

Modicon X80

Racks and Power Supplies

Hardware Reference Manual

Original instructions

EIO0000002626.06
08/2023

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Safety Information

Important Information

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



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



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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

Please Note

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

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

Before You Begin

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

▲ WARNING

UNGUARDED EQUIPMENT

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

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

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

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

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and

other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

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

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

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check are 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:

(In case of divergence or contradiction between any translation and the English original, the original text in the English language will prevail.)

- 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 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

Document Scope

EcoStruxure Plant is a Schneider Electric IIoT platform (Industrial Internet of Things) 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 Modicon M580 platforms, M340 platforms and X80 remote drops.

Validity Note

This document is valid for EcoStruxure™ Control Expert 16.0 or any subsequent supporting version(s).

The characteristics of the products described in this document are intended to match the characteristics that are available on www.se.com. As part of our corporate strategy for constant improvement, we may revise the content over time to enhance clarity and accuracy. If you see a difference between the characteristics in this document and the characteristics on www.se.com, consider www.se.com to contain the latest information.

Related Documents

| Title of documentation | Reference number |
|--|--|
| General Safety Instructions | EIO0000003905 (ENG), EIO0000003906 (FRE), EIO0000003907 (GER), EIO0000003908 (ITA), EIO0000003909 (SPA), EIO0000003910 (CHS) |
| Electrical installation guide | EIGED306001EN (ENG) |
| 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) |

| Title of documentation | Reference number |
|--|--|
| EcoStruxure™ Control Expert, System, Block Library | 33002539 (English), 33002540 (French), 33002541 (German), 33003688 (Italian), 33002542 (Spanish), 33003689 (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) |
| EcoStruxure Automation Device Maintenance user guide | EIO0000004033.05 (English), EIO0000004048.05 (French), EIO0000004046.05 (German), EIO0000004049.05 (Italian), EIO0000004047.05 (Spanish), EIO0000004050.05 (Chinese) |

You can download these technical publications, the present document and other technical information from domestic SE website"

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.

Modicon X80 Racks Description

Introduction

This chapter describes the Modicon X80 racks used for Modicon M580 platforms, M340 platforms and X80 remote drops in M580 architectures.

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

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 be part of a M580 Ethernet I/O architectures as an Ethernet remote I/O drop.

Functionalities

The Modicon X80 racks have the following functions:

| | |
|---------------------|---|
| Mechanical function | <p>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:</p> <ul style="list-style-type: none"> • In cabinets. • In the machine housings. • On panels. |
| Electrical function | <p>The racks provide:</p> <ul style="list-style-type: none"> • 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 the maximum limit of 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 dual X Bus and Ethernet 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 X Bus and Ethernet racks) | Yes | Yes | No |
| BMEXBP**02 (Redundant power supply racks) | Yes | Yes | Yes |

Modicon X80 Racks References

NOTE: These 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 (and its corresponding hardened version):

| Reference | | CPS slots | Module slots | | |
|---|---------------|-----------|--------------|--------------------|------------------|
| | | | Total | Ethernet and X Bus | X Bus (only) |
| Dual X Bus and Ethernet racks | BMXXBP0400(H) | 1 | 4 | – | 4 |
| | BMXXBP0600(H) | 1 | 6 | – | 6 |
| | BMXXBP0800(H) | 1 | 8 | – | 8 |
| | BMXXBP1200(H) | 1 | 12 | – | 12 |
| | BMXXBP1600(H) | 1 | 16 | – | 16 |
| Dual X Bus and Ethernet 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⁾ |
| <p>(1) X Bus connector (only) for the module slot number 02, 08, 10, and 11.</p> <p>(2) X Bus connector (only) for the module slot number 02, and 08.</p> | | | | | |

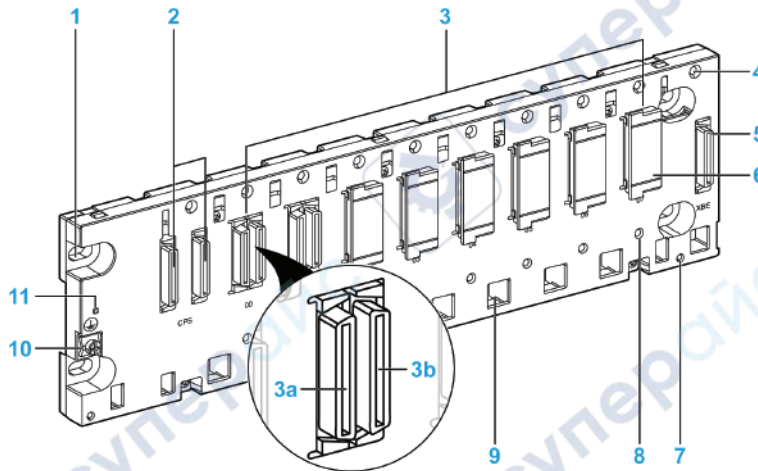
Compatibilities

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 X Bus and Ethernet racks , redundant power supply racks). NOTE: If the Ethernet backplane is not necessary, use BMXXBP**** PV:02 or any subsequent supporting version(s). The earlier versions do not work with M580 CPUs. |
| Modicon X80 I/O Drop in M580 architectures | All Modicon X80 rack references depending on the adapter module (CRA module). |

Modicon X80 Rack Description

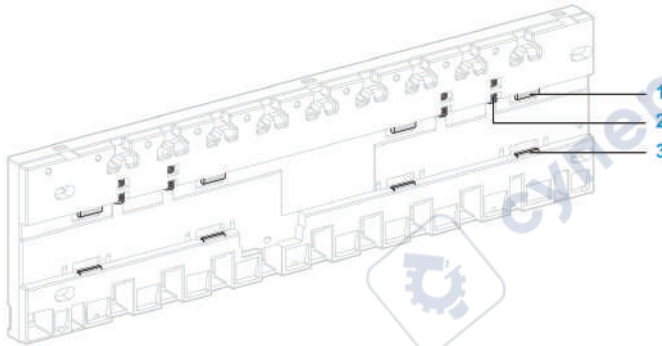
Front view of backplane (up to 12 module slots)



- 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.

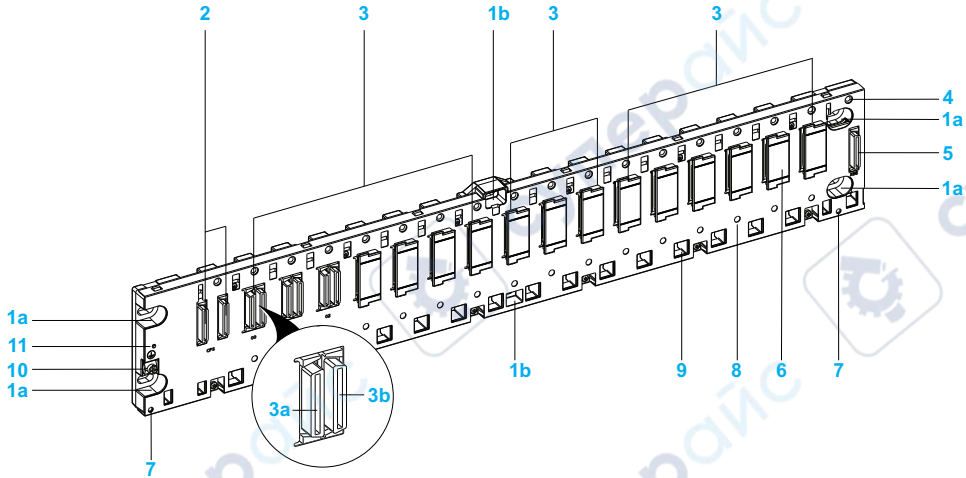
Rear view of backplane (up to 12 module slots)



- 1 Upper locking
- 2 Spring
- 3 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.

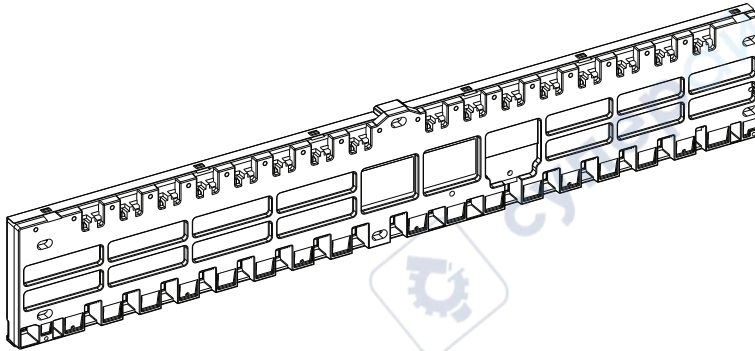
Front view of backplane (16 module slots)



- 1a** Panel mounting hole (x4)
- 1b** Panel mounting hole (x2), only for BMXXBP1600
- 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 of backplane (16 module slots)



NOTE: This rack cannot be mounted on a DIN rail.

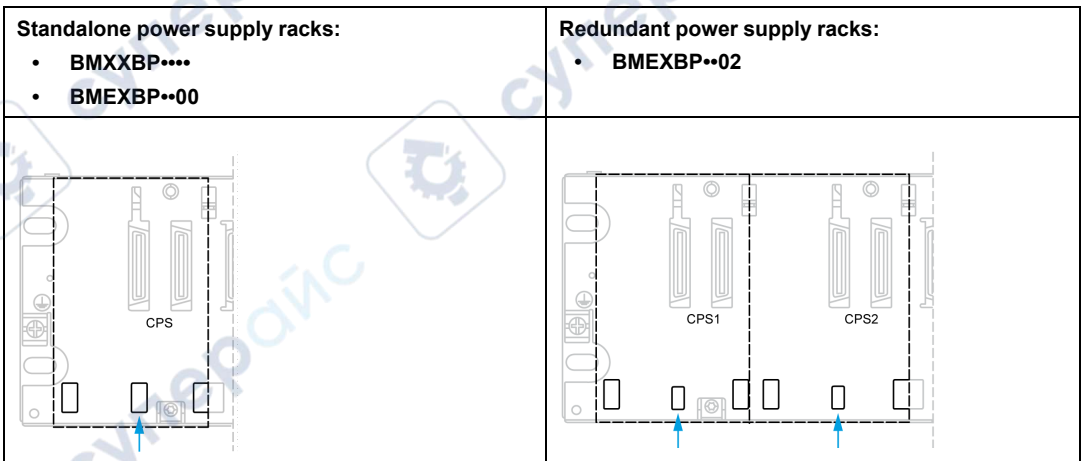
Power Supply Slots

The power supply slots are the leftmost slots on 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.



NOTE:

- Power supply slots are reserved for power supply modules only.
- A single power supply module can be used only on a single rack while a redundant power supply module is available for use in both single and redundant power supply racks.

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, page 15.

A keying hole (Front view of backplane (16 module slots), page 18, Front view of backplane (up to 12 module slots), page 19) is present on each module slot for the following rack references:

- BMXXBP**** (PV02 or any subsequent supporting version(s))
- BMEXBP**00
- BMEXBP**02

Some modules (M580 CPUs, eX80 modules, etc.) 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**** (PV02 or any subsequent supporting version(s)) rack.

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

Rack Extender Module Slot

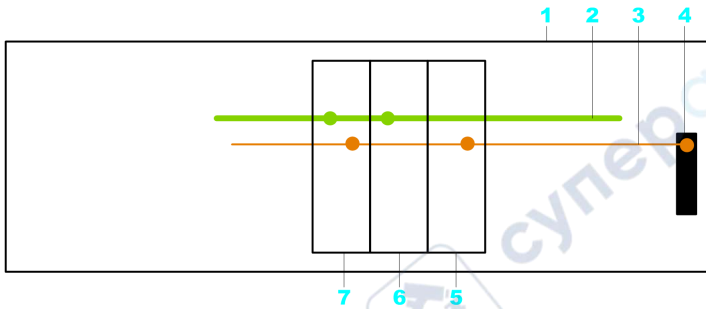
The module slot labeled **XBE** (rightmost module slot of the rack) is not a standard module slot. It is reserved for a BMXXBE1000 rack extender module. No other module type can be installed in the **XBE** slot.

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 Module only with X Bus connector
- 6 Module only with Ethernet bus connector
- 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

Rack Location

The address of a module is based on its physical location on a specific backplane (or its corresponding hardened version):

| Rack reference | Number of available module slots | 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 |
| BMXXBP1600(H) | 16 | 00 - 15 |

Standards and Certifications

Download

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

| Title | Languages |
|---|--|
| Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications | <ul style="list-style-type: none"> • English: EIO0000002726 • French: EIO0000002727 • German: EIO0000002728 • Italian: EIO0000002730 • Spanish: EIO0000002729 • Chinese: EIO0000002731 |

Electrical Characteristics

Introduction

The power supply modules installed in the X80 rack deliver two voltages (3.3 Vdc and 24 Vdc) to supply the backplane and connected modules.

Rack Power Consumption

The current consumption is in accordance with the rack references (and their corresponding hardened versions):

| Rack reference | Rack average current consumption | |
|----------------|--|---------------------|
| | 3.3 Vdc supply power | 24 Vdc supply power |
| BMXXBP0400(H) | 340 mA (1.12 W) | — |
| BMXXBP0600(H) | 510 mA (1.68W) | — |
| BMXXBP0800(H) | PV<03: 670 mA (2.21W) PV>=03: 40 mA (0.13W) | — |
| BMXXBP1200 | 50 mA (0.17 W) | — |
| BMXXBP1200H | 250 mA (0.83 W) | — |
| BMXXBP1600(H) | 51 mA (0.17 W) | — |
| BMEXBP0400(H) | 49 mA (0.16 W) | 118 mA (2.83 W) |
| BMEXBP0800(H) | 64 mA (0.21 W) | 164 mA (3.94 W) |
| BMEXBP1200(H) | 86 mA (0.28 W) | 164 mA (3.94 W) |
| BMEXBP0602(H) | 64 mA (0.21 W) | 164 mA (3.94 W) |
| BMEXBP1002(H) | 86 mA (0.28 W) | 164 mA (3.94 W) |

Mean Time Between Failures

The rack MTBF is a component of the global system MTBF. The value (hours) is in accordance with the rack references (and their corresponding hardened versions):

| Rack reference | MTBF (hours at 30 °C continuous) |
|-----------------------|---|
| BMXXBP0400 (H) | 4738887 |
| BMXXBP0600 (H) | 3705625 |
| BMXXBP0800 (H) | 3572194 |
| BMXXBP1200 (H) | 2961032 |
| BMXXBP1600 (H) | 2706433 |
| BMEXBP0400 (H) | 1588025 |
| BMEXBP0800 (H) | 1297516 |
| BMEXBP1200 (H) | 1166108 |
| BMEXBP0602 (H) | 1353797 |
| BMEXBP1002 (H) | 1184170 |

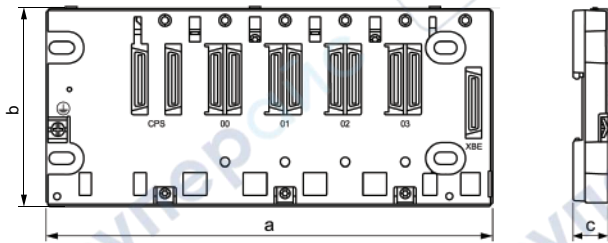
Dimensions

Height, Width, and Depth

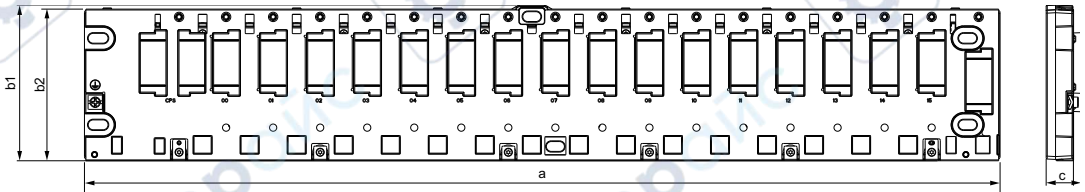
NOTE: The measurement values in the following tables apply to the listed backplane references and their corresponding hardened (*H*) versions.

The table below provides the width (*a*), height (*b*), and depth (*c*) measurements for BMEXBP•••• and BMXXBP•••• backplanes:

Backplane (up to 12 module slots)



Backplane (16 module slots)



NOTE: This diagram just for BMXXBP1600 (H).

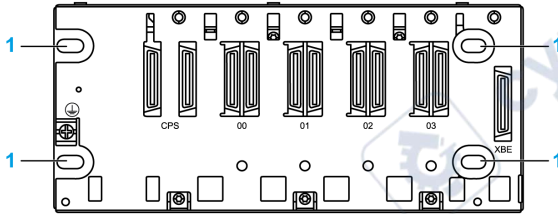
| Rack Type | | a | b | c |
|-------------------------------|---------------|--------------------------|-----------------------------|----------------------|
| X Bus racks | BMXXBP0400(H) | 242.4 mm (9.543 in.) | 103.7 mm (4.083 in.) | 19 mm (0.748 in.) |
| | BMXXBP0600(H) | 307.6 mm (12.110 in.) | | |
| | BMXXBP0800(H) | 372.8 mm (14.677 in.) | | |
| | BMXXBP1200(H) | 503.2 mm (19.811 in.) | | |
| | BMXXBP1600(H) | 634.6 mm (24.984 in.) | b1:108.01 mm (4.252 in.) | |
| b2:105.11 mm (4.138 in.) | | | | |
| Dual X Bus and Ethernet racks | BMEXBP0400(H) | 242.4 mm (9.543 in.) | 105.11 mm (4.138 in.) | 19 mm (0.748 in.) |
| | BMEXBP0800(H) | 372.8 mm (14.677 in.) | | |
| | BMEXBP1200(H) | 503.2 mm (19.811 in.) | | |
| Redundant power supply racks | BMEXBP0602(H) | 375.8 mm (14.795 in.) | 105.11 mm (4.138 in.) | 19 mm (0.748 in.) |
| | BMEXBP1002(H) | 506.2 mm (19.929 in.) | | |

NOTE: Depending on the modules installed on the rack, the overall size of an X80 I/O platform (the rack with modules installed) may be higher than the dimension of the rack itself. To estimate the overall size, refer to the directions for planning and installing Modicon X80 racks, page 32 .

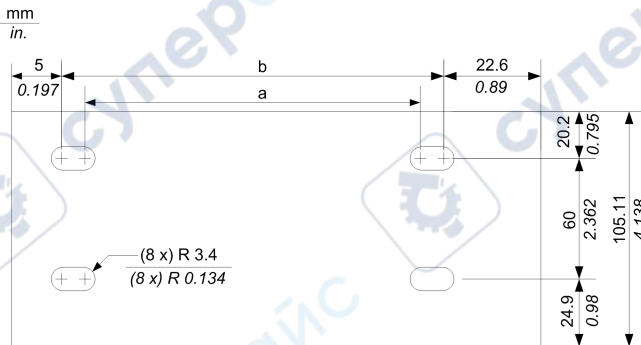
Panel Fastening Holes Dimension and Location

Backplane (up to 12 module slots)

For this backplane, the fastening holes are located at the four corners of the rack:



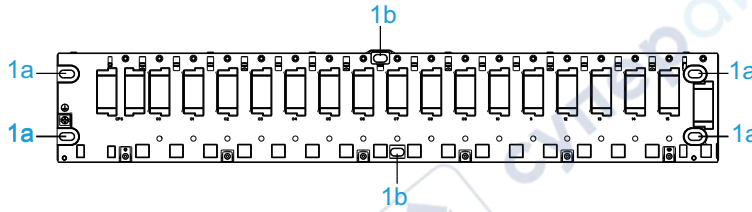
1 Fastening holes



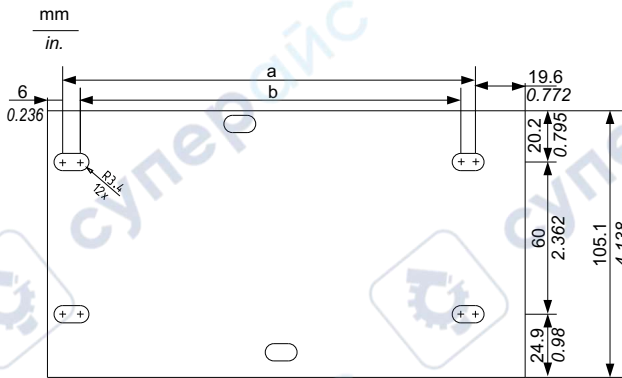
NOTE: Use M4, M5, M6, or UNC #6 screws in the fastening holes.

Backplane (16 module slots)

For this backplane, the fastening holes are located at the four corners and center of the rack:



1 Fastening holes



NOTE: Use only M5 and M6 screws to fasten rack, use hexagon socket head cap screws (corresponds to ISO4762) for middle holes .

These values correspond to the width (a) and height (b) measurements 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 (10.531 in.) | 280 mm (11.023 in.) |
| | BMXXBP0800(H) | 332.5 mm (13.091 in.) | 345.2 mm (13.591 in.) |
| | BMXXBP1200(H) | 462.9 mm (18.224 in.) | 475.6 mm (18.724 in.) |
| | BMXXBP1600(H) | 596.3mm (23.476 in.) | 609 mm (23.976 in.) |
| Dual X Bus and Ethernet racks | BMEXBP0400(H) | 202.1 mm (7.957 in.) | 214.8 mm (8.457 in.) |
| | BMEXBP0800(H) | 332.5 mm (13.091 in.) | 345.2 mm (13.591 in.) |
| | BMEXBP1200(H) | 462.9 mm (18.224 in.) | 475.6 mm (18.724 in.) |
| Redundant power supply racks | BMEXBP0602(H) | 332.5 mm (13.091 in.) | 345.2 mm (13.591 in.) |
| | BMEXBP1002(H) | 462.9 mm (18.224 in.) | 475.6 mm (18.724 in.) |

Firmware Update with Automation Device Maintenance

Overview

The EcoStruxure™ Automation Device Maintenance is a standalone tool that allows and simplifies the firmware update of devices in a plant (single or multiple).

The tool supports the following features:

- Automatic device discovery
- Manual device identification
- Certificate management
- Firmware update for multiple devices simultaneously

NOTE: For a description of the download procedure, refer to the *EcoStruxure™ Automation Device Maintenance, User Guide*.

Rack Firmware Update with Unity Loader

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
- BMECRA31•10 (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 **.ldx* 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.

Modicon X80 Racks Installation

Overview

This chapter explains how to install Modicon X80 racks.

Local Rack Installation

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.

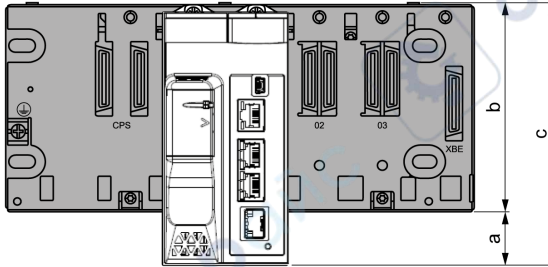
NOTE: Other rack mounting positions may cause overheating and unexpected equipment operation.

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

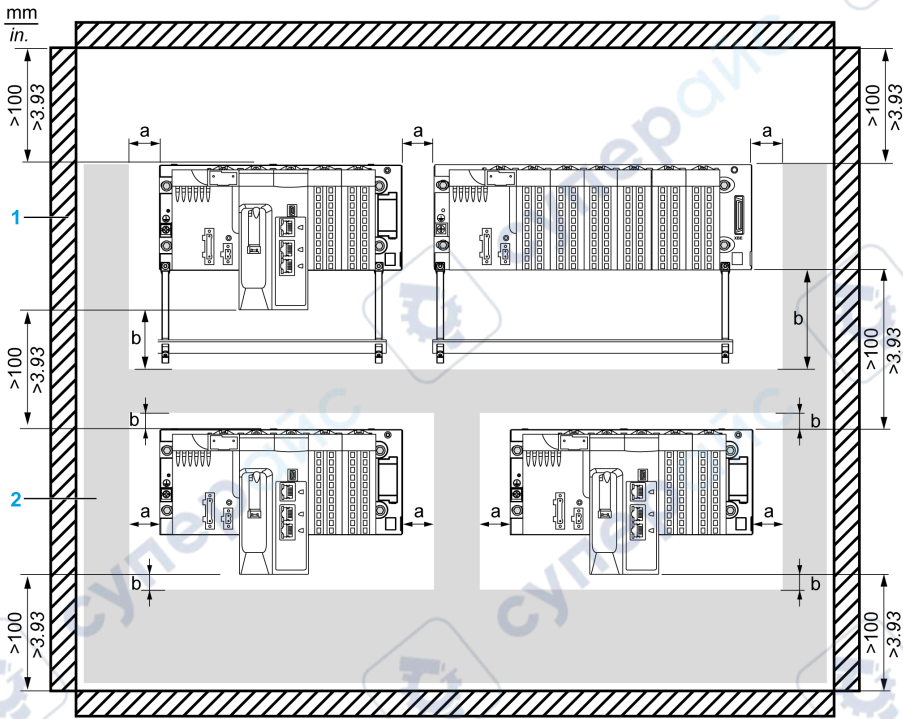
OVERHEATING AND UNEXPECTED EQUIPMENT OPERATION

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

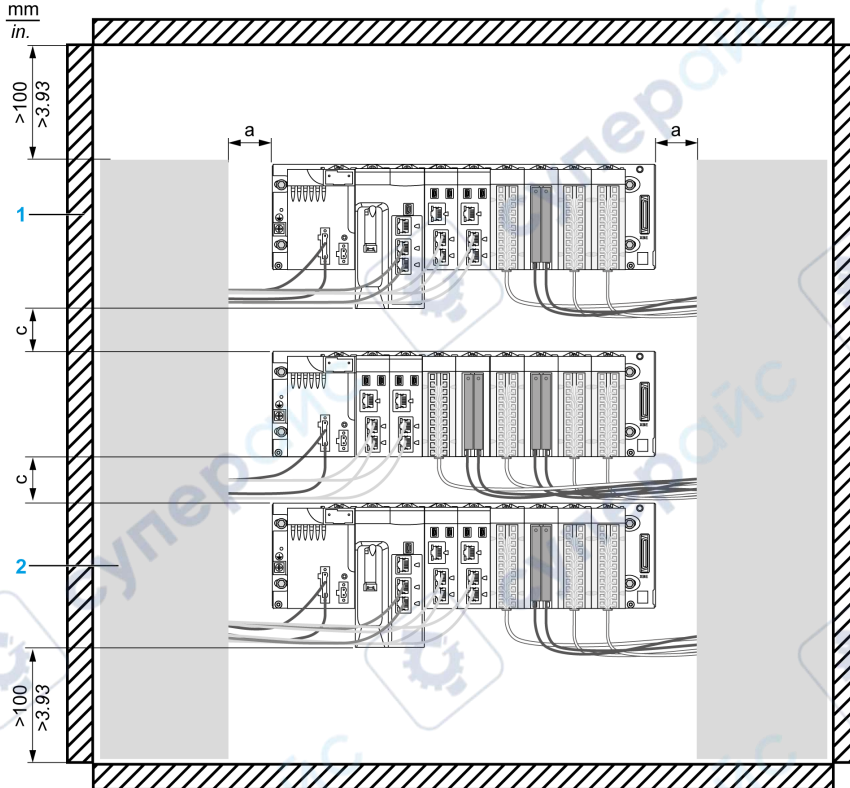
a side clearance: > 40 mm (1.57 in.)

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

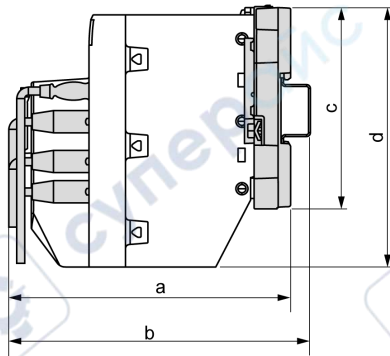
When you plan to install the racks inside an enclosure, leave a minimum space in front of the modules. The dimensions of each type of X80 modules are provided in Appendix B.

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

Rack Mount

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 rack on one of the following DIN rails:

| Symmetric DIN rail | | Double-profile DIN rail |
|--------------------|--------|-------------------------|
| Type A | Type B | |
| | | |

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.

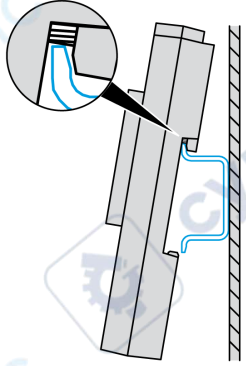
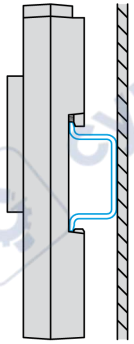
NOTICE

EQUIPMENT DAMAGE

Do not mount BMXXBP1200 (H), BMXXBP1600 (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 | <p>Position the upper DIN-rail locking mechanism at the rear of the rack as illustrated.</p> <p>Press down on the rear section of the rack in order to compress the springs.</p> |  |
| 2 | <p>Rotate the rack to the DIN rail until it clicks.</p> |  |

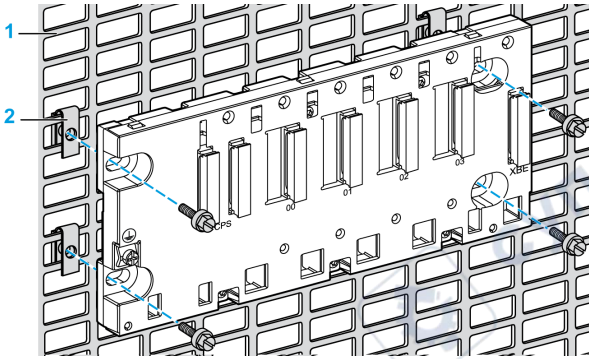
To remove a rack from a DIN rail:

| 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, page 27.

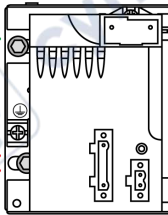
You can also mount a rack on a Telequick mounting plate NSYMR** using clip-on nuts:



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.

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.

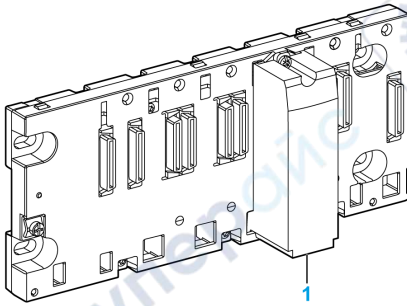
BMXXEM010 covers are sold in sets of 5.

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.
- Tightening torque: 0.4...1.5 N•m (0.30...1.10 lbf-ft).

A cover is placed on an unused module slot in a rack as follows:



1 BMXXEM010 cover

Shielding Connection Kit

Introduction

Use the BMXXSP•••• shielding connection kit 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
- XBT console to the processor (with a shielded USB cable)

Kit References

Each shielding connection kit includes the following components:

- A metal bar
- Two sub-bases

The shielding connection kit reference is dependent on the size of the Modicon X80 rack (and its corresponding hardened version):

| X Bus racks/Dual X Bus and Ethernet racks | Number of slots | Shielding Connection Kit |
|---|-----------------|--------------------------|
| BMXXBP0400(H) | 4 | BMXXSP0400 |
| BMEXBP0400(H) | | |
| BMXXBP0600(H) | 6 | BMXXSP0600 |
| BMXXBP0800(H) | 8 | BMXXSP0800 |
| BMEXBP0800(H) | | |
| BMXXBP1200(H) | 12 | BMXXSP1200 |
| BMEXBP1200(H) | | |
| BMXXBP1600(H) | 16 | BMXXSP1600 |

| Redundant power supply racks | Number of slots | Shielding Connection Kit |
|------------------------------|-----------------|--------------------------|
| BMEXBP0602(H) | 6 | BMXXSP0800 |
| BMEXBP1002(H) | 10 | 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.

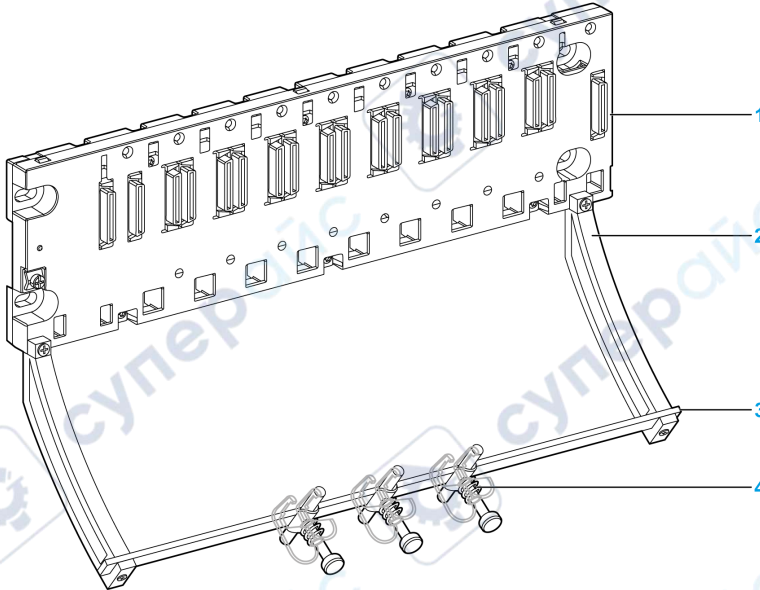
Depending on the cable diameter, the clamping rings are available under the following references:

- 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

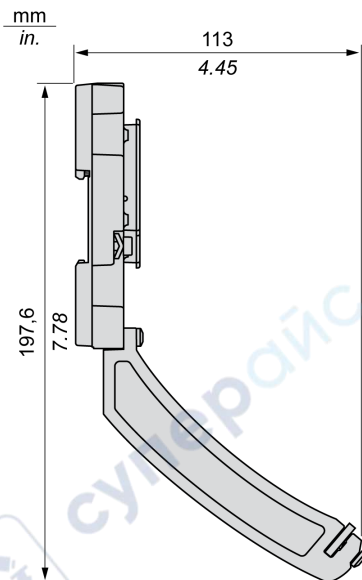
Tightening torques to install the shielding connection kit:

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

BMXXBE1000 Rack Extender Module

Introduction

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

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(H) | 3 |
| BMEP582020(H) | |
| BMEP582040(H) | |
| BMEP583020 | 7 |
| BMEP583040 | |
| BMEP584020 | |
| BMEP584040 | |
| BMEP585040(C) | |
| BMEP586040(C) | |

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, page 53, 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:

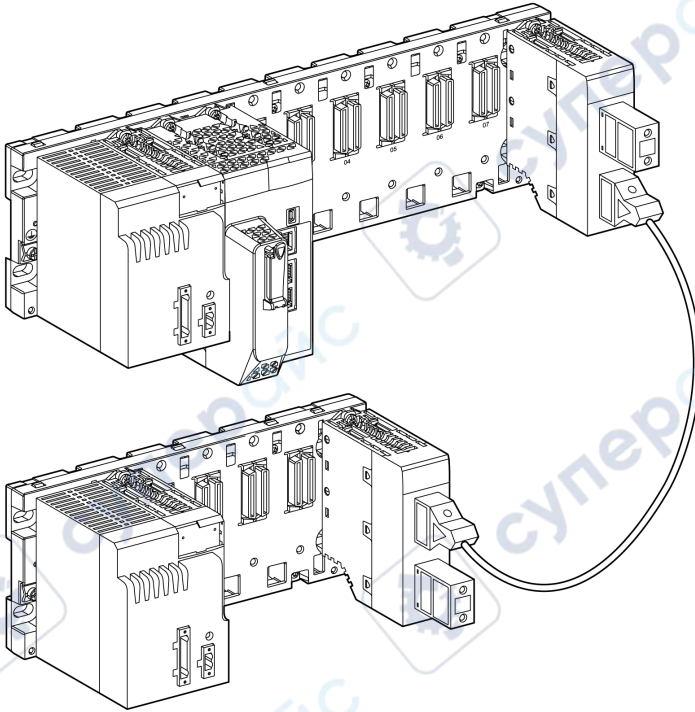
| Station | | Maximum number of X80 extended racks |
|----------------|---|--------------------------------------|
| Processor | OS Version | |
| BMXP341000(H) | 01.00 | 1 |
| | 02.00 any subsequent supporting version (s) | 2 |
| BMXP342000 | 02.00 any subsequent supporting version (s) | 4 |
| BMXP342010 | 01.00 | 1 |
| | 02.00 any subsequent supporting version (s) | 4 |
| BMXP3420102 | 01.00 | 1 |
| | 02.00 any subsequent supporting version (s) | 4 |
| BMXP342020(H) | 01.00 | 1 |
| | 02.00 any subsequent supporting version (s) | 4 |
| BMXP342030 | 01.00 | 1 |
| | 02.00 any subsequent supporting version (s) | 4 |
| BMXP3420302(H) | 01.00 | 1 |
| | 02.00 any subsequent supporting version (s) | 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, page 53, 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:



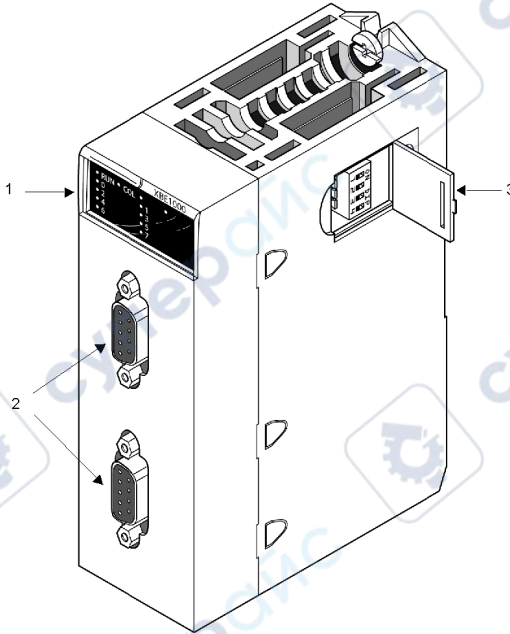
NOTE:

- 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.

Extender Module

Physical Description

A BMXXBE1000(H) rack extender module contains an 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 four micro-switches 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. |

Rack Extender Module Consumption

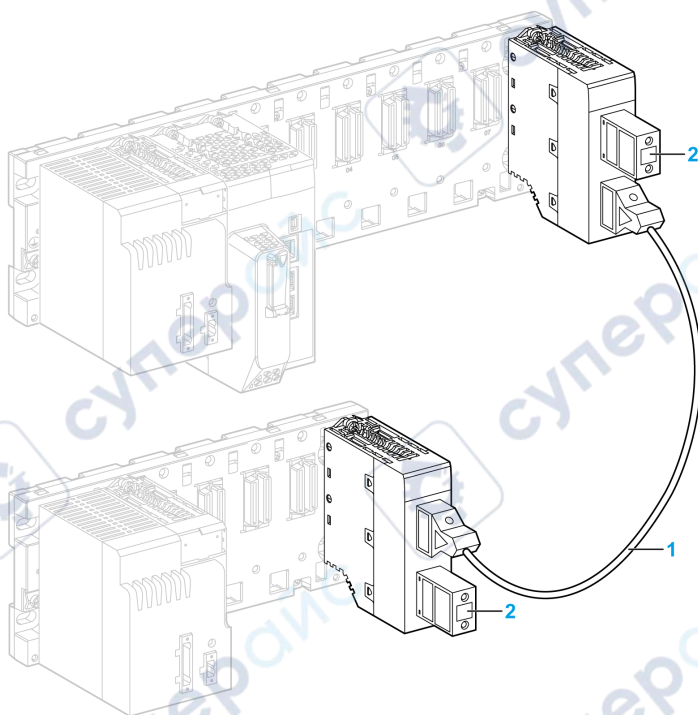
This table shows the power consumed by the BMXXBE1000 extender module:

| 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 BMXXBE0100 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.)

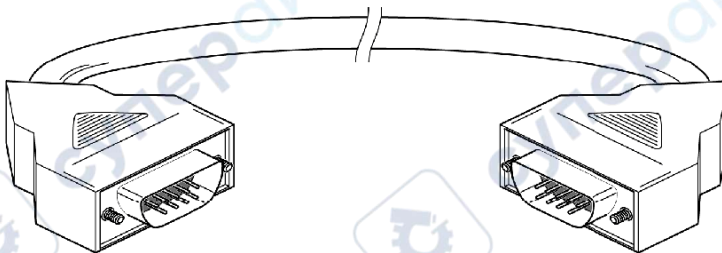
Failure to follow these instructions can result in injury or equipment damage.

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 BMXXBC•••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:

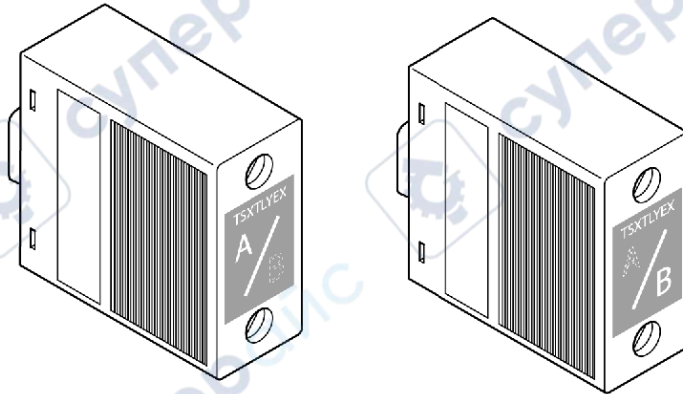
| Cable reference | | Length |
|---------------------|-------------|-----------------|
| Straight connectors | TSXCBY010K | 1 m (3.28 ft) |
| | TSXCBY030K | 3 m (9.84 ft) |
| | TSXCBY050K | 5 m (16.40 ft) |
| | TSXCBY120K | 12 m (39.37 ft) |
| | TSXCBY180K | 18 m (59.05 ft) |
| | TSXCBY280KT | 28 m (91.86 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

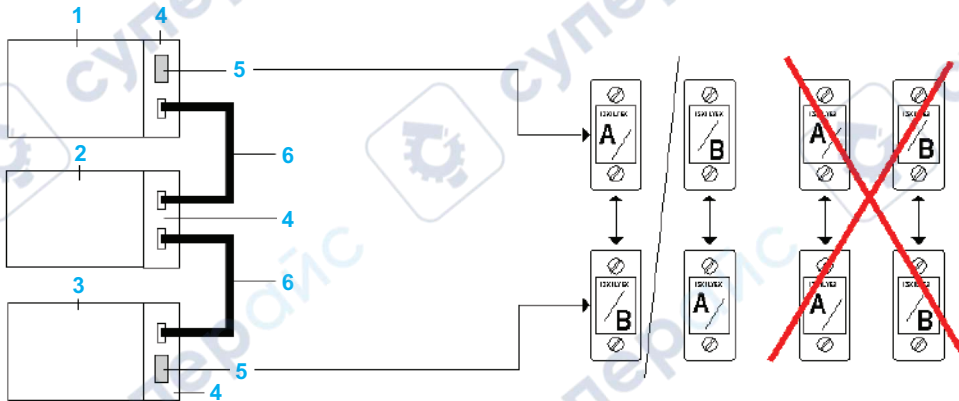
Insertion or extraction of a line terminator must only be done with all the station racks switched off.

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.

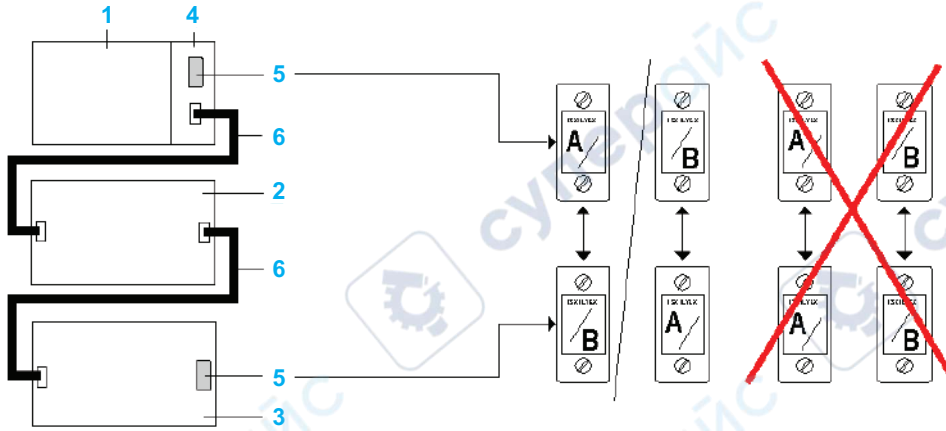
The following figures illustrates the possible choices to install the TSXTLYEX line terminators according to their label in different bus extensions.

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

Extender Module Installation

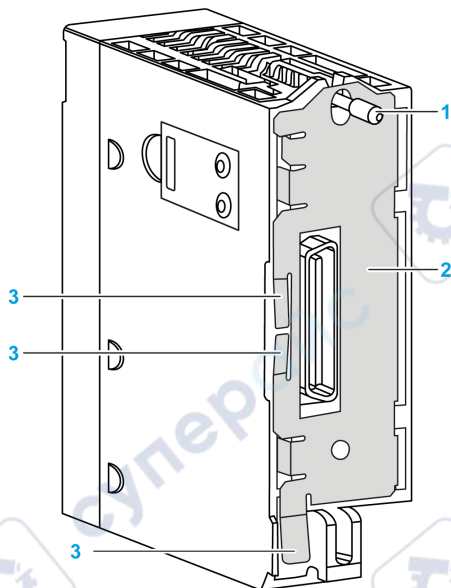
Introduction

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.

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, page 106.

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

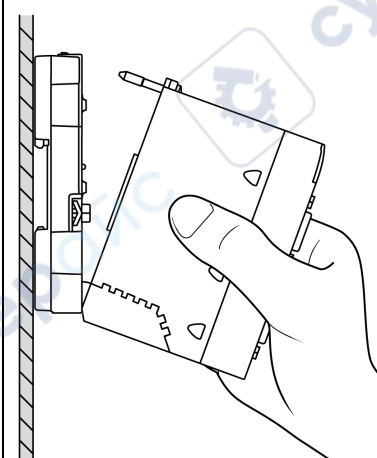
⚡ ⚠ DANGER

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, page 49. 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). | |
| 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 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 (0.30...1.10 lbf-ft)</p> |  |

| Step | Action |
|------|--|
| 5 | <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>▲ WARNING</p> <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> </div> <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> |

Modicon X80 Power Supply Modules Description

Introduction

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

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.

For more information, refer to chapter *Installation in more Severe Environments* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

NOTE: The power supply module 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 power supply management library (see EcoStruxure™ Control Expert, System, Block Library).

Physical Description

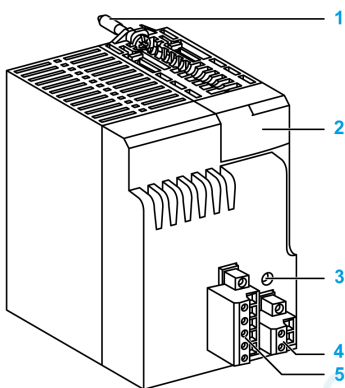
Introduction

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.

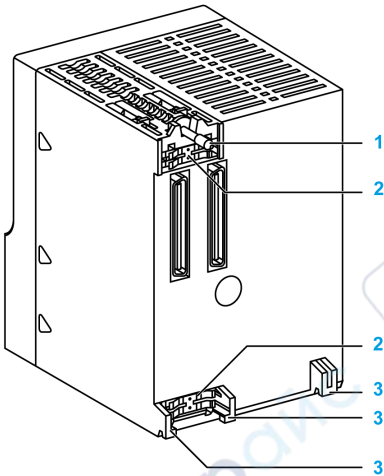
The power supply modules are delivered with two removable terminal blocks.

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

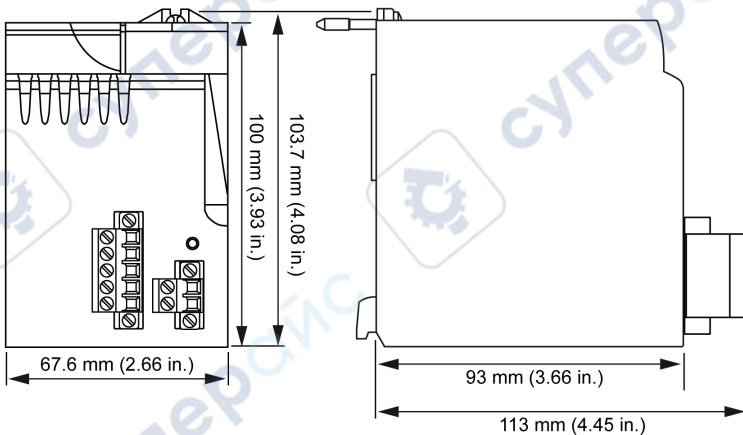
Rear View



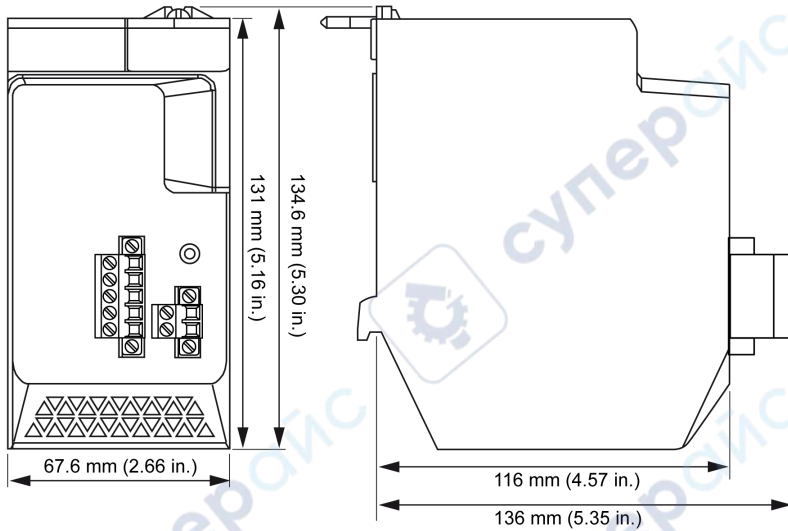
- 1 Mounting screw
- 2 Contact strips for EMC
- 3 Locating pins

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 | <ul style="list-style-type: none"> • 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, page 132.


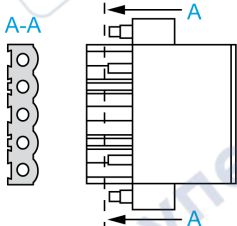
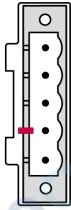
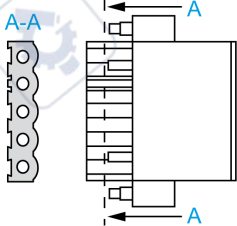
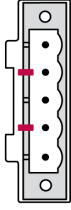
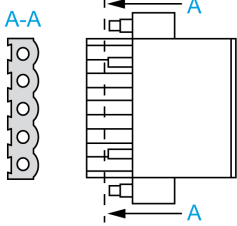
Characteristics:

| | |
|----------------------------|--|
| 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, page 111. |
| 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, page 132, 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:

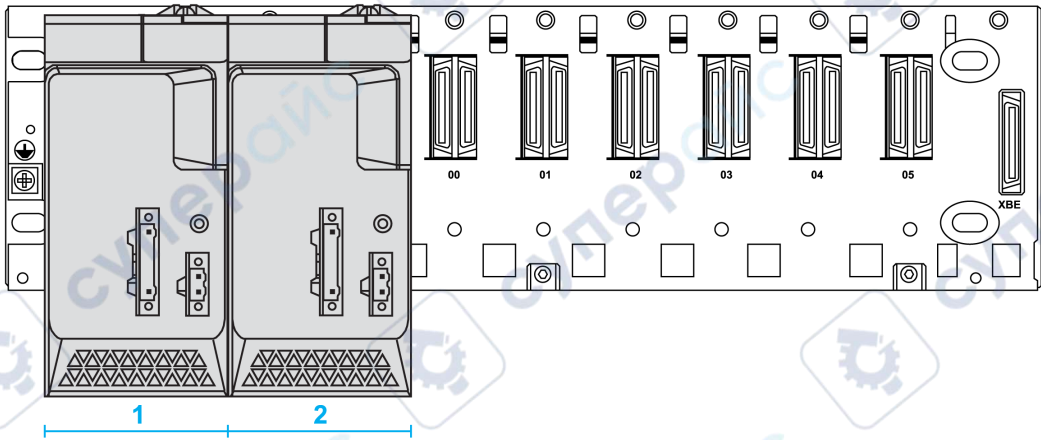
- Each of the two redundant power supply modules in a rack is either the master or the slave.
- An internal diagnostic (voltage and current) for each of the power supply modules.
- An inter-communication between the two redundant power supply modules in a rack to increase the diagnostic level.
- A redundancy 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, 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 BMECRA31•10 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 BMECRA31•10 modules.

If the redundant power supply module is on a remote rack using an (e)x80 BMECRA31•10 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.

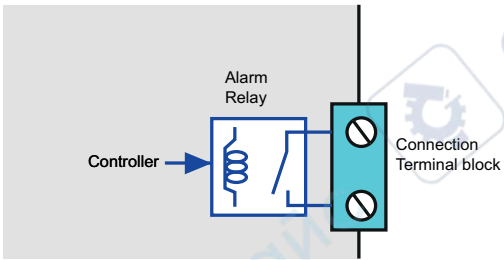
NOTE:

- 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 power supply management library (see EcoStruxure™ Control Expert, System, Block Library).

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. |

| Relay Status | Conditions |
|--|------------------------------------|
| 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 $\cos \Phi = 0.7$ | $\geq 100,000$ cycles |
| | | 200 Vac / 0.4 A 240 Vac / 0.3 A $\cos \Phi = 0.7$ | $\geq 300,000$ cycles |
| | | 200 Vac / 1 A 240 Vac / 0.5 A $\cos \Phi = 0.35$ | $\geq 100,000$ cycles |
| | | 200 Vac / 0.3 A 240 Vac / 0.15 A $\cos \Phi = 0.35$ | $\geq 300,000$ 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 |
| | | 20 million cycles | |
| Mechanical | 20 million cycles | | |

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 that 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 | |
| <ul style="list-style-type: none">• 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.

Modicon X80 Power Supply Modules Characteristics

Introduction

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

Characteristics of the BMXCPS2000 Power Supply Module

Introduction

The BMXCPS2000 module is an alternating current power supply module.

Altitude Operating Conditions

The characteristics in the table below apply to the BMXCPS2000 power supply module for use at altitude up to 2000 m (6560 ft). When the power supply module operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

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 ² t at locking | ≤ 0.5 A ² s at 120 Vac ≤ 2 A ² s at 240 Vac |
| | | I _t 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 |
| | | Maximum current | 2.5 A |
| | | Power (maximum) | 8.3 W |
| | 24V_BAC output | Nominal voltage | 24 Vdc |
| | | Maximum current | 0.7 A |
| | | Power (maximum) | 16.5 W |
| | 24V_SENSORS output | Nominal voltage | 24 Vdc |
| | | Maximum current | 0.45 A |
| Power (maximum) | | 10.8 W | |
| 3V3_BAC, 24V_BAC and 24V_SENSORS 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 strength at 50 Hz-1mn | 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 | ≥ 100 MΩ |

| | | |
|--|-------------------------|----------------------------|
| | Primary/ground | $\geq 100 \text{ M}\Omega$ |
| Operating temperature | 0...60 °C (32...140 °F) | |
| (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(H) Power Supply Module

Introduction

The BMXCPS3500(H) module is alternating current power supply module.

Altitude Operating Conditions

The characteristics in the table below apply to the BMXCPS3500 and BMXCPS3500H power supply modules for use at altitude up to 2000 m (6560 ft). When the power supply modules operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

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 | $\leq 30 \text{ A}$ at 120 Vac $\leq 60 \text{ A}$ at 240 Vac |
| | I ² t | $\leq 1 \text{ A}^2\text{s}$ at 120 Vac | |

| | | | |
|--|--|---|---|
| | | at locking | $\leq 3 \text{ A}^2\text{s}$ at 240 Vac |
| | | It | $\leq 0.05 \text{ As}$ at 120 Vac |
| | | at locking | $\leq 0.07 \text{ As}$ at 240 Vac |
| | Acceptable duration of power interruptions | | $\leq 10 \text{ ms}$ |
| | 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 |
| | | Maximum current | 4.5 A |
| | | Power (maximum) | 15 W |
| | 24V_BAC output | Nominal voltage | 24 Vdc |
| | | Maximum current | 1.3 A |
| | | Power (maximum) | 31.2 W |
| | 24V_SENSORS output | Nominal voltage | 24 Vdc |
| | | Maximum current | 0.9 A |
| | | Power (maximum) | 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 |
| 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 | 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 | $\geq 100 \text{ M}\Omega$ |
| Operating temperature | BMXCPS3500 | 0...60 °C (32...140 °F) | |

| | | |
|--|-------------|----------------------------|
| | BMXCPS3500H | -25...70 °C (-13...158 °F) |
| (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

Introduction

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

Altitude Operating Conditions

The characteristics in the table below apply to the BMXCPS3540T power supply module for use at altitude up to 2000 m (6560 ft). When the power supply module operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

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 ² t 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 |
| | | Maximum current | 4.5 A |
| | | Power (maximum) | 15 W |
| | 24V_BAC output | Nominal voltage | 24 Vdc |
| | | Maximum current | 1.3 A |
| | | Power (maximum) | 31.2 W |
| | 24V_SENSORS output | Nominal voltage | 24 Vdc |
| | | Maximum current | 0.9 A |
| Power (maximum) | | 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 |
| 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 | 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 | ≥ 100 MΩ |
| | | Primary/ground | ≥ 100 MΩ |
| Operating temperature | | -25...70 °C (-13...158 °F) | |
| (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

Introduction

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

Altitude Operating Conditions

The characteristics in the table below apply to the BMXCPS2010 power supply module for use at altitude up to 2000 m (6560 ft). When the power supply module operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

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 ² t at locking | ≤ 0.6 A ² s at 24 Vdc |
| | | I ^t 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 |
| | | Maximum current | 2.5 A |
| | | Power (maximum) | 8.3 W |
| | 24V_BAC output | Nominal voltage | 24 Vdc |
| | | Maximum current | 0.7 A |
| | | Power (maximum) | 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 | 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 | $\geq 10 \text{ M}\Omega$ |
| Operating temperature | | 0...60 °C (32...140 °F) | |
| (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(H) Power Supply Module

Introduction

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

Altitude Operating Conditions

The characteristics in the table below apply to the BMXCPS3020 and BMXCPS3020H power supply module for use at altitude up to 2000 m (6560 ft). When the power supply module operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

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 ² t 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 |
| | | Maximum current | 4.5 A |
| | | Power (maximum) | 15 W |
| | 24V_BAC output | Nominal voltage | 24 Vdc |
| Maximum current | | 1.3 A | |

| | | | |
|---|---------------------------------------|---|------------|
| | | Power (maximum) | 31.2 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 | Primary/secondary (24V_BAC/3V3_BAC) | 1,500 Vrms |
| | | Primary/ground | 1,500 Vrms |
| | Insulation resistance | Primary/secondary | ≥ 10 MΩ |
| | | Primary/ground | ≥ 10 MΩ |
| Operating temperature | BMXCPS3020 | 0...60 °C (32...140 °F) | |
| | BMXCPS3020H | -25...70 °C (-13...158 °F) | |
| (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(H) Redundant Power Supply Module

Introduction

The BMXCPS4002(H) module is a redundant alternating current power supply module.

Altitude Operating Conditions

The characteristics in the table below apply to the BMXCPS4002 and BMXCPS4002H power supply modules for use at altitude up to 2000 m (6560 ft). When the power supply modules operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

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 | |
| | | I _t 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 | |
| | | Maximum current | 5 A | |
| | | Power (maximum) | 16.5 W | |
| | 24V_BAC output | Nominal voltage | 24 Vdc | |
| | | Maximum current | 1.67 A | |
| | | Power (maximum) | 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 | | |
| Isolation | Dielectric resistance at 50 Hz-1mn | Primary/secondary (24V_BAC/3V3_BAC) | 3,000 Vrms | |

| | | | |
|---|-----------------------|----------------------------|----------------------------|
| | | Primary/ground | 1,500 Vrms |
| | Insulation resistance | Primary/secondary | $\geq 100 \text{ M}\Omega$ |
| | | Primary/ground | $\geq 100 \text{ M}\Omega$ |
| Operating temperature | BMXCPS4002 | 0...60 °C (32...140 °F) | |
| | BMXCPS4002H | -25...70 °C (-13...158 °F) | |
| (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 BMXCPS4022(H) Redundant Power Supply Module

Introduction

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

Altitude Operating Conditions

The characteristics in the table below apply to the BMXCPS4022 and BMXCPS4022H power supply modules for use at altitude up to 2000 m (6560 ft). When the power supply modules operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

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 | |
| | | Maximum current | 5 A | |
| | | Power (maximum) | 16.5 W | |
| | 24V_BAC output | Nominal voltage | 24 Vdc | |
| | | Maximum current | 1.67 A | |
| | | Power (maximum) | 40 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 | Primary/secondary (24V_ BAC/3V3_BAC) | 3,000 Vrms |
| | | Primary/ground | 1,500 Vrms |
| | Insulation resistance | Primary/secondary | ≥ 100 MΩ |
| | | Primary/ground | ≥ 100 MΩ |
| Operating temperature | BMXCPS4022 | 0...60 °C (32...140 °F) | |
| | BMXCPS4022H | -25...70 °C (-13...158 °F) | |
| (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(H) Redundant Power Supply Module

Introduction

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

Altitude Operating Conditions

The characteristics in the table below apply to the BMXCPS3522 and BMXCPS3522H power supply modules for use at altitude up to 2000 m (6560 ft). When the power supply modules operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications).

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 | $\leq 0.15 \text{ A}^2\text{s}$ at 125 Vdc |
| | | I_t at locking | $\leq 0.025 \text{ As}$ at 125 Vdc |
| | Acceptable duration of power interruptions at: | | $\leq 1 \text{ ms}$ |
| | <ul style="list-style-type: none"> • full load, and • minimum input voltage (i.e. 100 Vdc), and • full temperature range | | |
| | Acceptable duration of power interruptions at: | | $\leq 10 \text{ ms}$ |
| <ul style="list-style-type: none"> • full load, and • nominal input voltage (i.e. 125 Vdc), and • full temperature range | | | |
| 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 |
| | | Maximum current | 5 A |
| | | Power (maximum) | 16.5 W |
| | 24V_BAC output | Nominal voltage | 24 Vdc |
| | | Maximum current | 1.67 A |
| | | Power (maximum) | 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 |
| Isolation | Dielectric resistance at 50 Hz-1mn | Primary/secondary (24V_BAC/3V3_BAC) | 3,000 Vrms |
| | | Primary/ground | 1,500 Vrms |
| | Insulation resistance | Primary/secondary | $\geq 100 \text{ M}\Omega$ |
| | | Primary/ground | $\geq 100 \text{ M}\Omega$ |

| | | |
|---|-------------|----------------------------|
| Operating temperature | BMXCPS3522 | 0...60 °C (32...140 °F) |
| | BMXCPS3522H | -25...70 °C (-13...158 °F) |
| (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. | | |

Power Consumption Breakdown

Introduction

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

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) | PV<03: 670 PV>=03: 40 | — |
| | BMXXBP1200 | 50 | — |
| | BMXXBP1200H | 250 | — |
| | BMXXBP1600(H) | 51 | — |
| Dual X Bus and Ethernet rack | BMEXP0400(H) | 49 | 118 |
| | BMEXP0800(H) | 64 | 164 |
| | BMEXP1200(H) | 86 | 164 |
| Redundant power supply rack | BMEXP0602(H) | 64 | 164 |
| | BMEXP1002(H) | 86 | 164 |

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

M580 CPU

| Module | | Average Current Consumption (mA) | | |
|---|--|----------------------------------|----------------|--------------------|
| Reference | Description | 3V3_BAC Output | 24V_BAC Output | 24V_SENSORS Output |
| BMEP581020(H) BMEP582020(H) BMEP582040(H) | Standalone CPU Ethernet distributed IO | — | 270 | — |
| BMEP583020 | Standalone CPU Ethernet distributed IO | — | 295 | — |

| Module | | Average Current Consumption (mA) | | |
|--------------------------------|---|----------------------------------|---------------------------|--------------------|
| Reference | Description | 3V3_BAC Output | 24V_BAC Output | 24V_SENSORS Output |
| 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(C) BMEP586040(C) | Standalone CPU Ethernet remote and distributed IO | — | 300 | — |
| BMEH582040(C) | HSBY CPU Ethernet remote and distributed IO | — | 270 or 335 ⁽¹⁾ | — |
| BMEH584040(C) | HSBY CPU Ethernet remote and distributed IO | — | 295 or 360 ⁽¹⁾ | — |
| BMEH586040(C) | 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(H) | CPU 340-10 Modbus | — | 72 | — |
| BMXP342000 | CPU 340-20 Modbus | — | 72 | — |
| BMXP342010 BMXP3420102 | CPU 340-20 Modbus CANopen | — | 90 | — |

| Module | | Average Power Consumption (mA) | | |
|------------------------------|--------------------------------|--------------------------------|----------------|--------------------|
| Reference | Description | 3V3_BAC Output | 24V_BAC Output | 24V_SENSORS Output |
| BMXP342020(H) | CPU 340-20 Modbus Ethernet | — | 95 | — |
| BMXP342030 BMXP3420302(H) | 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) | eX80 performance EIO adapter | 1,800 | — | — |
| BMECRA31310(H) | eX80 performance Dual EIO adapter | 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(H) | 4 isolated high-speed analog inputs | 121 | 45 | — |
| BMXAMI0800 | 8 non-isolated high-speed analog inputs | 121 | 41 | — |
| BMXAMI0810(H) | 8 isolated high-speed analog inputs | 121 | 54 | — |
| BMXAMM0600(H) | 4 channel analog inputs | 126 | 120 | — |
| BMXAMO0210(H) | 2 isolated analog outputs | 126 | 102 | — |
| BMXAMO0410(H) | 4 isolated high-speed analog outputs | 145 | 137 | — |
| BMXAMO0802(H) | 8 non-isolated high-speed analog outputs | 126 | 156 | — |
| BMXART0414(H) | 4 isolated analog inputs | 150 | 40 | — |
| BMXART0814(H) | 8 isolated analog inputs | 150 | 50 | — |
| BMEAHI0812(H) | 8 high-density isolated fast analog inputs | 400 | 34 | — |
| BMEAHO0412(C) | 4 channel analog inputs | 380 | 137 | — |

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(H) | Ethernet 1 port 10/100 RJ45 | — | 90 | — |
| BMXNOC0401 | Ethernet 4 ports 10/100 RJ45 | 555 | — | — |
| BMENOR2200H | Ethernet 2 ports 10/100 RJ45 | — | 120 | — |
| BMXNOR0200H | Ethernet 2 ports 10/100 RJ45 | — | 95 | — |
| BMENOC0301(C) | Ethernet 3 ports 10/100 RJ45 | PV<13: 1,800 ⁽¹⁾ PV>=13: 900 | — | — |
| BMENOC0311(C) | Ethernet 3 ports 10/100 RJ45 | PV<14: 1,800 ⁽¹⁾ PV>=14: 900 | — | — |
| BMENOC0321(C) | Ethernet 3 ports 10/100/1000 RJ45 | 1,250 | — | — |
| BMXEIA0100 | sub-D connector AS-interface master | 160 | — | — |
| BMXNRP0200(C) | Multimode fiber converter | — | 200 | — |
| BMXNRP0201(C) | 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 BMENOC0301/11 module, you can disable unused communication ports. This applies only to PV<13 for the BMENOC0301 module and PV<14 for the BMENOC0311 module.</p> | | | | |

Counting X80 Modules

| Module | | Average Current Consumption (mA) | | |
|---------------|------------------------------|----------------------------------|----------------|--------------------|
| Reference | Description | 3V3_BAC Output | 24V_BAC Output | 24V_SENSORS Output |
| BMXEHC0200(H) | 2 channel high speed counter | 200 | 40 | 80 |
| BMXEHC0800(H) | 8 channel high speed counter | 200 | 40 | 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 | — |
| BMXDAI0814 | 8 discrete 100...120 Vac inputs | 72 | — | — |
| BMXDAI1602(H) | 16 discrete 24Vac/ 24Vdc inputs | 90 | — | 60 |
| BMXDAI1603(H) | 16 discrete 48 Vac inputs | 90 | — | 60 |
| BMXDAI1604(H) | 16 discrete 100...120 Vac inputs | 90 | — | — |
| BMXDAI1614(H) | 16 discrete 100...120 Vac inputs | 90 | — | — |
| BMXDAI16142 | 16 discrete 100...120 Vac inputs | 90 | — | — |
| BMXDAI1615(H) | 16 discrete 200...240 Vac inputs | 90 | — | — |
| BMXDDI1602(H) | 16 discrete 24 Vdc inputs | 90 | — | 60 |
| BMXDDI1603(H) | 16 discrete 48 Vdc inputs | 75 | — | 135 |

| Module | | Average Current Consumption (mA) | | |
|----------------|------------------------------|----------------------------------|----------------|--------------------|
| Reference | Description | 3V3_BAC Output | 24V_BAC Output | 24V_SENSORS Output |
| BMXDDI1604T | 16 discrete 125 Vdc inputs | 75 | — | 135 |
| BMXDDI3203(H) | 32 discrete 12/24 Vdc inputs | 115 | 115 | — |
| BMXDDI3232(H) | 32 discrete 48 Vdc inputs | 115 | 10 | — |
| BMXDDI3202K(H) | 32 discrete 24 Vdc inputs | 140 | — | 110 |
| BMXDDI6402K(H) | 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 |
| BMXDAO1605 | 16 discrete 100...240 Vac outputs | 100 | 95 | — |
| BMXDAO1615(H) | 16 discrete 24..240 Vac outputs | 75 | 55 | — |
| BMXDDO1602(H) | 16 discrete 0.5 A outputs | 100 | — | — |
| BMXDDO1612(H) | 16 discrete outputs | 100 | — | — |
| BMXDDO3202(H) | 32 discrete 0.5 A outputs | 56 | 35 | — |
| BMXDDO3202K(C) | 32 discrete 0.1 A outputs | 150 | — | — |
| BMXDDO6402K(C) | 64 discrete 0.1 A outputs | 240 | — | — |
| BMXDRA0804T | 8 discrete isolated outputs | 100 | 110 | — |
| BMXDRA0805(H) | 8 discrete isolated outputs | 100 | 55 | — |

| Module | | Average Current Consumption (mA) | | |
|---------------|-----------------------------|----------------------------------|----------------|--------------------|
| Reference | Description | 3V3_BAC Output | 24V_BAC Output | 24V_SENSORS Output |
| BMXDRA0815(H) | 8 discrete isolated outputs | 60 | 120 | — |
| BMXDRA1605(H) | 16 discrete outputs | 100 | 95 | — |
| BMXDRC0805(H) | 8 discrete isolated outputs | 60 | 120 | — |

Discrete Input/Output Modules

| Module | | Average Current Consumption (mA) | | |
|----------------|---|----------------------------------|----------------|--------------------|
| Reference | Description | 3V3_BAC Output | 24V_BAC Output | 24V_SENSORS Output |
| BMXDDM16022(H) | 8 discrete 24 Vdc inputs and 8 discrete outputs | 100 | — | 30 |
| BMXDDM16025(H) | 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, page 92, 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) | 31.2 W (1.3 A) | - |
| | 11.25 W (3.375 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) | 31.2 W (1.3 A) | 21.6 W (0.9 A) |
| | 11.25 W (3.375 A) | 23.4 W (0.975 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) | 31.2 W (1.3 A) | 21.6 W (0.9 A) |
| | 11.25 W (3.375 A) | 23.4 W (0.975 A) | |

| Power Supply Reference | Maximum available power: | | |
|--|--|---------------|-------------|
| | 3V3_BAC | 24V_BAC | 24V_SENSORS |
| | 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 | | |
| 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.

Power Supply Modules Installation

Introduction

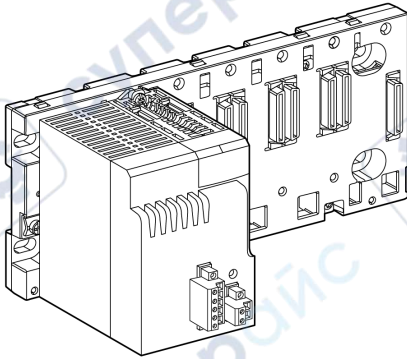
This chapter explain how to install the Modicon X80 power supply modules.

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

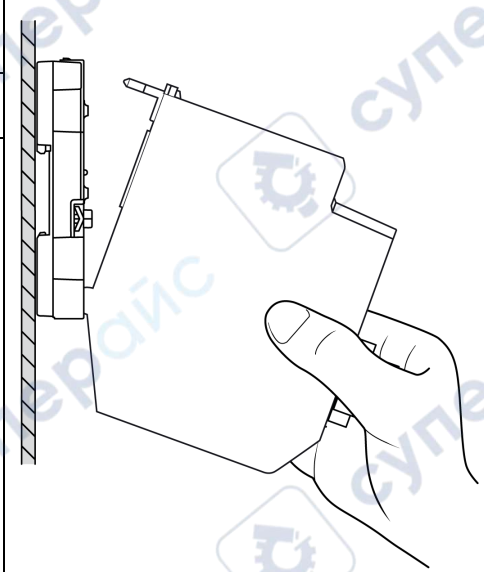
HAZARD OF ELECTRIC SHOCK

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

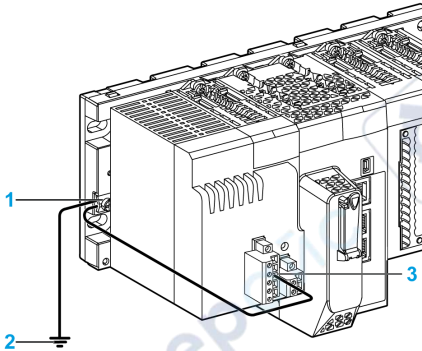
Check that the mounting screw is securely tightened to ensure the module is firmly attached to the rack.

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 power supply module:



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

NOTE: Ground every rack and power supply module in the PAC system.

Grounding Rules

To ground the rack and 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. Use the shortest cable 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.

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

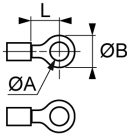
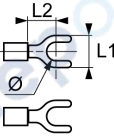
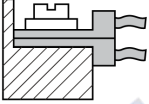
The tightening torque for the protective earth screw is 1.2 N•m (0.88 lbf-ft).

⚡⚠ 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 describes the ring and spade lug that 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 |
| <p>(*)</p>  | | | | | | |

For more information, refer to the "Wiring Rules" topic 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 *Electrical installation guide* and the *Control Panel Technical Guide, How to protect a machine from malfunctions due to electromagnetic disturbance*.

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:

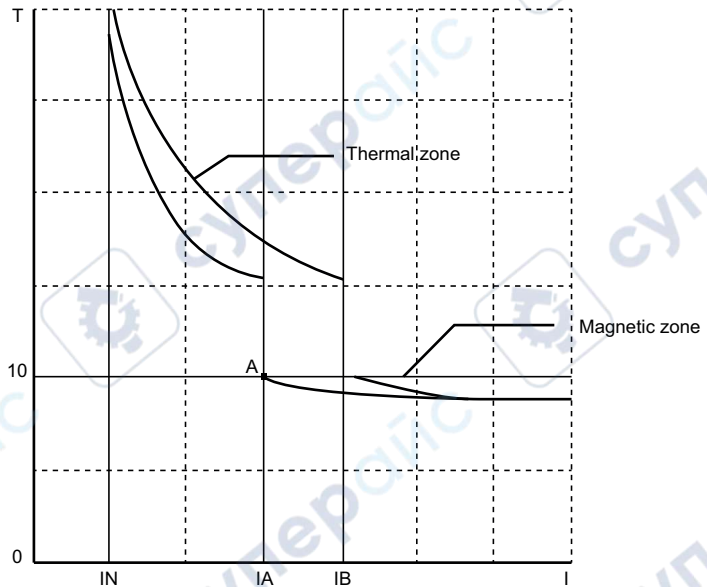
- nominal input current (I_{rms})
- signaling current (I)
- current characteristic (I_t)

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:

- I_N 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 _t ² |
| 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⁾ |
| <p>(1) Minimum individual wire size in stranded cable without cable end is AWG 30 (0,0507 mm²).</p> <p>(2) Depending on stranding.</p> | | | | | |

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.

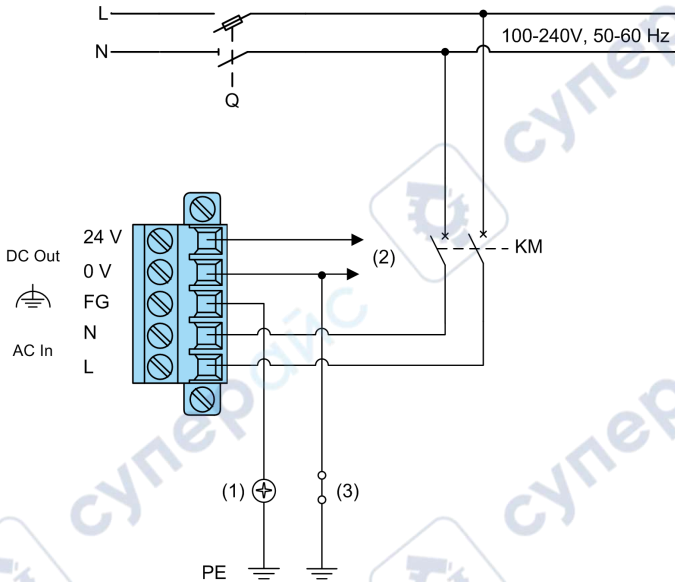
Line Protection

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 .

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(H) 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*, page 106.

BMXCPS4002(H) Wiring Diagram

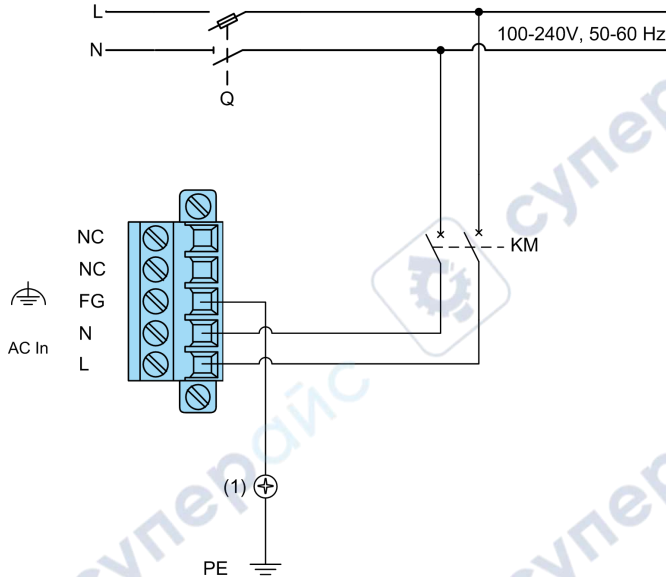
▲ WARNING

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*, page 106.

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(H) (24...48 Vdc)
- BMXCPS4022(H) (24...48 Vdc)
- BMXCPS3540T (125 Vdc)
- BMXCPS3522(H) (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.

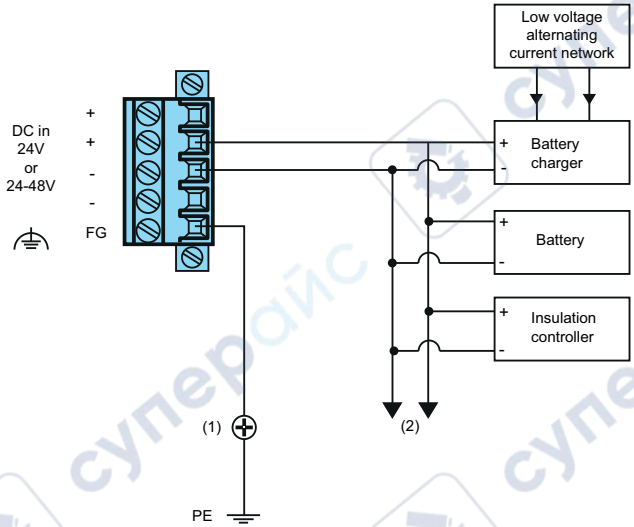
Line Protection

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, 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(H), and BMXCPS4022(H) 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

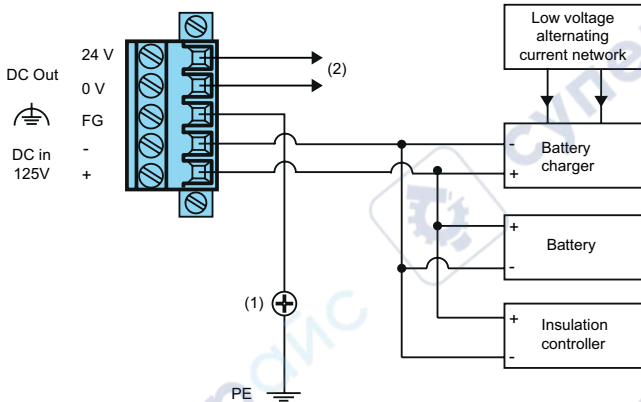
FG Functional ground

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*, page 106.

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*, page 106.

BMXCPS3522 Wiring Diagram

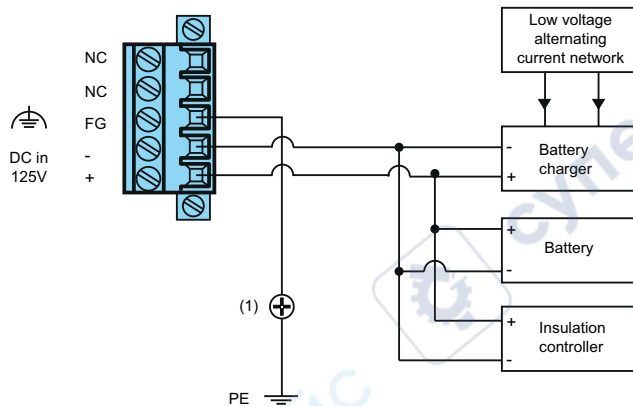
▲ WARNING

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*, page 106.

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(H) (24...48 Vdc)
- BMXCPS4022(H) (24...48 Vdc)
- BMXCPS3540T (125 Vdc)
- BMXCPS3522(H) (125 Vdc)

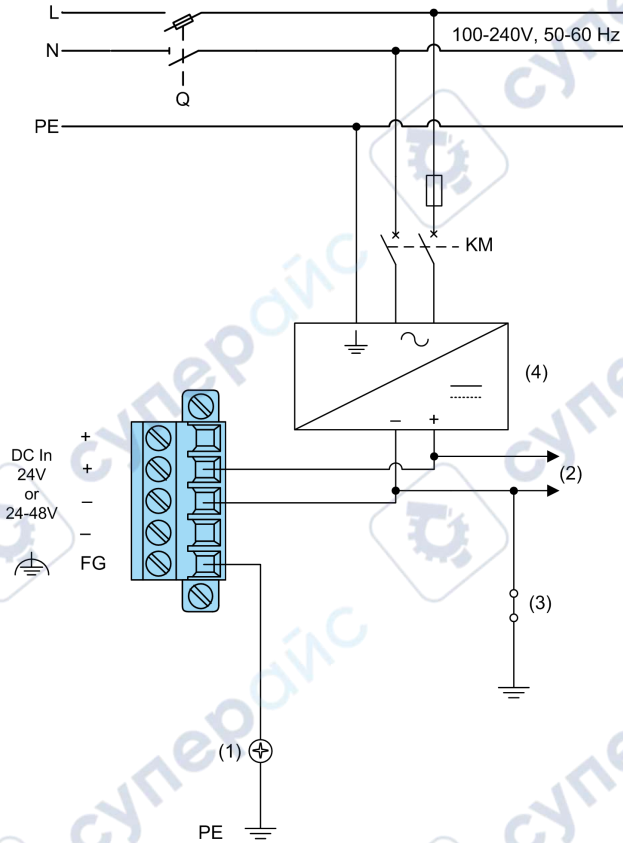
Line Protection

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, 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(H), and BMXCPS4022(H) 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

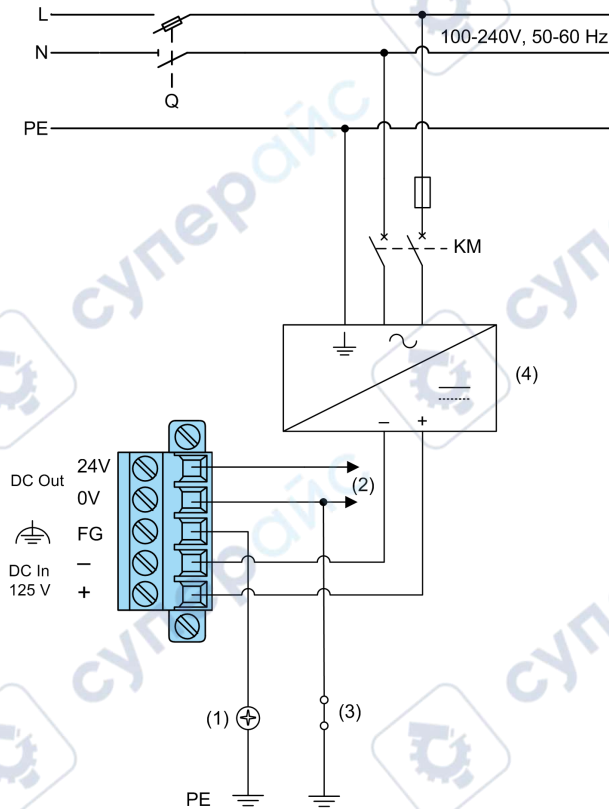
L Phase

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*, page 106.

BMXCPS3540T Wiring Diagram

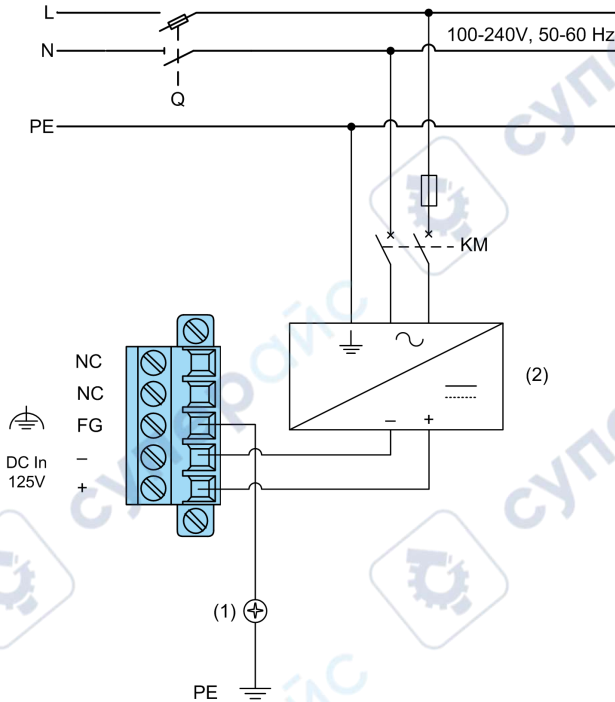


- (1) Ground screw of the rack
 - (2) Sensor power supply
 - (3) Shielding connector kit
 - (4) Minimum basic insulation AC/DC converter
- FG** Functional ground
- PE** Protective earth
- N** Neutral
- L** Phase
- Q** General isolator
- KM** Line contactor or circuit breaker

NOTE: To connect the functional ground (FG) to the protective earth (PE), refer to the section *Grounding the Rack and the Power Supply Module*, page 106.

BMXCPS3522(H) 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*, page 106.

Sensor and Pre-actuator Power Supply Control by Alarm Relay

How to Set Up Sensor and Pre-actuator Power Supply

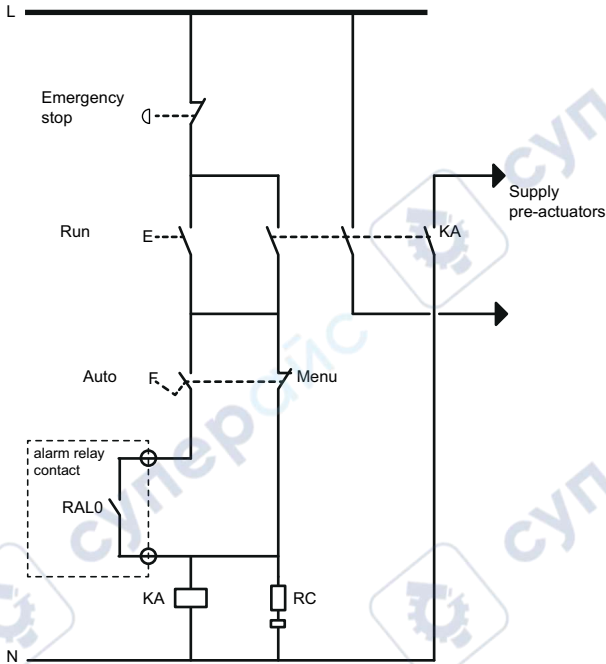
It is recommended that control of the different power supplies is set up in the following sequence.

| Step | Action |
|------|--|
| 1 | Switch on the power supply to the PLC and the inputs (sensors), using the contactor KM (see diagram, page 115). |
| 2 | When the PLC is in RUN mode and running on MANU/AUTO, switch on the output power supply (pre-actuators), using the contactor KA. Only in AUTO, this is controlled by the alarm relay contact in each power supply. NOTE: In alternating current, the contactor KA controls the supply sensors. In direct current, the contactor KA controls the supply pre-actuators and the supply sensors. |

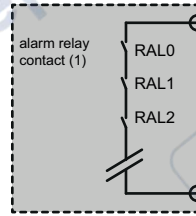
NOTE: Before restarting the installation following a stop (caused by a power outage or an emergency stop), observe the recommendations given in the *General Safety Instructions*.

Example 1

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



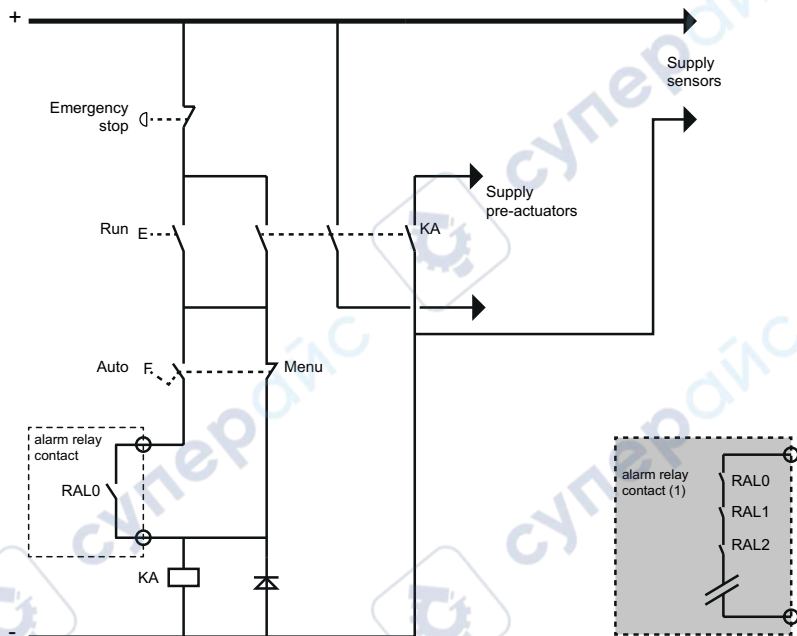
KA: contact controlled by alarm relay from supply module in AUTO run mode.



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

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

What's in This Part

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| Removable Connectors Kit | 132 |
| Dimensions of X80 Modules | 134 |

Removable Connectors Kit

What's in This Chapter

Removable Connectors Kit 132

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 connecting or unconnected 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

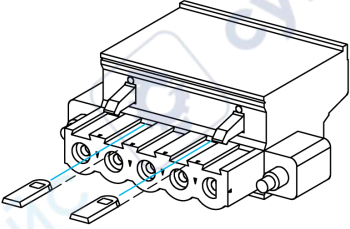
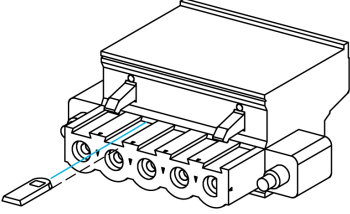
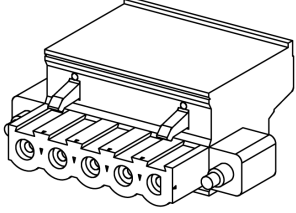
Ensure that the 5-pin terminal block of the power supply module is correctly keyed.

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 |  |

Dimensions of X80 Modules

What's in This Chapter

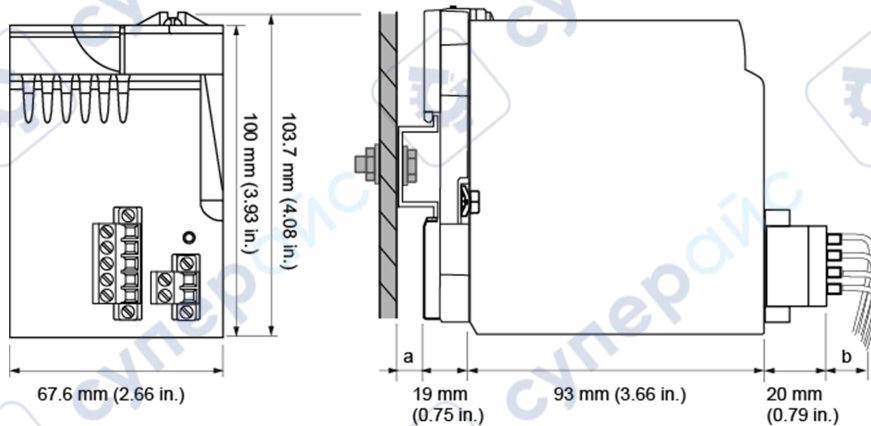
- Dimensions of X80 Power Supply Modules 134
- Dimensions of X80 Basic Functions Modules 136
- Dimensions of X80 Expert Functions Modules..... 143
- Dimensions of X80 Communication Modules 149

Dimensions of X80 Power Supply Modules

Dimensions of X80 Power Supply Modules

General Presentation of X80 Power Supply Modules

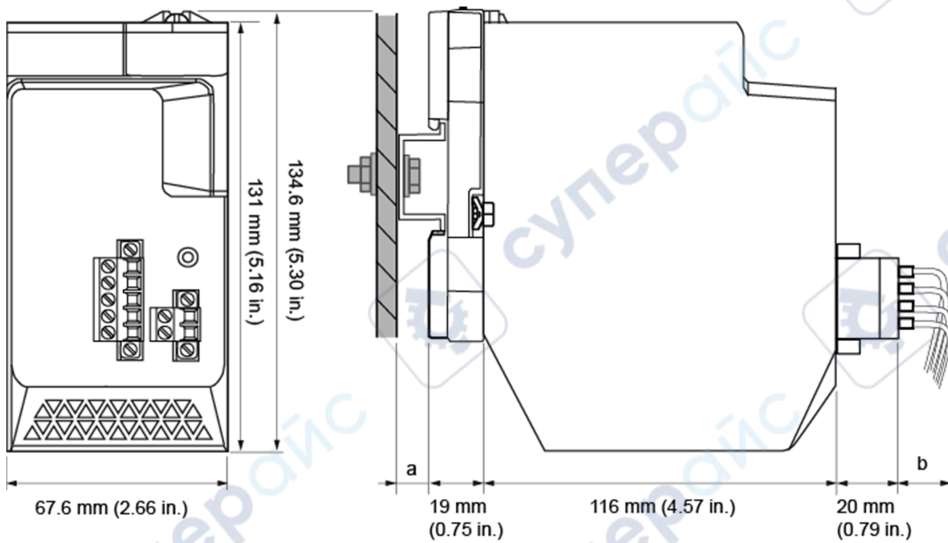
Standalone Power Supply Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

b Wiring depth: the value depends on the connector and the wires used in your platform.

Redundant Power Supply Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

b Wiring depth: the value depends on the connector and the wires used in your platform.

Dimensions of X80 Power Supply Modules

| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|--|--------------------|---------------------|-------------------|-----------------------------------|
| | Width | Height | Depth | |
| Standalone Power Supply Modules | | | | |
| BMXCPS2000 | 67.6 mm (2.66 in.) | 103.7 mm (4.08 in.) | 93 mm (3.66 in.) | 113 mm (4.45 in.) ⁽¹⁾ |
| BMXCPS3500(H) | | | | |
| BMXCPS2010 | | | | |
| BMXCPS3020(H) | | | | |
| BMXCPS3540T | | | | |
| Redundant Power Supply Modules | | | | |
| BMXCPS4002(H) | 67.6 mm (2.66 in.) | 134.6 mm (5.30 in.) | 116 mm (4.57 in.) | 136 mm (5.35 in.) ⁽¹⁾ |
| BMXCPS4022(H) | | | | |
| BMXCPS3522(H) | | | | |
| (1) DIN-rail depth (a) and wiring depth (b) are not included. | | | | |

NOTE: Connectors that are delivered with the X80 Power Supply modules (caged clamp terminal blocks) and removable connector kits (BMXXTSCPS10 and BMXXTSCPS20) have the same dimensions.

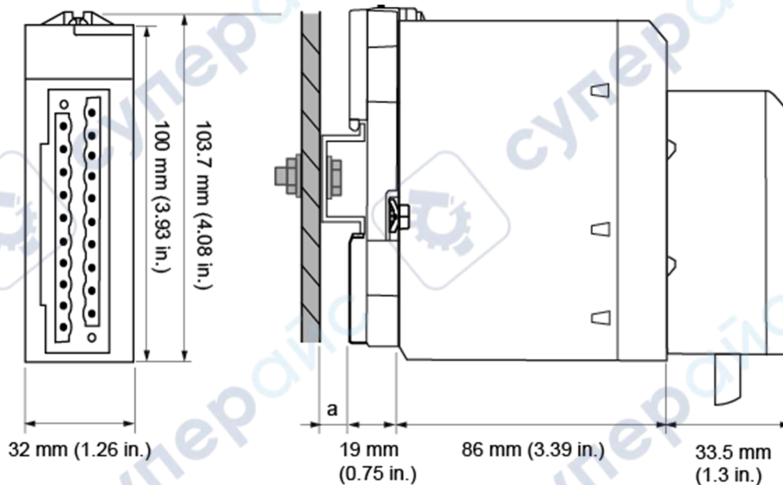
NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 Basic Functions Modules

Dimensions of X80 Discrete I/O Modules

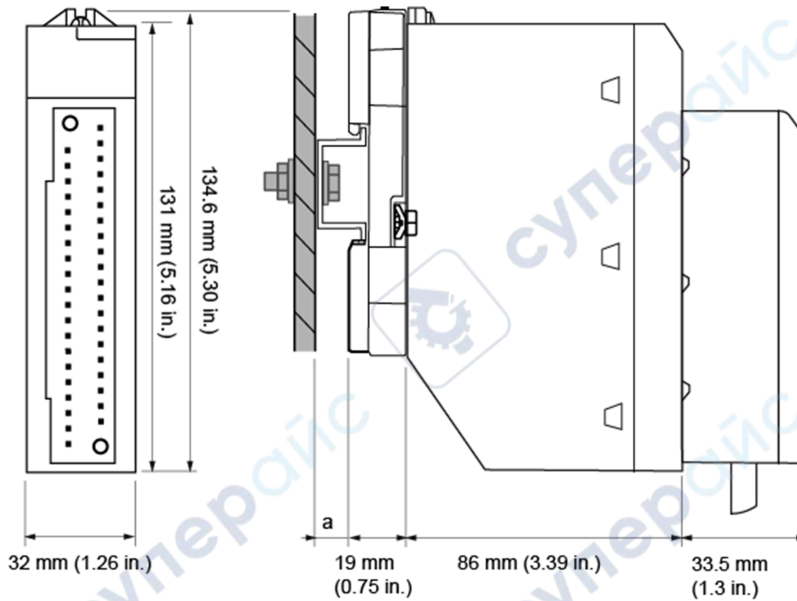
General Presentation of X80 Discrete I/O Modules

X80 Discrete I/O Module with a 20-pin removable terminal block



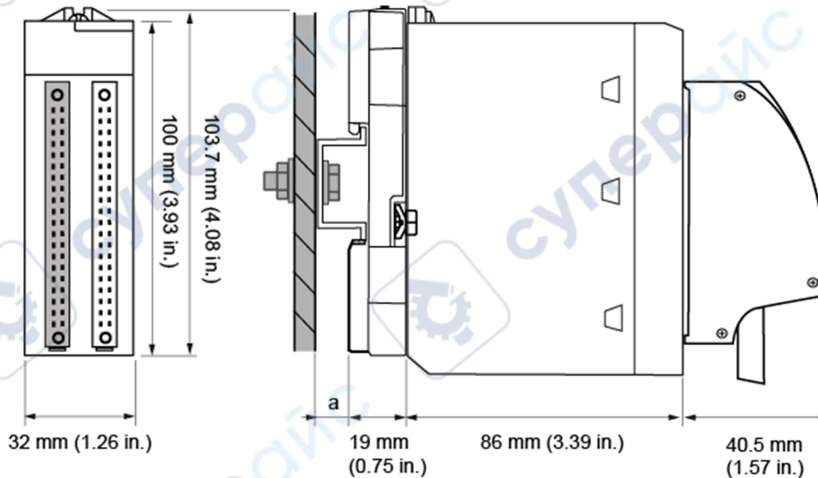
a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

X80 Discrete I/O Module with a 40-pin removable terminal block



a DIN-rail depth: the value depends on the DIN-rail type used in your platform. Refer to *Mounting the Racks*, page 37.

X80 Discrete I/O Module with 40-pin FCN-type connectors



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

Dimensions of X80 Discrete Modules

| Module reference | Module dimension | | | Installation depth ⁽¹⁾ |
|--|------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Module alone | |
| X80 Discrete I/O Modules with a 20-pin removable terminal block | | | | |
| BMXDDI1602(H) | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| BMXDDI1603(H) | | | | |
| BMXDDI1604T/H | | | | |
| BMXDAI1602(H) | | | | |
| BMXDAI1603(H) | | | | |
| BMXDAI1604(H) | | | | |
| BMXDAI0805 | | | | |
| BMXDAI0814 | | | | |
| BMXDDO1602(H) | | | | |
| BMXDDO1612(H) | | | | |
| BMXDRA0804T | | | | |
| BMXDRA0805(H) | | | | |
| BMXDRA0815(H) | | | | |
| BMXDRA1605(H) | | | | |
| BMXDAO1605(H) | | | | |
| BMXDDM16022(H) | | | | |
| BMXDDM16025(H) | | | | |

| Module reference | Module dimension | | | Installation depth ⁽¹⁾ |
|--|------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Module alone | |
| X80 Discrete I/O Modules with a 40-pin removable terminal block | | | | |
| BMXDDI3203(H) | 32 mm (1.26 in.) | 134.6 mm (5.30 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| BMXDDI3232(H) | | | | |
| BMXDDO3202(H) | | | | |
| BMXDAI16142 | | | | |
| BMXDAI1614(H) | | | | |
| BMXDAI1615(H) | | | | |
| BMXDDO3202(H) | | | | |
| BMXDRC0805(H) | | | | |
| BMXDAO1615(H) | | | | |
| X80 Discrete I/O Modules with 1 or 2 40-pin FCN-type connectors | | | | |
| BMXDDI3202K(H) | 32 mm (1.26 in.) | 134.6 mm (5.30 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| BMXDDO3202K(C) | | | | |
| BMXDDM3202K | | | | |
| BMXDDI6402K(H) | | | | |
| BMXDDO6402K(C) | | | | |
| (1) DIN-rail depth (a) is not included. | | | | |

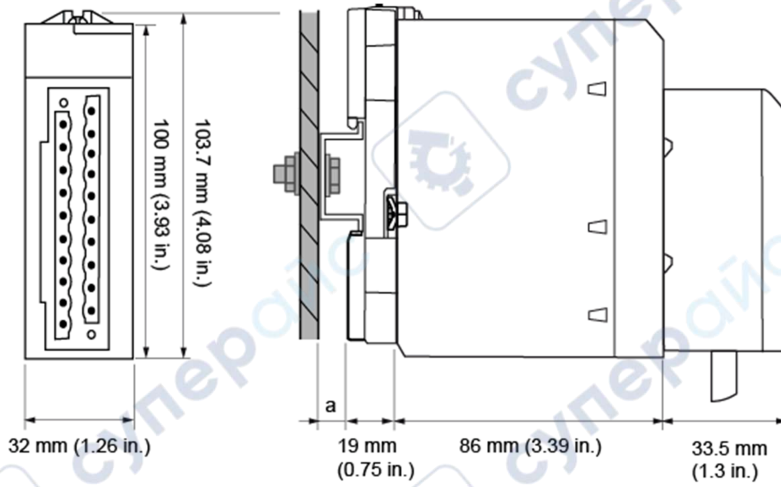
NOTE: Connectors that are delivered with the X80 Discrete I/O modules (20-pin and 40-pin removable terminal blocks) and the corresponding pre-assembled cordsets (BMXFTW**1 and BMXFTW**5) have the same dimensions.

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 Analog I/O Modules

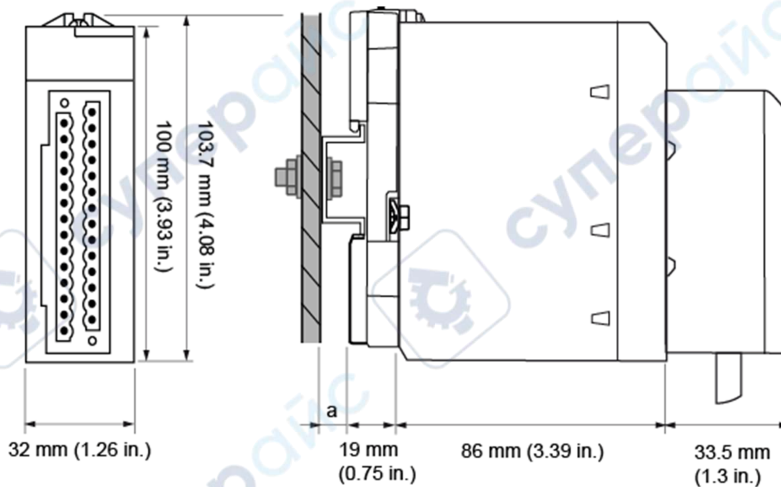
General Presentation

X80 analog I/O module with a 20-pin removable terminal blocks:



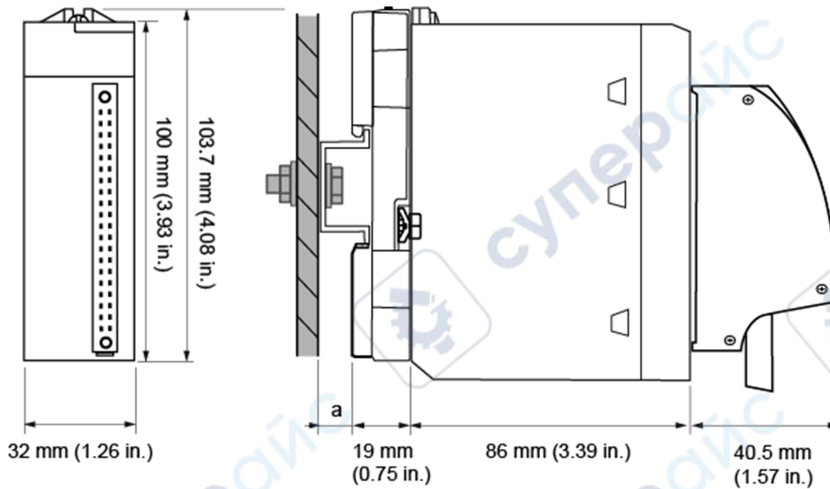
a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

X80 analog I/O module with a 28-pin removable terminal blocks:



a DIN-rail depth: the value depends on the DIN-rail type used in your platform. Refer to *Mounting the Racks*, page 37.

X80 analog I/O module with a 40-pin FCN-type connector:



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

Dimensions

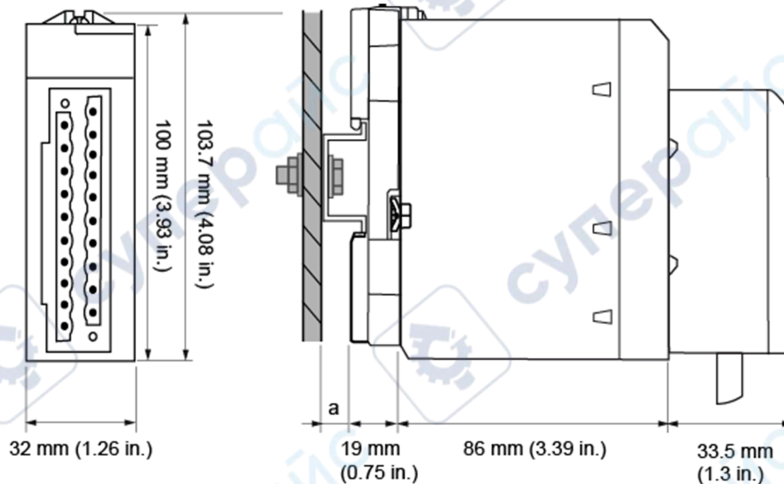
| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|---|-------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Depth | |
| X80 analog I/O module with a 20-pin removable terminal block | | | | |
| BMXAMI0410 (H) | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| BMXAMO0210 (H) | | | | |
| BMXAMO0410 (H) | | | | |
| BMXAMO0802 (H) | | | | |
| BMXAMM0600 (H) | | | | |
| X80 analog I/O module with a 28-pin removable terminal block | | | | |
| BMXAMI0800 | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| BMXAMI0810 (H) | | | | |
| X80 analog I/O module with a 40-pin FCN-type connector | | | | |
| BMXART0414 (H) | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 126.5 mm (4.96 in.) ⁽¹⁾ |
| BMXART0814 (H) | | | | |
| (1) DIN-rail depth (a) is not included. | | | | |

NOTE: Connectors that are delivered with the X80 analog I/O modules (20-pin and 28-pin removable terminal blocks, and 40-pin FCN-type connector) and the corresponding pre-assembled cordsets (BMXFTW*01S, BMXFTW*08S, and BMXFCW*01S) have the same dimensions.

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 HART Analog I/O Modules

General Presentation



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

Dimensions

| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|--|-------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Depth | |
| BMEAHI0812(H) | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| BMEAHO0412(C) | | | | |
| (1) DIN-rail depth (a) is not included. | | | | |

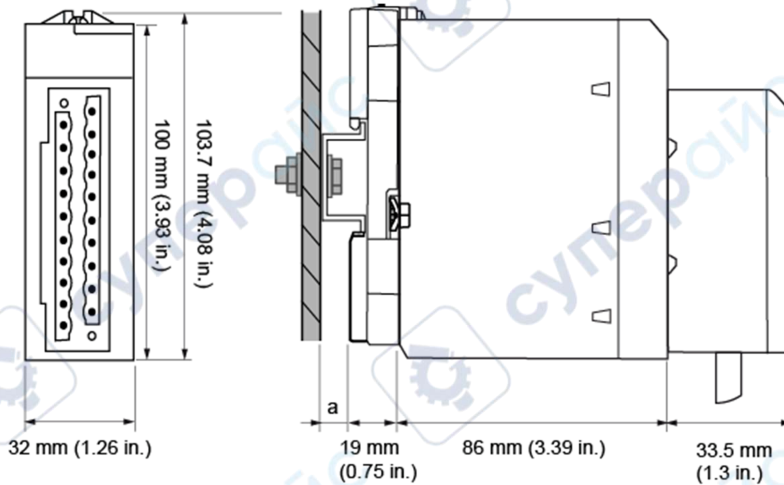
NOTE: Connectors that are delivered with the X80 HART analog I/O modules (20-pin removable terminal blocks) and the corresponding pre-assembled cordsets (BMXFTW*01S) have the same dimensions.

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 Expert Functions Modules

Dimensions of X80 BMXEHC0800(H) Counting Modules

Introduction



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

Dimensions

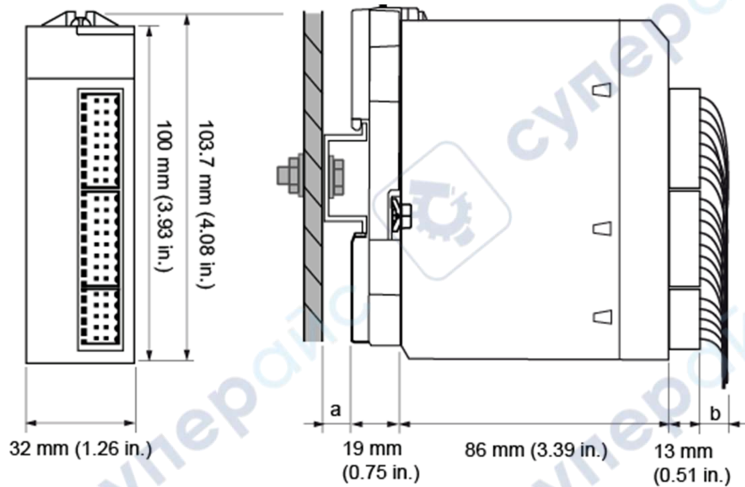
| Module Reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|---------------------------------------|-------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Depth | |
| BMXEHC0800(H) | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| 1 DIN-rail depth (a) is not included. | | | | |

NOTE: Connectors that are delivered with BMXEHC0800(H) modules (20-pin removable terminal blocks) and the corresponding pre-assembled cordsets (BMXFTW*01S) have the same dimensions.

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 BMXEHC0200(H) Counting Module

General Presentation of X80 BMXEHC0200(H) Counting Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

b Wiring depth: the value depends on the connector and the wires used in your platform.

Dimensions of X80 BMXEHC0200(H) Counting Module

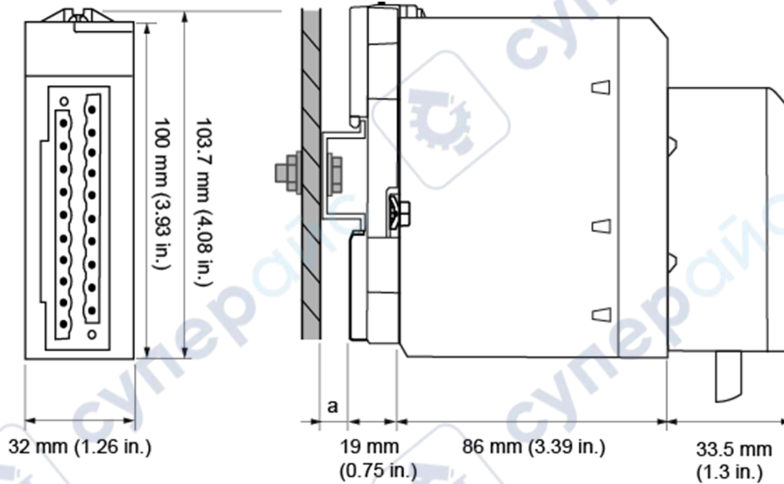
| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|------------------------------|-------------------|---------------------|------------------|-----------------------------------|
| | Width | Height | Depth | |
| BMXEHC0200(H) ⁽²⁾ | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 99 mm (3.9 in.) ⁽¹⁾ |

(1) DIN-rail depth (a) and wiring depth (b) are not included.
 (2) The removable terminal block set for BMXEHC0200(H) includes 1x10-pin terminal block and 2x16-pin terminal blocks

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 BMXETM0200H Expert Input Frequency Module

General Presentation of X80 BMXETM0200H Expert Input Frequency Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

Dimensions of X80 BMXETM0200H Expert Input Frequency Module

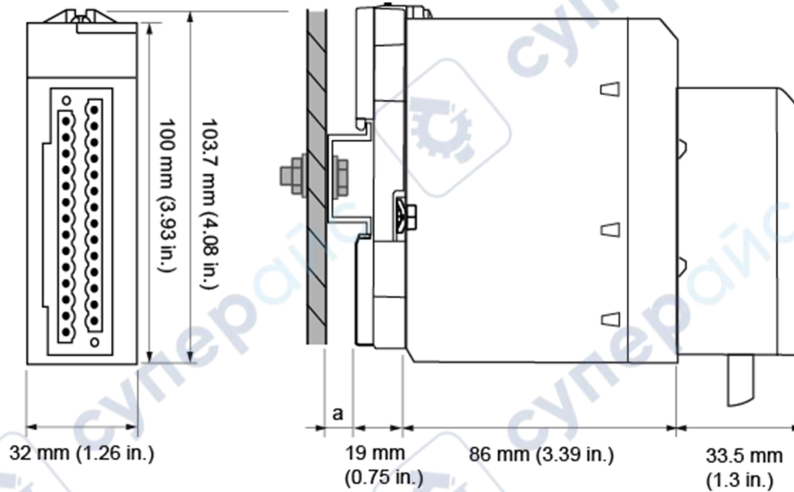
| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|--|-------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Depth | |
| BMXETM0200H | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| (1) DIN-rail depth (a) is not included. | | | | |

NOTE: Connectors that are delivered with BMXETM0200H modules (20-pin removable terminal blocks) and the corresponding pre-assembled cordsets (BMXFTW*01S) have the same dimensions.

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 BMXMSP0200 Pulse Train Output Module

General Presentation of X80 BMXMSP0200 Pulse Train Output Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

Dimensions of X80 BMXMSP0200 Pulse Train Output Module

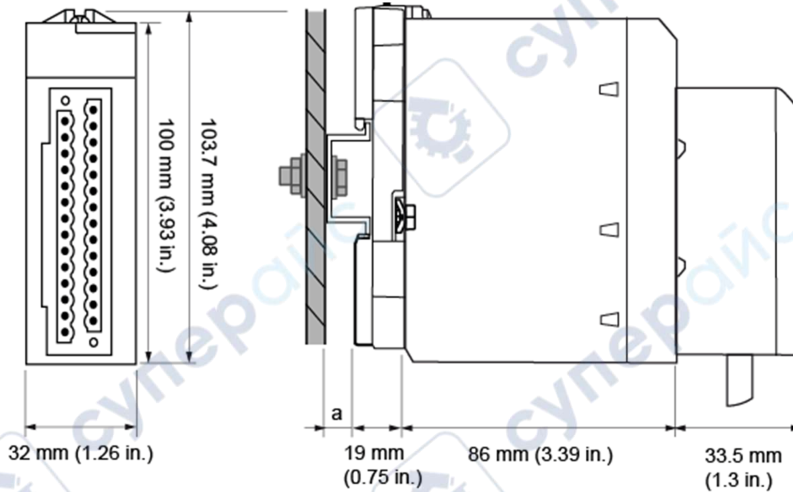
| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|---|-------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Depth | |
| BMXMSP0200 | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| (1) DIN-rail depth (a) is not included. | | | | |

NOTE: Connectors that are delivered with BMXMSP0200 modules (28-pin removable terminal blocks) and the corresponding pre-assembled cordsets (BMXFTW*08S) have the same dimensions.

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 BMXERT1604T/H Time Stamping Module

General Presentation of X80 BMXERT1604T/H Time Stamping Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

Dimensions of X80 BMXERT1604T/H Time Stamping Module

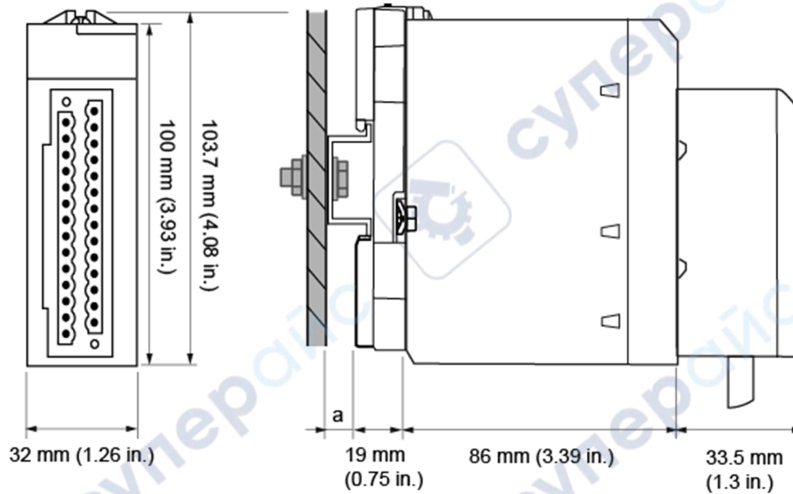
| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|--|-------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Depth | |
| BMXERT1604T/H | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |
| (1) DIN-rail depth (a) is not included. | | | | |

NOTE: Connectors that are delivered with BMXERT1604T/H modules (28-pin removable terminal blocks) and the corresponding pre-assembled cordsets (BMXFTW*08S) have the same dimensions.

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 BMXEAE0300(H) SSI Module

General Presentation of X80 BMXEAE0300(H) SSI Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

Dimensions of X80 BMXEAE0300(H) SSI Module

| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|------------------|-------------------|---------------------|------------------|------------------------------------|
| | Width | Height | Depth | |
| BMXEAE0300(H) | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 119.5 mm (4.69 in.) ⁽¹⁾ |

⁽¹⁾ DIN-rail depth (a) is not included.

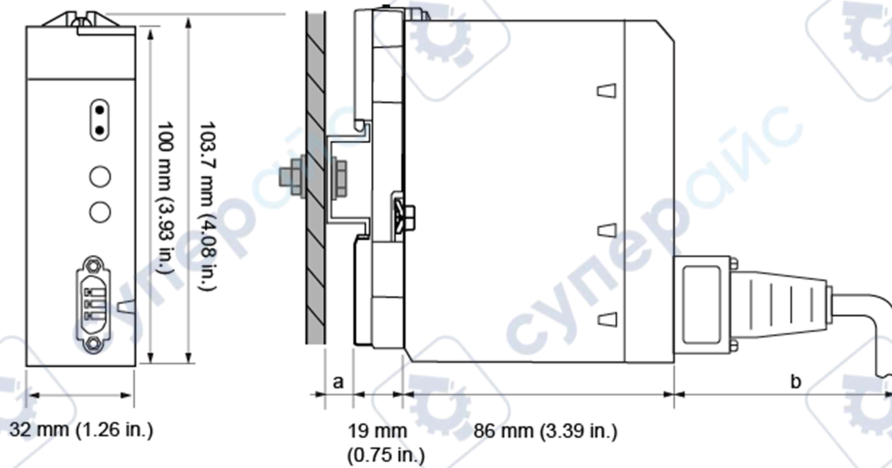
NOTE: Connectors that are delivered with BMXEAE0300(H) modules (28-pin removable terminal blocks) and the corresponding pre-assembled cordsets (BMXFTW*08S) have the same dimensions.

NOTE: Consider clearance for cable installation and spacing around the racks.

Dimensions of X80 Communication Modules

Dimensions of X80 BMXEIA0100 AS-Interface Bus Module

General Presentation of X80 BMXEIA0100 AS-Interface Bus Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

b Wiring depth: the value depends on the connector and the wires used in your platform.

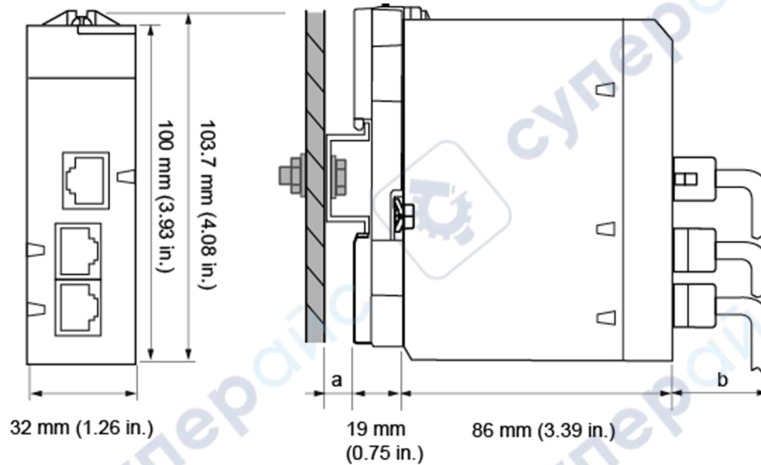
Dimensions of X80 BMXEIA0100 AS-Interface Bus Module

| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|--|-------------------|---------------------|------------------|-----------------------------------|
| | Width | Height | Depth | |
| BMXEIA0100 | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 105 mm (4.13 in.) ⁽¹⁾ |
| (1) DIN-rail depth (a) and wiring depth (b) are not included. | | | | |

NOTE: Consider the connector dimensions, clearance for cable installation, and spacing around the racks.

Dimensions of X80 BMXNOM0200(H) Serial Link Module

General Presentation of X80 BMXNOM0200(H) Serial Link Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

b Wiring depth: the value depends on the connector and the wires used in your platform.

Dimensions of X80 BMXNOM0200(H) Serial Link Module

| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|------------------|-------------------|---------------------|------------------|-----------------------------------|
| | Width | Height | Depth | |
| BMXNOM0200(H) | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 105 mm (4.13 in.) ⁽¹⁾ |

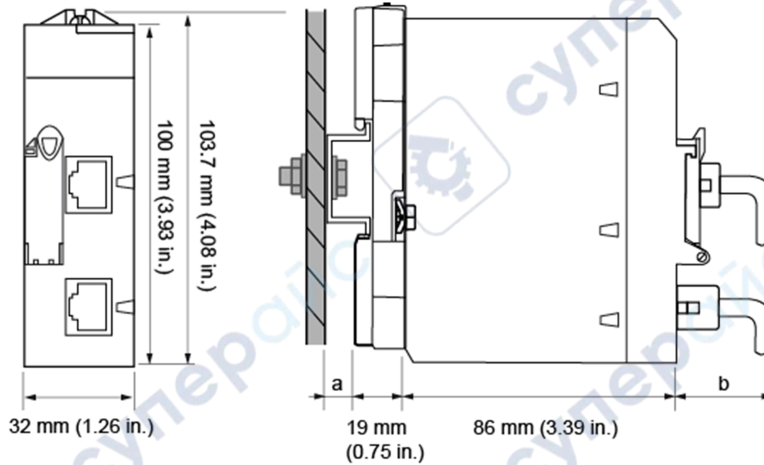
(1) DIN-rail depth (a) and wiring depth (b) are not included.

NOTE: Consider the connector dimensions, clearance for cable installation, and spacing around the racks.

Dimensions of X80 BMXNOR0200H RTU Module

General Presentation of X80 BMXNOR0200H RTU Module

X80 BMXNOR0200H RTU Module



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

b Wiring depth: the value depends on the connector and the wires used in your platform.

Dimensions of X80 BMXNOR0200H RTU Module

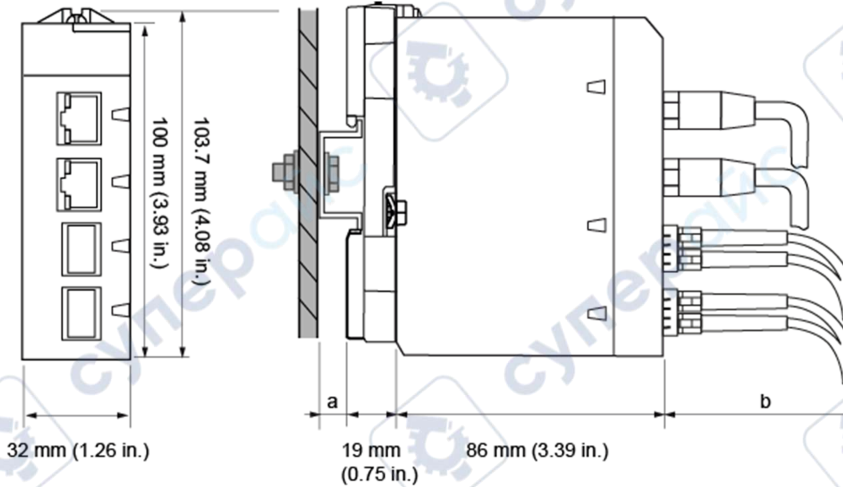
| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|--|-------------------|---------------------|------------------|-----------------------------------|
| | Width | Height | Depth | |
| BMXNOR0200H | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 105 mm (4.13 in.) ⁽¹⁾ |
| ⁽¹⁾ DIN-rail depth (a) and wiring depth (b) are not included. | | | | |

NOTE: Consider the connector dimensions, clearance for cable installation, and spacing around the racks.

Dimensions of X80 BMXNRP0200/0201(C) Fiber Converter Modules

General Presentation of X80 BMXNRP0200/0201(C) Fiber Converter Modules

X80 BMXNRP0200(C)/BMXNRP0201(C) Fiber Converter Modules



a DIN-rail depth: the value depends on the DIN-rail type used in your platform.

b Wiring depth: the value depends on the connector and the wires used in your platform.

Dimensions of X80 BMXNRP0200/0201(C) Fiber Converter Module

| Module reference | Module dimensions | | | Installation depth ⁽¹⁾ |
|------------------|-------------------|---------------------|------------------|-----------------------------------|
| | Width | Height | Depth | |
| BMXNRP0200(C) | 32 mm (1.26 in.) | 103.7 mm (4.08 in.) | 86 mm (3.39 in.) | 105 mm (4.13 in.) ⁽¹⁾ |
| BMXNRP0201(C) | | | | |

(1) DIN-rail depth (a) and wiring depth (b) are not included.

NOTE: Consider the connector dimensions, clearance for cable installation, and spacing around the racks.

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