 100,000$ cycles
		200 Vac / 0.4 A 240 Vac / 0.3 A cos Φ = 0.7	$\geq 300,000$ cycles
		200 Vac / 1 A 240 Vac / 0.5 A cos Φ = 0.35	$\geq 100,000$ cycles
		200 Vac / 0.3 A 240 Vac / 0.15 A cos Φ = 0.35	$\geq 300,000$ cycles
	Direct current	24 Vdc / 1 A 48 Vdc / 0.3 A L/R = 7 ms	$\geq 100,000$ cycles
		24 Vdc / 0.3 A 48 Vdc / 0.1 A L/R = 7 ms	$\geq 300,000$ cycles
Mechanical	20 million cycles		

Power Supply LED Display

Introduction

The status and performance of the Modicon X80 power supplies are monitored and reported through the LED display on the front of the module.

LED Status for Standalone Power Supply

All standalone power supply modules have a (green) **OK** LED. It indicates this diagnostic information:

LED	Status Indication	
OK	ON	Module operations are normal.
	OFF	One of these conditions exists: <ul style="list-style-type: none"> ● The rack power supply output voltage is below the threshold. ● The RESET button is pressed

The BMXCPS2000, BMXCPS3500, and BMXCPS3540T power supplies also have a (green) **24 V** LED, which indicates this diagnostic information:

LED	Status Indication	
24 V	ON	Module operations are normal.
	OFF	The 24 Vdc sensor voltage from the power supply is not present.

LED Status for Redundant Power Supply

The redundant power supply module has (green) LEDs that indicate these diagnostic information:

LED	Status Indication	
OK	ON	Module operations are normal, that is: <ul style="list-style-type: none"> ● The rack power supply output voltages are in the acceptable range, and ● The RESET button is not pressed
	OFF	The RESET button is pressed
	Blinking	The RESET button is not pressed and one of the rack power supply output voltages (24 Vdc or 3.3 Vdc) is below the threshold.
ACTIVE	ON	The power supply performs the role of master and the RESET button is not pressed.
	OFF	The power supply performs the role of slave or the RESET button is pressed.
RD	ON	The redundancy functionality is operational: <ul style="list-style-type: none"> ● The power supply module is installed in a redundant configuration (with another redundant power supply that operates normally in the same redundant power supply rack), and ● The rack power supply output voltages of both redundant power supply modules are in the acceptable range, and ● The communication between both redundant power supplies through the backplane is operating, and ● None of both RESET button are pressed.
	OFF	One of these conditions exists: <ul style="list-style-type: none"> ● The power supply module is installed in a redundant configuration but the other redundant power supply is not operating. ● The power supply module is installed in a standalone configuration (without another redundant power supply in the rack). ● The 24 Vdc output voltage of the power supply is out of range. ● The 3.3 Vdc output voltage of the power supply is out of range. ● Communication through the backplane is interrupted. ● The RESET button is pressed.
	Blinking	The redundancy current measurement failed. The power supply module is installed in a redundant configuration but one of these conditions exists: <ul style="list-style-type: none"> ● The current capability on the 24 Vdc output voltage of at least one of the redundant power supplies is insufficient. ● The current capability on the 3.3 Vdc output voltage of at least one of the redundant power supplies is insufficient.

Reset Button

Pressing the Reset Button

The power supply module has a **Reset** button on its front panel.

 **DANGER**

HAZARD OF ELECTRIC SHOCK

- Do not touch the **Reset** button directly.
- Use an insulated tool to press the **Reset** button.

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

NOTE: The power is still present on the backplane when pressing **Reset** button.

Standalone Configuration

Pressing the **Reset** button of a standalone power supply module, triggers an initialization sequence of the modules on the rack that it supplies.

As a consequence:

- The ALARM relay is forced to open state, and
- The power supply **OK** LED is switched off.

Redundant Configuration

In a redundant configuration, pressing one of the **Reset** buttons of the power supply modules, triggers an initialization sequence of the modules on the rack that they supply. There is no need to press simultaneously both **Reset** buttons of the redundant power supply modules.

As a consequence:

- Both ALARM relays are forced to open state, and
- The **OK**, **RD**, and **ACTIVE** LEDs of both power supplies are switched off.

Chapter 5

Modicon X80 Power Supply Modules Characteristics

Introduction

This section gives the characteristics of the Modicon X80 power supply modules.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Characteristics of the BMXCPS2000 Power Supply Module	78
Characteristics of the BMXCPS3500 Power Supply Module	80
Characteristics of the BMXCPS3540T Power Supply Module	82
Characteristics of the BMXCPS2010 Power Supply Module	84
Characteristics of the BMXCPS3020 Power Supply Module	85
Characteristics of the BMXCPS4002 Redundant Power Supply Module	87
Characteristics of the BMXCPS4022 Redundant Power Supply Module	89
Characteristics of the BMXCPS3522 Redundant Power Supply Module	91

Characteristics of the BMXCPS2000 Power Supply Module

General

The BMXCPS2000 module is an alternating current power supply module.

Characteristics

Characteristics of the primary block	Nominal voltage		100 – 120 Vac/200 – 240 Vac
	Voltage range		85 - 264 Vac
	Nominal frequency/frequency range		50-60 Hz/47-63 Hz
	Power		70 VA
	Nominal current consumption		0.61 A at 115 Vac 0.31 A at 240 Vac
	Initial power-up at 25 °C ⁽¹⁾	InRush current I	≤ 30 A at 120 Vac ≤ 60 A at 240 Vac
		I^2t at locking	≤ 0.5 A ² s at 120 Vac ≤ 2 A ² s at 240 Vac
		It at locking	≤ 0.03 As at 120 Vac ≤ 0.06 As at 240 Vac
Acceptable duration of power interruptions		≤ 10 ms	
Built-in over-current protection		By internal, inaccessible fuse	
Characteristics of the secondary block	Total usable power		20 W
	Maximum usable power at the two outputs, 3V3_BAC and 24V_BAC		16.5 W
	3V3_BAC output	Nominal voltage	3.3 Vdc
		Nominal current	2.5 A
		Power (typical)	8.3 W
	24V_BAC output	Nominal voltage	24 Vdc
		Nominal current	0.7 A
		Power (typical)	16.5 W
	24V_SENSORS output	Nominal voltage	24 Vdc
		Nominal current	0.45 A
Power (typical)		10.8 W	
3V3_BAC, 24V_BAC and 24V_SENSORS output protection		Against overload, short circuits and over-voltage	
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Maximum Dissipated Power			8.5 W
Characteristics of the auxiliary functions	Alarm relay	Normally open dry contacts	
	Display	Front panel LED	
	Back-up battery	No	
Isolation	Dielectric strength at 50 Hz-1mn and altitude in the 0 - 4,000 m (32 - 7,232 ft) range	Primary/secondary (24V_BAC/3V3_BAC)	1,500 Vrms
		Primary/secondary (24V_SENSORS)	2,300 Vrms
		Primary/ground	1,500 Vrms
		24V_SENSORS/ground output	500 Vrms
	Insulation resistance	Primary/secondary	$\geq 100 \text{ M}\Omega$
		Primary/ground	$\geq 100 \text{ M}\Omega$
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Characteristics of the BMXCPS3500 Power Supply Module

General

The BMXCPS3500 module is alternating current power supply module.

Characteristics

Characteristics of the primary block	Nominal voltage		100 - 120 Vac/ 200 - 240 Vac
	Voltage range		85 - 264 Vac
	Nominal frequency / frequency range		50-60 Hz/47-63 Hz
	Power		120 VA
	Nominal current consumption		1.04 A at 115 Vac 0.52 A at 240 Vac
	Initial power-up at 25 °C ⁽¹⁾	InRush current I	≤ 30 A at 120 Vac ≤ 60 A at 240 Vac
		I^2t at locking	≤ 1 A ² s at 120 Vac ≤ 3 A ² s at 240 Vac
		It at locking	≤ 0.05 As at 120 Vac ≤ 0.07 As at 240 Vac
	Acceptable duration of power interruptions		≤ 10 ms
Built-in over-current protection		By internal, inaccessible fuse	
Characteristics of the secondary block	Total useful power		36 W
	Maximum useful power at the two outputs, 3V3_BAC and 24V_BAC		31.2 W
	3V3_BAC output	Nominal voltage	3.3 Vdc
		Nominal current	4.5 A
		Power (typical)	15 W
	24V_BAC output	Nominal voltage	24 Vdc
		Nominal current	1.3 A
		Power (typical)	31.2 W
	24V_SENSORS output	Nominal voltage	24 Vdc
		Nominal current	0.9 A
		Power (typical)	21.6 W
3V3_BAC, 24V_BAC and 24V_SENSORS output protection		Against overload, short circuits and over-voltage	
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Maximum Dissipated Power			8.5 W
Characteristics of the auxiliary functions	Alarm relay	Normally open dry contacts	
	Display	Front panel LED	
	Back-up battery	No	
Isolation	Dielectric resistance at 50 Hz-1mn and altitude in the 0 - 4,000 m (32 - 7,232 ft) range	Primary/secondary (24V_BAC/3V3_BAC)	1,500 Vrms
		Primary/secondary (24V_SENSORS)	2,300 Vrms
		Primary/ground	1,500 Vrms
		24V_SENSORS/ground output	500 Vrms
	Insulation resistance	Primary/secondary	$\geq 100 \text{ M}\Omega$
		Primary/ground	$\geq 100 \text{ M}\Omega$
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Characteristics of the BMXCPS3540T Power Supply Module

General

The BMXCPS3540T module is a direct current (125 Vdc) power supply module.

Characteristics

Characteristics of the primary block	Nominal voltage		125 Vdc
	Voltage range		100-150 Vdc
	Power		45 W
	Nominal current consumption		0.36 A at 125 Vdc
	Initial power-up at 25 °C ⁽¹⁾	InRush current I	≤ 30 A at 125 Vdc
		I^2t at locking	≤ 2 A ² s at 125 Vdc
		$I t$ at locking	≤ 0.05 As at 125 Vdc
	Acceptable duration of power interruptions		≤ 10 ms
Built-in over-current protection		By internal, inaccessible fuse	
Characteristics of the secondary block	Total useful power		36 W
	Maximum useful power at the two outputs, 3V3_BAC and 24V_BAC		31.2 W
	3V3_BAC output	Nominal voltage	3.3 Vdc
		Nominal current	4.5 A
		Power (typical)	15 W
	24V_BAC output	Nominal voltage	24 Vdc
		Nominal current	1.3 A
		Power (typical)	31.2 W
	24V_SENSORS output	Nominal voltage	24 Vdc
		Nominal current	0.9 A
		Power (typical)	21.6 W
3V3_BAC, 24V_BAC and 24V_SENSORS output protection		Against overload, short circuits and over-voltage	
Maximum Dissipated Power		8.5 W	
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Characteristics of the auxiliary functions	Alarm relay	Normally open dry contacts	
	Display	Front panel LED	
	Back-up battery	No	
Isolation	Dielectric resistance at 50 Hz-1mn and altitude in the 0 - 4,000 m (32 - 7,232 ft) range	Primary/secondary (24V_BAC/3V3_BAC)	3,000 Vrms
		Primary/secondary (24V_SENSORS)	3,000 Vrms
		Primary/ground	2,000 Vrms
		24V_SENSORS/ground output	500 Vrms
	Insulation resistance	Primary/secondary	$\geq 100 \text{ M}\Omega$
Primary/ground		$\geq 100 \text{ M}\Omega$	
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

NOTE: In order to restart the power supply after a detected output overload, short circuit, or over-voltage condition on the 24V_BAC, you must switch the primary power line to the off state, wait 1 minute, and then switch the primary power line back to the on state.

Characteristics of the BMXCPS2010 Power Supply Module

General

The BMXCPS2010 module is a direct current (24 Vdc) power supply module.

Characteristics

Characteristics of the primary block	Nominal voltage		24 Vdc	
	Voltage range		19.2 - 31.2 Vdc	
	Nominal current consumption		1 A at 24 Vdc	
	Initial power-up at 25 °C ⁽¹⁾	InRush current I	30 A at 24 Vdc	
		I^2t at locking	≤ 0.6 A ² s at 24 Vdc	
		It at locking	≤ 0.15 As at 24 Vdc	
	Acceptable duration of power interruptions		≤ 1 ms	
Built-in over-current protection		By internal, inaccessible fuse		
Characteristics of the secondary block	Total usable power		17 W	
	3V3_BAC output	Nominal voltage	3.3 Vdc	
		Nominal current	2.5 A	
		Power (typical)	8.3 W	
	24V_BAC output	Nominal voltage	24 Vdc	
		Nominal current	0.7 A	
		Power (typical)	16.5 W	
3V3_BAC and 24V_BAC output protection		Against overload, short circuits and over-voltage		
Maximum Dissipated Power			8.5 W	
Characteristics of the auxiliary functions	Alarm relay		Normally open dry contacts	
	Display		Front panel LED	
	Back-up battery		No	
Isolation	Dielectric resistance at 50 Hz-1mn and at an altitude in the 0 - 4,000 m (32 - 7,232 ft) range	Primary/secondary (24V_BAC/3V3_BAC)	1,500 Vrms	
		Primary/ground	1,500 Vrms	
	Insulation resistance	Primary/secondary	≥ 10 MΩ	
		Primary/ground	≥ 10 MΩ	
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.				

Characteristics of the BMXCPS3020 Power Supply Module

General

The BMXCPS3020 module is a direct current (24 - 48 Vdc) power supply module.

Characteristics

Characteristics of the primary block	Nominal voltage		24 - 48 Vdc
	Voltage range		19.2 - 62.4 Vdc
	Nominal current consumption		1.65 A at 24 Vdc 0.83 A at 48 Vdc
	Initial power-up at 25 °C ⁽¹⁾	InRush current I	30 A at 24 Vdc 60 A at 48 Vdc
		I^2t at locking	≤ 1 A ² s at 24 Vdc ≤ 3 A ² s at 48 Vdc
		$I t$ at locking	≤ 0.2 As at 24 Vdc ≤ 0.3 As at 48 Vdc
	Acceptable duration of power interruptions at: ● full load, and ● full temperature range		≤ 1 ms
	Acceptable duration of power interruptions at: ● 18 W load, and ● 20.4 Vdc input voltage, and ● temperature range 0 °C to maximum		≤ 10 ms
Built-in over-current protection	By internal, inaccessible fuse		
Characteristics of the secondary block	Total usable power		32 W
	3V3_BAC output	Nominal voltage	3.3 Vdc
		Nominal current	4.5 A
		Power (typical)	15 W
	24V_BAC output	Nominal voltage	24 Vdc
		Nominal current	1.3 A
		Power (typical)	31.2 W
3V3_BAC and 24V_BAC output protection	Against overload, short circuits and over-voltage		
Maximum Dissipated Power		8.5 W	
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Characteristics of the auxiliary functions	Alarm relay	Normally open dry contacts	
	Display	Front panel LED	
	Back-up battery	No	
Isolation	Dielectric resistance at 50 Hz-1mn and at an altitude in the 0 - 4,000 m (32 - 7,232 ft) range	Primary/secondary (24V_BAC/3V3_BAC)	1,500 Vrms
		Primary/ground	1,500 Vrms
	Insulation resistance	Primary/secondary	$\geq 10 \text{ M}\Omega$
		Primary/ground	$\geq 10 \text{ M}\Omega$
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Characteristics of the BMXCPS4002 Redundant Power Supply Module

General

The BMXCPS4002 module is a redundant alternating current power supply module.

Characteristics

Characteristics of the primary block	Nominal voltage		100...240 Vac
	Voltage range		85...132 Vac 170...264 Vac
	Nominal frequency/frequency range		50...60 Hz / 47...63 Hz
	Power		130 VA
	Nominal current consumption		1.1 A at 115 Vac 0.55 A at 230 Vac
	Initial power-up at 25 °C ⁽¹⁾	InRush current I	≤ 30 A at 115 Vac ≤ 60 A at 230 Vac
		i ² t at locking	≤ 1 A ² s at 115 Vac ≤ 4 A ² s at 230 Vac
		It at locking	≤ 0.1 As at 115 Vac ≤ 0.15 As at 230 Vac
	Acceptable duration of power interruptions		≤ 10 ms
Built-in over-current protection		By internal, inaccessible fuse	
Characteristics of the secondary block	Total useful power		40 W on 24V BAC only
	3V3_BAC output	Nominal voltage	3.3 Vdc
		Nominal current	5 A
		Power (typical)	16.5 W
	24V_BAC output	Nominal voltage	24 Vdc
		Nominal current	1.67 A
		Power (typical)	40 W
3V3_BAC and 24V_BAC output protection		Against overload, short circuits and over-voltage	
Characteristics of the auxiliary functions	Alarm relay	Normally open dry contacts	
	Display	Front panel LED	
	Back-up battery	No	
1 These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Isolation	Dielectric resistance at 50 Hz-1mn and at an altitude in the 0 - 4,000 m (32 - 7,232 ft) range	Primary/secondary (24V_BAC/3V3_BAC)	1,500 Vrms
		Primary/ground	1,500 Vrms
	Insulation resistance	Primary/secondary	≥ 100 MΩ
		Primary/ground	≥ 100 MΩ
1 These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Exception: You can install BMXCPS4002 power supply modules only on the following dual-bus racks (Ethernet and X bus):

- BMEXBP0602
- BMEXBP1002

Characteristics of the BMXCPS4022 Redundant Power Supply Module

General

The BMXCPS4022 module is a redundant direct current (24 - 48 Vdc) power supply module.

Characteristics

Characteristics of the primary block	Nominal voltage		24 - 48 Vdc
	Voltage range		19.2 - 62.4 Vdc
	Nominal current consumption		1.9 A at 24 Vdc 1.0 A at 48 Vdc
	Initial power-up at 25 °C ⁽¹⁾	InRush current I	≤ 60 A at 24 Vdc ≤ 60 A at 48 Vdc
		I^2t at locking	≤ 0.4 A ² s at 24 Vdc ≤ 1.9 A ² s at 48 Vdc
		$I t$ at locking	≤ 0.05 As at 24 Vdc ≤ 0.08 As at 48 Vdc
	Acceptable duration of power interruptions at: ● full load, and ● full temperature range		≤ 10 ms
	Acceptable duration of power interruptions at: ● 18 W load, and ● 20.4 Vdc input voltage, and ● temperature range 0 °C to maximum		≤ 10 ms
Built-in over-current protection	By internal, inaccessible fuse		
Characteristics of the secondary block	Total usable power		40 W on 24V_BAC only
	3V3_BAC output	Nominal voltage	3.3 Vdc
		Nominal current	5 A
		Power (typical)	16.5 W
	24V_BAC output	Nominal voltage	24 Vdc
		Nominal current	1.67 A
		Power (typical)	40 W
3V3_BAC and 24V_BAC output protection	Against overload, short circuits and over-voltage		
Maximum Dissipated Power			8.5 W
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Characteristics of the auxiliary functions	Alarm relay	Normally open dry contacts	
	Display	Front panel LED	
	Back-up battery	No	
Isolation	Dielectric resistance at 50 Hz-1mn and at an altitude in the 0 - 4,000 m (32 - 7,232 ft) range	Primary/secondary (24V_BAC/3V3_BAC)	1,500 Vrms
		Primary/ground	1,500 Vrms
	Insulation resistance	Primary/secondary	≥ 10 MΩ
		Primary/ground	≥ 10 MΩ
(1) These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Characteristics of the BMXCPS3522 Redundant Power Supply Module

General

The BMXCPS3522 module is a redundant direct current (125 Vdc) power supply module.

Characteristics

Characteristics of the primary block	Nominal voltage		125 Vdc
	Voltage range		100...150 Vdc
	Power		40 W
	Nominal current consumption		0.6 A at 125 Vdc
	Initial power-up at 25 °C ⁽¹⁾	InRush current I	≤ 60 A at 125 Vdc
		I^2t at locking	≤ 0.15 A ² s at 125 Vdc
		$I t$ at locking	≤ 0.025 As at 125 Vdc
	Acceptable duration of power interruptions at: <ul style="list-style-type: none"> ● full load, and ● minimum input voltage (i.e. 100 Vdc), and ● full temperature range 		≤ 1 ms
	Acceptable duration of power interruptions at: <ul style="list-style-type: none"> ● full load, and ● nominal input voltage (i.e. 125 Vdc), and ● full temperature range 		≤ 10 ms
Built-in over-current protection		By internal, inaccessible fuse	
Characteristics of the secondary block	Total useful power		40 W on 24V BAC only
	3V3_BAC output	Nominal voltage	3.3 Vdc
		Nominal current	5 A
		Power (typical)	16.5 W
	24V_BAC output	Nominal voltage	24 Vdc
		Nominal current	1.67 A
		Power (typical)	40 W
3V3_BAC and 24V_BAC output protection	Against overload, short circuits and over-voltage		
1 These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Characteristics of the auxiliary functions	Alarm relay	Normally open dry contacts	
	Display	Front panel LED	
	Back-up battery	No	
Isolation	Dielectric resistance at 50 Hz-1mn and at an altitude in the 0 - 4,000 m (32 - 7,232 ft) range	Primary/secondary (24V_BAC/3V3_BAC)	1,500 Vrms
		Primary/ground	1,500 Vrms
	Insulation resistance	Primary/secondary	≥ 100 MΩ
		Primary/ground	≥ 100 MΩ
1 These values are to be taken into account for the start-up of several devices simultaneously or for establishing the size of the protection devices.			

Chapter 6

Power Consumption Breakdown

Introduction

This chapter provides a breakdown of the power and power consumption for selecting the power supply modules.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Power Consumption	94
Usable Power	101

Power Consumption

Calculation Table

The power required by a rack depends on the type of modules installed.

NOTE: Two redundant power supplies on the same rack are not summable.

Calculate the global power consumption to define the power supply module to be installed on the rack:

Power	Calculation	Result
P 3.3 V rack = power required on the 3V3_BAC output	current absorbed on the 3V3_BAC output by all modules (mA) $\times 10^{-3} \times 3.3$	=.....W
P 24 V rack = power required on the 24V_BAC output	current absorbed on the 24V_BAC output by all modules (mA) $\times 10^{-3} \times 24$	=.....W
P 24 V sensors = power required on the 24V_SENSORS output	current absorbed on the 24V_SENSORS output by all modules (mA) $\times 10^{-3} \times 24$	=.....W
total power required	P 3.3 V rack + P 24 V rack + P 24 V sensors	=.....W

NOTE: Control Expert software can display the power consumption budget (*see EcoStruxure™ Control Expert, Operating Modes*) for a given configuration.

The following tables give the average power consumption per module. The average value is calculated regarding the maximum and typical consumptions.

Rack and Extender Module Consumption

Rack Family	Rack Reference	Average Current Consumption (mA)	
		3V3_BAC Output	24V_BAC Output
X bus rack	BMXXBP0400(H)	340	–
	BMXXBP0600(H)	510	–
	BMXXBP0800(H)	670	–
	BMXXBP1200	50	–
	BMXXBP1200(H)	250	–
Dual Ethernet and X bus rack	BMEXBP0400(H)	49	118
	BMEXBP0800(H)	64	164
	BMEXBP1200(H)	86	164
Redundant power supply rack	BMEXBP0602(H)	58	152
	BMEXBP1002(H)	76	162

Module Reference	Description	Average Current Consumption (mA)	
		3V3_BAC Output	24V_BAC Output
BMXXBE1000	rack extender module	22	160

M580 CPU

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMEP581020 BMEP582020 BMEP582040	Standalone CPU Ethernet distributed IO	–	270	–
BMEP583020	Standalone CPU Ethernet distributed IO	–	295	–
BMEP583040	Standalone CPU Ethernet remote and distributed IO	–	295	–
BMEP584020	Standalone CPU Ethernet distributed IO	–	295	–
BMEP584040	Standalone CPU Ethernet remote and distributed IO	–	295	–
BMEP585040 BMEP586040	Standalone CPU Ethernet remote and distributed IO	–	300	–
BMEH582040	HSBY CPU Ethernet remote and distributed IO	–	270 or 335 ⁽¹⁾	–
BMEH584040	HSBY CPU Ethernet remote and distributed IO	–	295 or 360 ⁽¹⁾	–
BMEH586040	HSBY CPU Ethernet remote and distributed IO	–	295 or 365 ⁽¹⁾	–
(1) with a copper SFP				

M340 PLC

The following table gives the average power consumption for each module.

Module		Average Power Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXP341000	CPU 340-10 Modbus	-	72	-
BMXP342000	CPU 340-20 Modbus	-	72	-
BMXP342010 BMXP3420102	CPU 340-20 Modbus CANopen	-	90	-
BMXP342020	CPU 340-20 Modbus Ethernet	-	95	-
BMXP342030 BMXP3420302	CPU 340-20 Ethernet CANopen	-	135	-

RIO Drop Adapter Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXCRA31200	X80 standard EIO adapter	1,200	-	-
BMXCRA31210(C)	X80 performance EIO adapter	1,200	-	-
BMECRA31210(C)	8 isolated high- speed analog inputs	1,800	-	-

DIO Drop Adapter Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXPRA0100	DIO drop adapter	-	95	-

Analog X80 Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXAMI0410	4 isolated high-speed analog inputs	150	45	–
BMXAMI0800	8 non-isolated high-speed analog inputs	150	41	–
BMXAMI0810	8 isolated high-speed analog inputs	150	54	–
BMXAMM0600	4 channel analog inputs	240	–	120
BMXAMO0210	2 isolated analog outputs	150	110	–
BMXAMO0410	4 isolated high-speed analog outputs	150	140	–
BMXAMO0802	8 non-isolated high-speed analog outputs	150	135	–
BMXART0414	4 isolated analog inputs	150	40	–
BMXART0814	8 isolated analog inputs	220	50	–
BMEAHI0812	8 high-density isolated fast analog inputs	400	40	–
BMEAHO0412	4 channel analog inputs	380	140	–

Communication X80 Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXNOE0100(H)	Ethernet 1 port 10/100 RJ45	-	90	-
BMXNOE0110	Ethernet 1 port 10/100 RJ45	-	90	-
BMXNOC0401	Ethernet 4 ports 10/100 RJ45	555	-	-
BMXNOR0200	Ethernet 2 ports 10/100 RJ45	-	95	-
BMENOC0301 BMENOC0311	Ethernet 3 ports 10/100 RJ45	1,800 ⁽¹⁾	-	-
BMENOC0321	Ethernet 3 ports 10/100/1000 RJ45	1,800 ⁽¹⁾	-	-
BMXEIA0100	sub-D connector AS-interface master	160	-	-
BMXNRP0200	Multimode fiber converter	-	200	-
BMXNRP0201	Single-mode fiber converter	-	200	-
<p>(1) Current consumption at a temperature above 50 °C (122 °F). At a temperature of 30°C (86 °F) the current consumption is 1,200 mA.</p> <p>NOTE: To lower the current consumption of the BMENOC03*1 module, you can disable unused communication ports.</p>				

Counting X80 Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXEHC0200	2 channel high speed counter	200	40	80
BMXEHC0800	8 channel high speed counter	200	-	80

Discrete Input Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXDAI0805	8 discrete 200...240 Vac inputs	103	13	–
BMXDAI1602	16 discrete 24Vac/24Vdc inputs	90	–	60
BMXDAI1603	16 discrete 48 Vac inputs	90	–	60
BMXDAI1604	16 discrete 100...120 Vac inputs	90	–	–
BMXDDI1602	16 discrete 24 Vdc inputs	90	–	60
BMXDDI1603	16 discrete 48 Vdc inputs	75	–	135
BMXDDI1604T	16 discrete 125 Vdc inputs	75	–	135
BMXDDI3202K	32 discrete 24 Vdc inputs	140	–	110
BMXDDI6402K	64 discrete 24 Vdc inputs	200	–	110

Discrete Output Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXD AO1605	16 discrete outputs	100	95	–
BMXD DO1602	16 discrete 0.5 A outputs	100	–	–
BMXD DO1612	16 discrete outputs	100	–	–
BMXD DO3202K	32 discrete 0.1 A outputs	150	–	–
BMXD DO6402K	64 discrete 0.1 A outputs	240	–	–
BMXDRA0804T	8 discrete isolated outputs	100	110	–
BMXDRA0805	8 discrete isolated outputs	100	55	–
BMXDRA1605	16 discrete outputs	100	95	–

Discrete Input/Output Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXDDM16022	8 discrete 24 Vdc inputs and 8 discrete outputs	100	–	30
BMXDDM16025	8 discrete 24 Vdc inputs and 8 discrete outputs	100	50	30
BMXDDM3202K	16 discrete 24 Vdc inputs and 16 discrete outputs	150	–	55

Motion Modules

Module		Average Current Consumption (mA)		
Reference	Description	3V3_BAC Output	24V_BAC Output	24V_SENSORS Output
BMXMSP0200	2 independent Pulse Train Output channels	200	150	–

Usable Power

Introduction

When the power requirements for a rack have been calculated (*see page 94*), use the following tables to select the appropriate power supply module to be installed on the rack.

Usable Power Table

Power Supply Reference	Maximum available power:		
	3V3_BAC	24V_BAC	24V_SENSORS
BMXCPS2000 (100...240 Vac)	8.3 W (2.5 A)	16.5 W (0.7 A)	10.8 W (0.45 A)
	3V3_BAC and 24V_BAC cumulated = 16.5 W		
	3V3_BAC, 24V_BAC, and 24V_SENSORS cumulated = 20 W		
BMXCPS2010 (24 Vdc)	8.3 W (2.5 A)	16.5 W (0.7 A)	–
	3V3_BAC and 24V_BAC cumulated = 16.5 W		
BMXCPS3020 (24...48 Vdc)	15 W (4.5 A)	31.2 W (1.3 A)	–
	3V3_BAC and 24V_BAC cumulated = 31.2 W		
BMXCPS3020H ⁽¹⁾ (24...48 Vdc)	15 W (4.5 A) 11.25 W (3.375 A)	31.2 W (1.3 A) 23.4 W (0.975 A)	–
	3V3_BAC and 24V_BAC cumulated = 31.2 W (23.4 W)		
BMXCPS3500 (100...240 Vac)	15 W (4.5 A)	31.2 W (1.3 A)	21.6 W (0.9 A)
	3V3_BAC and 24V_BAC cumulated = 31.2 W		
	3V3_BAC, 24V_BAC, and 24V_SENSORS cumulated = 36 W		
BMXCPS3500H ⁽¹⁾ (100...240 Vac)	15 W (4.5 A) 11.25 W (3.375 A)	31.2 W (1.3 A) 23.4 W (0.975 A)	21.6 W (0.9 A) 16.2 W (0.5 A)
	3V3_BAC and 24V_BAC cumulated = 31.2 W (23.4 W)		
	3V3_BAC, 24V_BAC, and 24V_SENSORS cumulated = 36 W (27 W)		
BMXCPS3540T ⁽¹⁾ (125 Vdc)	15 W (4.5 A) 11.25 W (3.375 A)	31.2 W (1.3 A) 23.4 W (0.975 A)	21.6 W (0.9 A) 16.2 W (0.5 A)
	3V3_BAC and 24V_BAC cumulated = 31.2 W (23.4 W)		
	3V3_BAC, 24V_BAC, and 24V_SENSORS cumulated = 36 W (27 W)		
BMXCPS4002H ⁽²⁾ (100...240 Vac)	16.5 W (5 A)	40 W (1.67 A)	–
	3V3_BAC and 24V_BAC cumulated = 40 W		
(1) For the power supply modules that can operate in an extended temperature range, the usable powers are subject to derating (written in bold) in the temperature range of 60...70 °C (140...158 °F).			
(2) There is no derating for the redundant power supply modules.			

Power Supply Reference	Maximum available power:		
	3V3_BAC	24V_BAC	24V_SENSORS
BMXCPS4022(H) ⁽²⁾ (24...48 Vdc)	16.5 W (5 A)	40 W (1.67 A)	–
	3V3_BAC and 24V_BAC cumulated = 40 W		
BMXCPS3522(H) ⁽²⁾ (125 Vdc)	16.5 W (5 A)	40 W (1.67 A)	–
	3V3_BAC and 24V_BAC cumulated = 40 W		
<p>(1) For the power supply modules that can operate in an extended temperature range, the usable powers are subject to derating (written in bold) in the temperature range of 60...70 °C (140...158 °F).</p> <p>(2) There is no derating for the redundant power supply modules.</p>			

24V_SENSORS Output

The 24V_SENSORS output is the 24 Vdc sensor power supply output and is only available on the following modules:

- BMXCPS2000
- BMXCPS3500(H)
- BMXCPS3540T

Excessive load on the 24V_SENSORS output causes limitation of the available current. Reduce the current consumption on the 24V_SENSORS output.

WARNING

UNEXPECTED EQUIPMENT OPERATION

Do not exceed the 24V_SENSORS output power rating.

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

Power Limits

Excessive load can cause the power supply to trip.

WARNING

UNEXPECTED EQUIPMENT OPERATION

Do not exceed the total useful power rating of the module.

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

Follow these rules to establish the power used by power supply modules:

- Do not let the power absorbed on each output (3V3_BAC, 24V_BAC, and 24V_SENSORS) exceed respectively the maximum usable power for each output.
- Do not let the sum of the power absorbed on the 3V3_BAC and 24V_BAC outputs exceed the maximum usable power for 3V3_BAC and 24V_BAC cumulated.
- Do not let the sum of the power absorbed on the 3V3_BAC, 24V_BAC, and 24V_SENSORS outputs exceed the maximum usable power of the module.

Once a power supply has tripped, disconnect the power supply from its power source for 5 minutes in order to restore its internal circuit breaker.

NOTICE

RECOVERY TIME AFTER TRIPPING

After tripping, remove the power to the power supply module and wait 5 minutes before applying the power again.

Failure to follow these instructions can result in equipment damage.

The redundant power supplies are not summable. The global power of the rack cannot exceed the capacity of a single supply.

Chapter 7

Power Supply Modules Installation

Introduction

This chapter explain how to install the Modicon X80 power supply modules.

What Is in This Chapter?

This chapter contains the following topics:

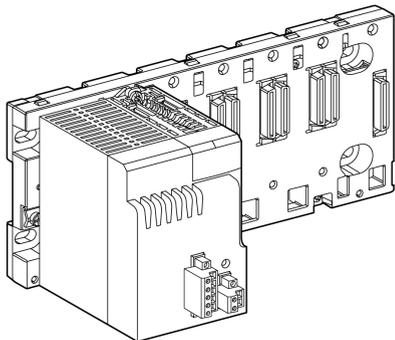
Topic	Page
Installing a Power Supply Module	106
Grounding the Rack and Power Supply Module	108
Definition of Protection Devices at the Start of the Line	111
Wiring Rules	113
Connection of Alternating Current Power Supply Modules	116
Connection of Direct Current Power Supply Modules to a Floating Direct Current Network	118
Connection of Direct Current Power Supply Modules to an Alternating Current Network	122
Sensor and Pre-actuator Power Supply Control by Alarm Relay	126

Installing a Power Supply Module

Introduction

Install the power supply module in the first two slots of each rack marked **CPS**.

Example of power supply module installed in a BMEXBP0400 rack:



NOTE: The power supply module design only allows it to be placed in the dedicated slots.

Power Supply Module Installation

DANGER

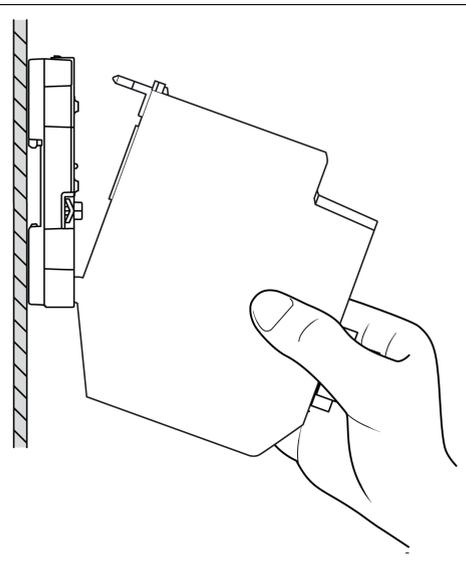
HAZARD OF ELECTRIC SHOCK

Remove all power sources to the terminal block before installing the power supply module.

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

Install an X80 power supply module in a rack:

Step	Action
1	Remove the protective cover from the two connectors of the power supply module labeled CPS , CPS1 , or CPS2
2	Position the locating pins situated at the rear of the module (on the bottom part) in the corresponding slots in the rack.
3	Swivel the module towards the top of the rack so that the module sits flush with the rack.
4	Tighten the mounting screw on top of the power supply module to hold the module in place on the rack. Tightening torque: 0.4...1.5 N·m (0.29...1.10 lbf-ft).



WARNING

UNINTENDED EQUIPMENT OPERATION

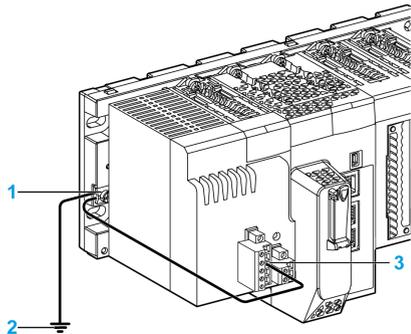
Check that the mounting screw is securely tightened to ensure the module is firmly attached to the rack.

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

Grounding the Rack and Power Supply Module

Overview

The following illustration shows how to ground the rack and the power supply module:



- 1 Protective earth screw of the rack
- 2 Earthing of the installation (i.e., cabinet)
- 3 Functional ground (**FG**) terminal of the power supply module.

NOTE: Ground every racks and power supply modules in the PAC system.

Grounding Rules

To ground the rack and the power supply module:

- connect a ground cable between the earthing of the installation and the protective earth screw of the rack.
- connect a ground cable between the functional ground (FG) terminal of the power supply module and the protective earth screw of the rack. This cable should be as short as possible.

NOTE: For redundant power supply modules in the same rack, do not chain the functional ground (FG) terminal of the modules together.

The protective earth screw of the rack is located on the left-hand side of the rack, close to the power supply module.

 **DANGER****HAZARD OF ELECTRIC SHOCK**

Connect the protective earth screw of the rack to the earthing of the installation.

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

 **DANGER****HAZARD OF ELECTRIC SHOCK**

- Connect the functional ground (FG) terminal of the power supply module directly to the protective earth screw of the rack.
- Do not chain the function ground (FG) terminals of redundant power supply modules together.
- Do not connect anything else to the functional ground (FG) terminal of the power supply module.

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

The ends of the cables connected to the protective earth screw of the rack must have ring or spade connectors that maintain an electrical connection when the screw is loose.

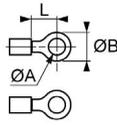
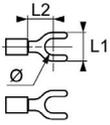
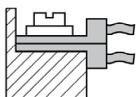
The tightening torque for the protective earth screw is 1.2 N•m (0.88 lb-ft).

 **DANGER****LOOSE WIRING CAUSES ELECTRIC SHOCK**

- Use only cables with ring or spade lugs to connect the protective earth screw of the rack and check that there is a good ground connection.
- Make sure that the protective earth screw of the rack is tightened properly.

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

The following table gives the ring and spade lugs characteristics to connect ground cables to the M4 protective earth screw of the rack:

						
	ØA	ØB	L(*)	Ø	L1	L2(*)
mm	4.34	≤ 8.8	≥ 6.2	4.34	≤ 9.8	≥ 6.2
in.	0.171	≤ 0.346	≥ 0.245	0.171	≤ 0.385	≥ 0.245
(*) 						

Refer to the chapter Wiring Rules ([see page 113](#)) for power supply terminal block connections.

Equipotential Grounding System

When developing an M580 Hot Standby system, confirm that all equipment is grounded to the same potential. This includes, for example, the primary and the standby Hot Standby local racks, plus all connected RIO drops and distributed equipment. To accomplish this, confirm that you have an equipotential grounding system in place.

NOTE: Refer to the ground protection information provided in the Grounding and Electromagnetic Compatibility of PLC Systems, Basic Principles and Measures, User Manual and *Control Panel Technical Guide, How to protect a machine from malfunctions due to electromagnetic disturbance* ([see page 10](#)).

Definition of Protection Devices at the Start of the Line

Introduction

It is recommended that you install a protection device at the start of the line on the power supply network, including these elements:

- circuit breaker
- fuse

Choice of Line Circuit Breaker

Consider these factors when you choose the size of the line circuit breaker:

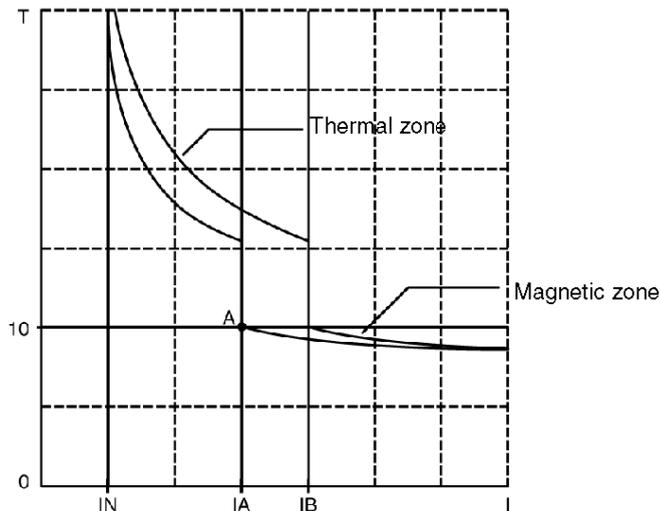
- nominal input current (I_{rms})
- signaling current (I)
- current characteristic (I_t)

The choice of minimum circuit breaker size is made according to these rules:

- IN circuit breaker size greater than the power supply nominal input current (I_{rms})
- maximum circuit breaker size greater than the power supply signaling current (I)
- current characteristic (I_t) at point A of the curve greater than the power supply current characteristic (I_t)

NOTE: Protect all poles of the main power line by at least fuses or breakers rated 15 A for North America and 16 A for other countries.

This graph shows an example of characteristics provided by a circuit breaker manufacturer:



Choice of Line Fuse

When you choose the size of the line fuse, consider:

- current characteristic (I^2t)

The choice of minimum fuse size is made according to these rules:

- IN fuse size greater than 3 times the power supply nominal input current I_{rms}
- fuse current characteristic I^2t greater than 3 times the power supply current characteristic I^2t

Power Supply Characteristics

This table gives a synthesis of the current characteristics needed to define the minimum size of the circuit breaker and fuse for a given power supply module:

Power Supply Module		nominal input current I_{rms}	signaling current $I^{(1)}$	current characteristic	
				$I t$	$I^2 t$
BMXCPS2000 (100...240 Vac)	at 115 Vac	0.61 A	–	–	–
	at 120 Vac	–	30 A	0.03 As	0.5 A ² s
	at 240 Vac	0.31 A	60 A	0.06 As	2 A ² s
BMXCPS2010 (24 Vdc)	at 24 Vdc	1 A	30 A	0.15 As	0.6 A ² s
BMXCPS3020(H) (24...48 Vdc)	at 24 Vdc	1.65 A	30 A	0.2 As	1 A ² s
	at 48 Vdc	0.83 A	60 A	0.3 As	3 A ² s
BMXCPS3500(H) (100...240 Vac)	at 115 Vac	1.04 A	–	–	–
	at 120 Vac	–	30 A	0.05 As	1 A ² s
	at 240 Vac	0.52 A	60 A	0.07 As	3 A ² s
BMXCPS3540T (125 Vdc)	at 125 Vdc	0.36 A	30 A	0.05 As	2 A ² s
BMXCPS4002(H) (100...240 Vac)	at 115 Vac	1.1 A	30 A	0.1 As	1 A ² s
	at 120 Vac	–	–	–	–
	at 240 Vac	0.55 A	60 A	0.15 As	4 A ² s
BMXCPS4022(H) (24...48 Vdc)	at 24 Vdc	1.9 A	60 A	0.05 As	0.4 A ² s
	at 48 Vdc	1 A	60 A	0.08 As	1.9 A ² s
BMXCPS3522(H) (125 Vdc)	at 125 Vdc	0.6 A	60 A	0.025 As	0.15 A ² s
1 values at initial power-up and at 25 °C (77 °F)					

Wiring Rules

Wiring Recommendations

The power supply terminal block can accommodate:

- Bare wires:
 - Solid conductor
 - Stranded cable

NOTE: Without cable end, the minimum individual wire size



in stranded cable is

AWG 30 (0,0507 mm²).

- Wires with cable ends:
 - Single cable end : DZ5CE****/DZ5CA****
 - Twin cable end : AZ5DE****

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

NOTE: When using stranded cable, Schneider Electric strongly recommends the use of cable end which are fitted with an appropriate tool.

DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCK

Do not insert more than one wire per connector of the terminal block without a twin cable end.

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

DANGER

FIRE HAZARD

Use only the recommended wire sizes.

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

Cable size

The following table provides the size for the cables to use with the 5-pin caged terminal block:

Cable type	 1 solid conductor	 1 stranded cable ⁽¹⁾	 1 stranded cable with single cable end 	 2 solid conductors, only with twin cable end 	 2 solid conductors, only with twin cable end 
AWG	24...12	22...14	22...14	2x24...2x16	2x22...2x16
mm ²	0,205...3,310	0,357...2,285 ⁽²⁾	0,324...2,285 ⁽²⁾	2x0,205...2x0,82	2x0,324...2x1,44 ⁽²⁾
AWG	24...12	22...14	22...14	2x24...2x16	2x22...2x16

(1) Minimum individual wire size in stranded cable without cable end is AWG 30 (0,0507 mm²).
(2) Depending on stranding.

NOTE: When using a cable end, check that the overall section does not exceed wire capability of the terminal block 4.0 mm².

Sensor Power Supply

When available, power supply modules have a built-in power supply providing a voltage of 24 Vdc which is used to supply power to the sensors.

Sensors connected to the modules of one rack must be powered from this rack or from an external power supply. Using power from a different rack will cause unintended equipment operation and incorrect activation of outputs, and may damage the power supply module.

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Do not power sensors connected to the modules of one rack with the power supply of another rack.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Direct Current Network

As the direct current power supply modules BMXCPS2010, BMXCPS3020(H), and BMXCPS4022(H) has a strong signaling current, it is recommended not to use these modules on direct current networks which have a fold back current limiting protection.

NOTE: If the power supply module is connected to a direct current network, the length of the power supply cable must be limited in order to avoid transmission losses.

The following table gives the maximum length of the power supply cables:

Power supply module	Copper wire size	
	2.5 mm ² (12 AWG)	1.5 mm ² (14 AWG)
BMXCPS2010	30 m (98.4 ft)	20 m (65.6 ft)
BMXCPS3020(H) BMXCPS4022(H)	15 m (49.2 ft)	10 m (32.8 ft)

NOTE: You can double the maximum length for “there and back”.

Connection of Alternating Current Power Supply Modules

Introduction

This section presents the connection of BMXCPS2000, BMXCPS3500, and BMXCPS4002 alternating current power supply modules.

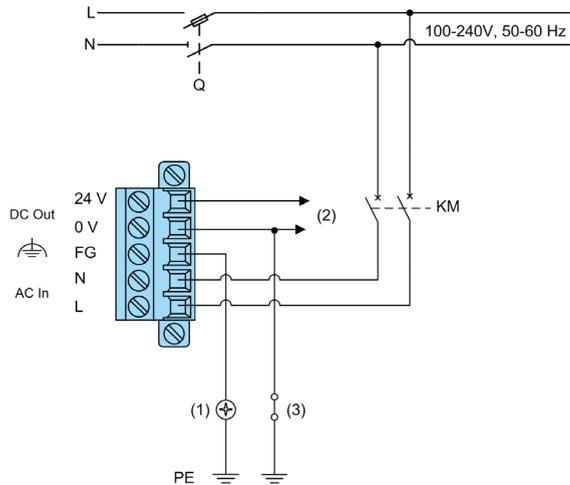
Line Protection

The power supply module is intended for use in low-voltage installations, in which the main power branch is protected on both wires by devices as fuses or breakers that limit the current to 15 A for North America and 16 A for the rest of the world. For details, refer to the description of standards and certifications (*see page 22*).

NOTE: The alternating current power supply modules are already equipped with a protective fuse. This fuse, connected at the input phase of the alternating current network, is inside the module and is not accessible.

BMXCPS2000 and BMXCPS3500 Wiring Diagram

The following diagram shows the 5-pin terminal block connections on to alternating current network:



- (1) Ground screw of the rack
- (2) Sensor power supply
- (3) Shielding connector kit
- FG Functional ground
- PE Protective earth
- N Neutral
- L Phase
- Q General isolator
- KM Line contactor or circuit breaker

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module (see page 108)*.

BMXCPS4002 Wiring Diagram

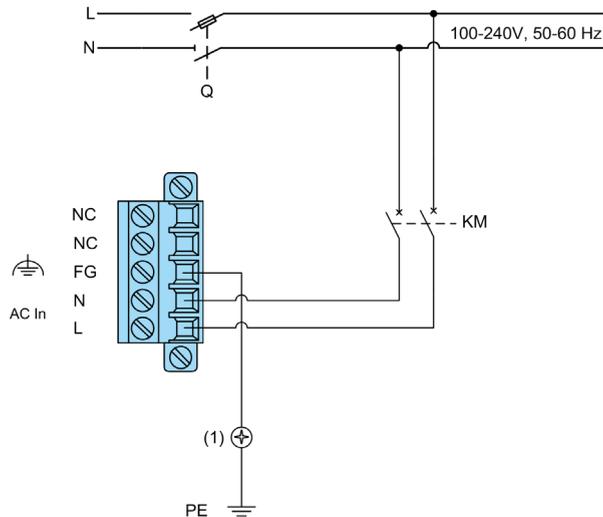
⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

Do not connect any wiring to connections designated as No connection (NC).

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

The following diagram shows the 5-pin terminal block connections on to alternating current network:



- (1) Ground screw of the rack
- NC No connection
- FG Functional ground
- PE Protective earth
- N Neutral
- L Phase
- Q General isolator
- KM Line contactor or circuit breaker

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module (see page 108)*.

Connection of Direct Current Power Supply Modules to a Floating Direct Current Network

Introduction

For a floating (non-grounded) assembly used in specific applications, marine applications in particular, an insulated power supply module must be chosen among the following references:

- BMXCPS2010 (24 Vdc)
- BMXCPS3020 (24...48 Vdc)
- BMXCPS4022 (24...48 Vdc)
- BMXCPS3540T (125 Vdc)
- BMXCPS3522 (125 Vdc)

A device can permanently measure the degree of 24 Vdc, 48 Vdc, or 125 Vdc insulation in relation to the ground and give an alert if the degree of insulation is abnormally low. All input/output modules in the Modicon X80 range are insulated.

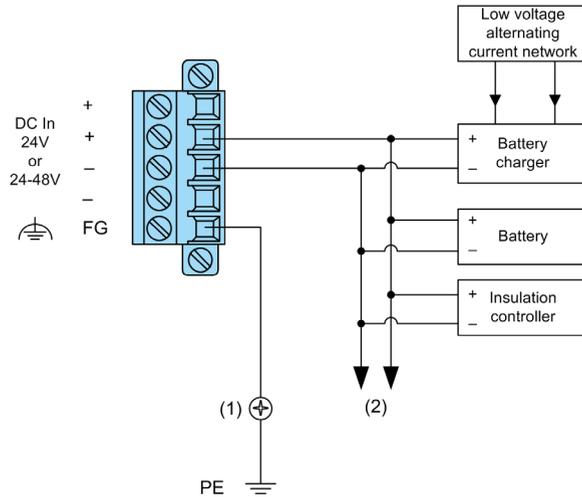
Line Protection

The power supply module is intended for use in low-voltage installations, in which the main power branch is protected on both wires by devices as fuses or breakers that limit the current to 15 A for North America and 16 A for the rest of the world. For details, refer to the description of standards and certifications (*see page 22*).

NOTE: The direct current power supply modules are already equipped with a protective fuse. This fuse, connected at input voltage, is inside the module and is not accessible.

BMXCPS2010, BMXCPS3020, and BMXCPS4022 Wiring Diagram

The following diagram shows the 5-pin terminal block connections on to a floating direct current network:



(1) Ground screw of the rack

(2) Floating network for the power supply of sensors, actuators and input/output modules

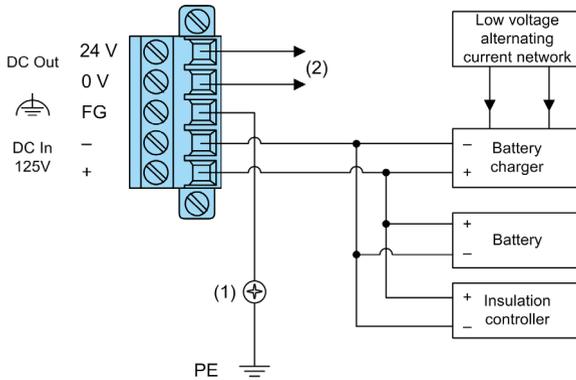
FG Functional ground

PE Protective earth

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module (see page 108)*.

BMXCPS3540T Wiring Diagram

The following diagram shows the 5-pin terminal block connections on to a floating direct current network:



- (1) Ground screw of the rack
- (2) 24 Vdc sensor power supply.
- FG Functional ground
- PE Protective earth

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module* (see page 108).

BMXCPS3522 Wiring Diagram

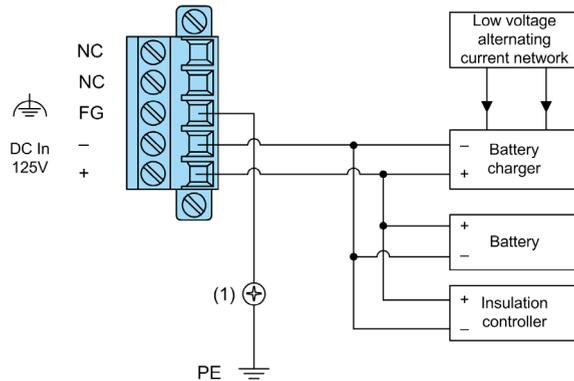
⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

Do not connect any wiring to connections designated as No connection (NC).

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

The following diagram shows the 5-pin terminal block connections on to a floating direct current network:



(1) Ground screw of the rack

NC No connection

FG Functional ground

PE Protective earth

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module* ([see page 108](#)).

Connection of Direct Current Power Supply Modules to an Alternating Current Network

Introduction

This section presents the connection of direct current power supply modules to an alternating current network:

- BMXCPS2010 (24 Vdc)
- BMXCPS3020 (24...48 Vdc)
- BMXCPS4022 (24...48 Vdc)
- BMXCPS3540T (125 Vdc)
- BMXCPS3522 (125 Vdc)

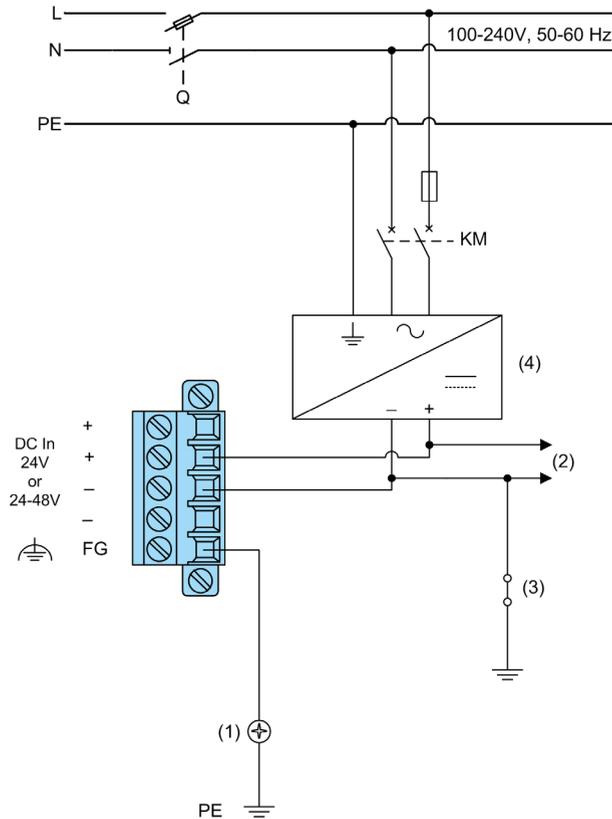
Line Protection

The power supply module is intended for use in low-voltage installations, in which the main power branch is protected on both wires by devices as fuses or breakers that limit the current to 15 A for North America and 16 A for the rest of the world. For details, refer to the description of standards and certifications (*see page 22*).

NOTE: The direct current power supply modules are already equipped with a protective fuse. This fuse, connected at input voltage, is inside the module and is not accessible.

BMXCPS2010, BMXCPS3020, and BMXCPS4022 Wiring Diagram

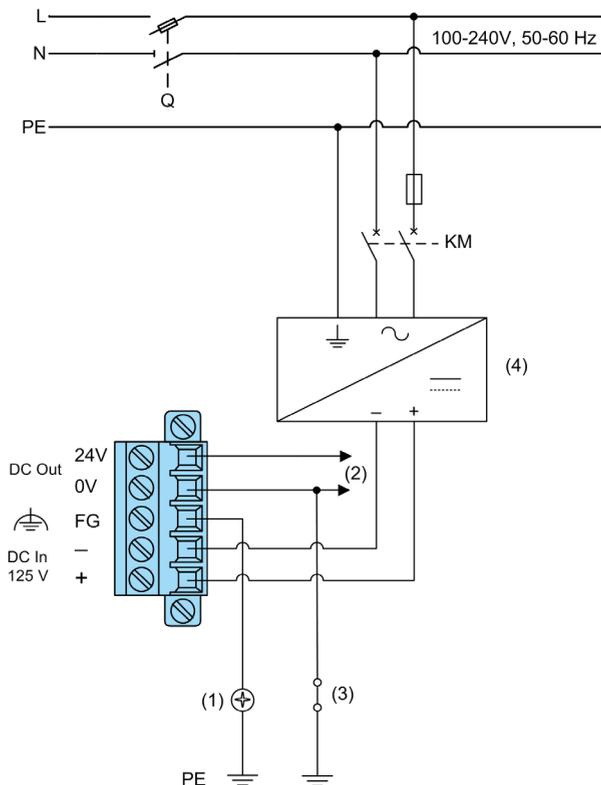
The following diagram shows the 5-pin terminal block connections on to a grounded alternating current network:



- (1) Ground screw of the rack
- (2) Sensor power supply
- (3) Shielding connector kit
- (4) Minimum basic insulation AC/DC converter
- FG Functional ground
- PE Protective earth
- N Neutral
- L Phase
- Q General isolator
- KM Line contactor or circuit breaker

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module* (see page 108).

BMXCPS3540T Wiring Diagram

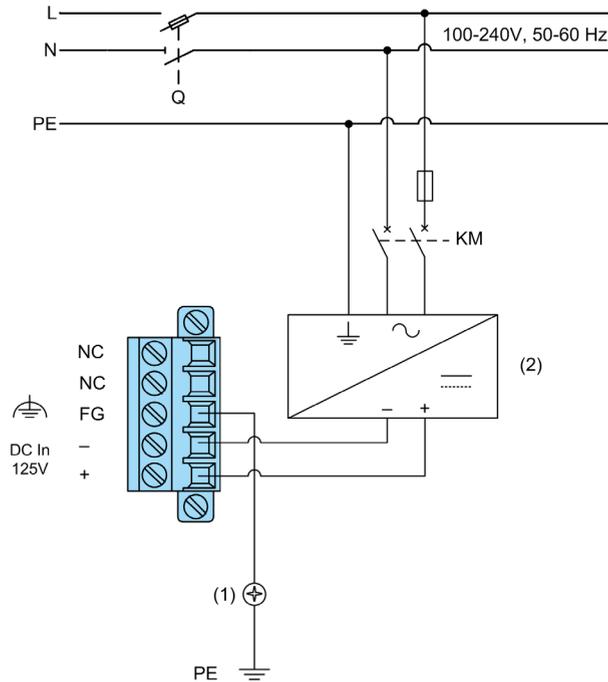


- (1) Ground screw of the rack
- (2) Sensor power supply
- (3) Shielding connector kit
- (4) Minimum basic insulation AC/DC converter
- FG** Functional ground
- PE** Protective earth
- N** Neutral
- L** Phase
- Q** General isolator
- KM** Line contactor or circuit breaker

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module* (see page 108).

BMXCPS3522 Wiring Diagram

The following diagram shows the 5-pin terminal block connections on to a grounded alternating current network:

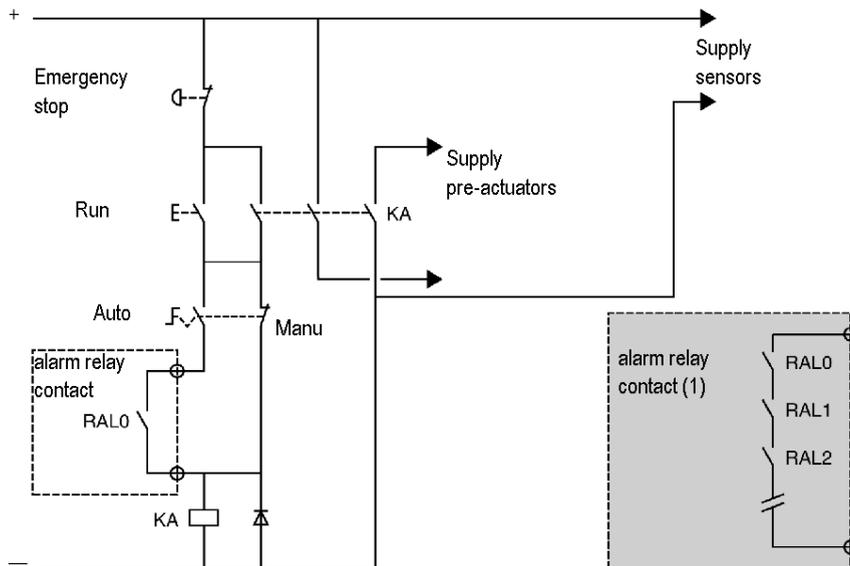


- (1) Ground screw of the rack
- (2) Minimum basic insulation AC/DC converter
- NC** Not connected
- FG** Functional ground
- PE** Protective earth
- N** Neutral
- L** Phase
- Q** General isolator
- KM** Line contactor or circuit breaker

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module (see page 108)*.

Example 2

The following diagram shows a PLC station supplied by direct current:



KA: contact controlled by alarm relay from supply module in AUTO run mode.

(1) When the PLC station is composed of several racks: set all the "alarm relay" contacts in series (RAL0, RAL1, RAL2, etc.).

Appendices



Appendix A

Removable Connectors Kit

Removable Connectors Kit

General

Power supply modules are supplied with cage clamp removable terminal blocks (one 5-pin and one 2-pin). To be ordered separately, two kits are on sale:

Kit reference	Terminal block type
BMXXTSCPS10	Cage clamp
BMXXTSCPS20	Spring

Each kit contains the following equipment:

- one 5-pin terminal block
- one 2-pin terminal block
- one guidance system

DANGER

HAZARD OF ELECTRIC SHOCK

Disconnect the power cable of the power supply module before plugging/unplugging its terminal block.

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

Guidance System

The guidance system prevents from inserting the 5-pin terminal block wired for a power line to a power supply module designed for another current network voltage.

DANGER

HAZARD OF ELECTRICAL SHOCK

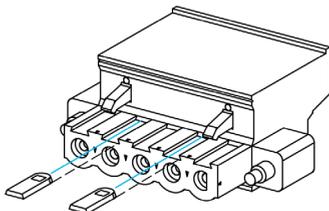
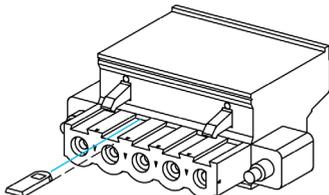
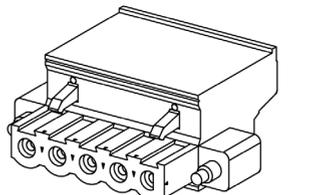
Ensure that the 5-pin terminal block of the power supply module is correctly keyed.

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

The guidance system prevents from connecting:

- a 5-pin terminal block wired for an alternating power line to a power supply module designed for a direct current network voltage.
- a 5-pin terminal block wired for a 125 Vdc power line to a power supply module designed for a 24 Vdc direct current network voltage.

The following table give the instructions to install the coding keys on 5-pin terminal blocks for each power supply module types:

Power line	Power Supply Module Reference	Instruction	Illustration
Alternating current (100...240 Vac)	BMXCPS2000 BMXCPS3500 BMXCPS3500H BMXCPS4002 BMXCPS4002H	Mount 2 coding keys in position 2 and 4.	
Direct current (125 Vdc)	BMXCPS3540T BMXCPS3522 BMXCPS3522H	Mount 1 coding key in position 2.	
Direct current (24 Vdc) and (24...48 Vdc)	BMXCPS2010 BMXCPS3020 BMXCPS3020H BMXCPS4022 BMXCPS4022H	No coding key	



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