Modicon M580 distributed Programmable Automation Controller

User Guide

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Schneider Electric

www.se.com

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Table of Contents

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

This guide provides information about the Modicon M580 distributed Programmable Automation Controller (dPAC), BMED581020 and BMED581020C, and related hardware when configured with EcoStruxure™ Automation Expert software in a standalone M580 system that conforms to the IEC 61499 standard. The BMED581020 and BMED581020C controllers are not compatible with BMEP58•••• and BMEH58•••• controllers, which are configured with EcoStruxure™ Control Expert software. The BMED581020 and BMED581020C controllers do not support a Hot Standby system.

NOTE: The specific configuration settings contained in this guide are for instructional purposes only. The settings required for your specific configuration may differ from the examples presented in this guide.

This guide is intended for users with knowledge of:

- IEC 61499 standard.
- EcoStruxure Automation Expert software, which is the engineering tool for the BMED581020 and BMED581020C controllers.

Validity Note

This document has been updated for the release of EcoStruxure™ Automation Expert V23.1.

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.

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Available Languages of this Document

This document is available in these languages:

- English (EIO0000004215)
- French (EIO0000004483)
- German (EIO0000004484)
- Italian (EIO0000004485)
- Portuguese (EIO0000004694)
- Spanish (EIO0000004693)
- Turkish (EIO0000005015)
- Chinese (EIO0000004487)

Related Documents

Document Title	Reference Number
Modicon M580 Distributed PAC Composite Automation Type Online Help	EIO0000004216 (English) EIO0000004488 (French) EIO0000004489 (German) EIO0000004490 (Italian) EIO0000004696 (Portuguese) EIO0000004492 (Chinese) EIO0000004695 (Spanish)
EcoStruxure™ Automation Expert User Manual	EIO0000004459 (English), EIO0000004460 (French), EIO0000004461 (German), EIO0000004462 (Italian), EIO0000004685 (Portuguese), EIO0000004684 (Spanish), EIO0000004464 (Chinese)
EcoStruxure™ Automation Expert Getting Started	EIO0000004453 (English), EIO0000004748 (French), EIO0000004749 (German), EIO0000004750 (Italian), EIO0000004752 (Portuguese), EIO0000004751 (Spanish), EIO0000004458 (Chinese)

Document Title	Reference Number
EcoStruxure™ Automation Expert SE.DPAC Library Guide	EIO0000004608 (English) EIO0000004609 (French) EIO0000004610 (German) EIO0000004611 (Italian) EIO0000004753 (Portuguese) EIO0000004612 (Spanish) EIO0000004613 (Chinese)
EcoStruxure™ Automation Expert Common Process Reference Manual	EIO0000004517 (English)
EcoStruxure™ Automation Expert Sequence Control Library User Guide	EIO0000004493 (English)
EcoStruxure™ Automation Expert Single Line Power Monitoring Reference Manual	EIO0000004678 (English)
EcoStruxure™ Automation Expert Water and Waste Water Reference Manual	EIO0000004683 (English)
Electrical Installation Guide	EIGED306001 (English)
Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications	EIO0000002726 (English) EIO0000002727 (French) EIO0000002728 (German) EIO0000002730 (Italian) EIO0000002729 (Spanish) EIO0000002731 (Chinese)

To find documents online, visit the Schneider Electric download center (www.se.com/ww/en/download/).

Cybersecurity Information

Information on cybersecurity is provided on the Schneider Electric website: https://www.se.com/ww/en/about-us/cybersecurity-data-protection/

Product Related Information

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

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

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

DANGER

POTENTIAL FOR EXPLOSION

- Only use this equipment in non-hazardous locations, or in locations that comply with Class I, Division 2, Groups A, B, C and D.
- Do not substitute components which would impair compliance to Class I Division 2.
- Do not connect or disconnect equipment unless power has been removed or the location is known to be non-hazardous.

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

⚠WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.[1]
- Test each implementation of a system for proper operation before placing it into service.

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

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

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

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

Terminology Derived from Standards

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

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

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2023	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2021	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2021	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

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

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

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

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

Information on Non-Inclusive or Insensitive Terminology

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

BMED581020 and BMED581020C dPAC

Introduction

This chapter presents the BMED581020 and BMED581020C controller, the Modicon M580 distributed programmable automation controller (dPAC), which is configured with EcoStruxure™ Automation Expert software in a standalone M580 system that complies with the IEC 61499 standard.

NOTE: Use the same version number between EcoStruxure Automation Expert and the M580 dPAC. For example, only use version 23.1 of EcoStruxure Automation Expert with version 23.1 of M580 dPAC firmware and 23.0 software with 23.0 firmware.

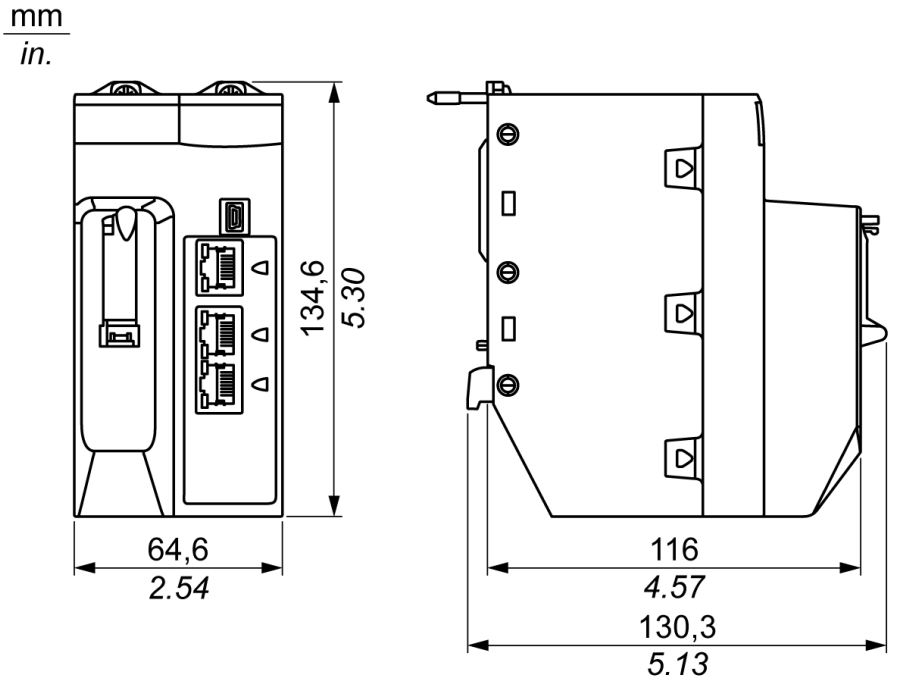
Physical Description

Position on the Local Backplane

The BMED581020 or BMED581020C controller is installed in the two-module slot position directly to the right of the power supply in the main local backplane. The controller cannot be put in any other slot location or any other backplane.

Dimensions

The following graphic shows the front and side dimensions of the controller:

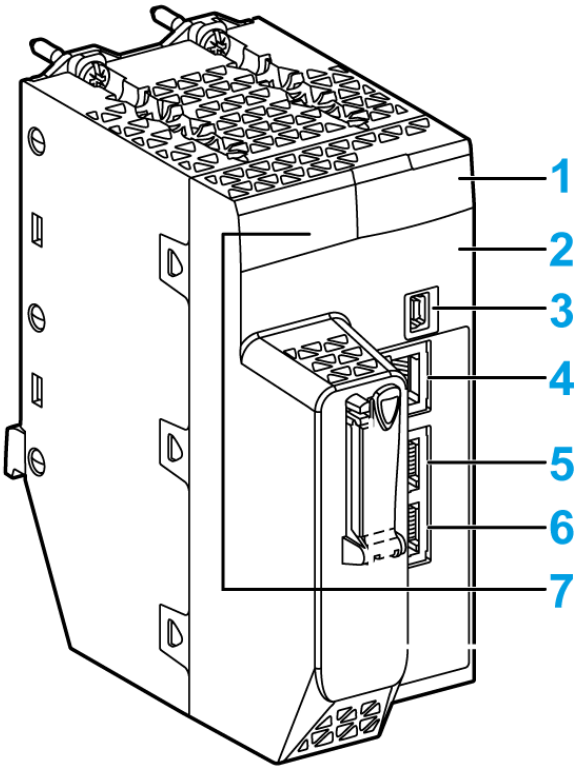


NOTE: Consider the height of the controller when you are planning the installation of the local backplane. The controller extends below the lower edge of the backplane by:

- 29.49 mm (1.161 in.) for an Ethernet backplane
- 30.9 mm (1.217 in.) for an X Bus backplane

Front Panel

Physical features:



Legend:

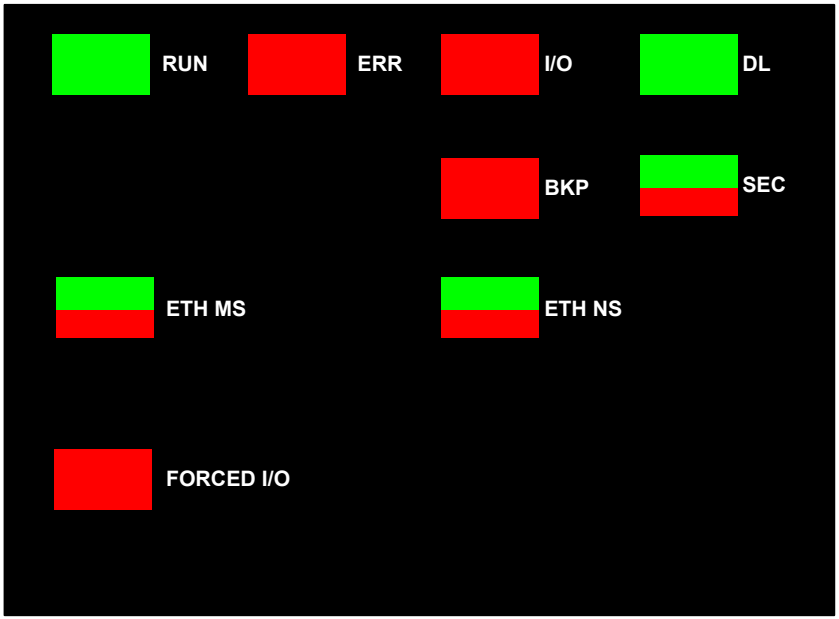
Item	Marking	Description
1	–	LED Display, page 19 for controller status and diagnostics
2	**Eth MAC Address** **xx.xx.xx.xx.xx.xx**	Media Access Control (MAC) address assigned to the controller
	IP ADDRESS: ...	Blank space for you to write the IP address assigned to the controller **NOTE:** The default IP address starts with 10.10 and uses the last two bytes of the MAC address. When the last two octets of the MAC address (*MAC5.MAC6*) correspond to *0.0* in the default address, make a point-to-point cable connection between your computer and the controller, communication module, or other module.

Item	Marking	Description
3		Mini-B USB connector (used only for Schneider Electric Service Personnel)
4	**Service**	RJ45 Ethernet connector, page 28 for the service port
5	**Dual Port/Device Network**	Dual RJ45 Ethernet connectors, page 28 that support distributed equipment
6		
7	—	QR code

LED Display

LED Panel

The following LEDs are located on the front panel of the BMED581020 and BMED581020C controllers:



LED Descriptions

LED Indicator	Description
RUN	**ON**: The controller is in RUN state
ERR	**ON**: The controller or system has detected an error
I/O	**ON**: The controller or system has detected an error in one or more I/O modules
DL (*download*)	• **Flashing**: Firmware update in progress • **OFF**: No firmware update in progress
BKP	**ON** • The memory card or the controller flash memory is missing or inoperable • The memory card is not usable (incorrect format, unrecognized type) • The memory card or the controller flash memory content is inconsistent with the application • The memory card has been removed and reinserted • The **controller** performed a **Project Backup** and a **Backup Clear** command. The **BKP** LED stays **ON** until the project is successfully backed-up. **OFF**: The memory card or the controller flash memory is valid, and the application in the execution memory is identical
SEC	• **ON** (green): The cybersecurity features have been configured, and the controller is configured in **Secure** mode • **OFF** (red): The cybersecurity features have not been configured, and the controller is not configured in **Secure** mode For details, refer to the Cybersecurity Rotary Switch topic, page 31.
ETH MS	**Module Status** (green/red): Indicates the Ethernet port configuration status
ETH NS	Network Status (green/red): Indicates the Ethernet connection status
FORCED I/O	• **ON** (red): If I/O is forced • **OFF**: If I/O is not forced

The table below illustrates the LED indicator pattern symbols. These symbols are used to describe the LED patterns according to the controller states in the subsequent tables.

Symbol	Description	Symbol	Description
	Steady Green		Flashing Green
	Steady Red		Flashing Red
	Steady Orange		Flashing Orange
	Off	–	

Powering On

The table below illustrates the LED patterns when the controller is powering on:

Controller State	RUN	ERR	I/O	DL	ETH MS	ETH NS	FORCED I/O	SEC
Power off								
Power on: Phase 1								
Phase 2								
Phase 3								
Phase 4								
Phase 5: Auto-test								

I/O Data Communication Not Established (Not Configured)

The table below illustrates the LED patterns when the controller did not establish I/O data communication (Not configured):

Controller State	RUN	ERR	I/O	DL	ETH MS	ETH NS	FORCED I/O	SEC
Out of box, no configuration								 Cybersecurity not configured
CLEAN state		  Reboot after non-recoverable error						 Cybersecurity configured  Cybersecurity not configured

I/O Data Communication Established (Configured)

The table below illustrates the LED patterns when the controller has established I/O data communication (Configured):

Controller State	RUN	ERR	I/O	DL	ETH MS	ETH NS	FORCED I/O	SEC
STOP state						 EtherNet/ IP configured  EtherNet/ IP not configured		 Cyberse-curity configured
RUN state						 EtherNet/ IP configured  EtherNet/ IP not configured	 I/O forced  I/O not forced	 Cyberse-curity configured

Detected Error States

The table below illustrates the LED patterns when the controller has detected an error:

Controller State	RUN	ERR	I/O	DL	ETH MS	ETH NS	FORCED I/O	SEC
Recoverable error								Depends on configuration (OFF, red, green)
Non recoverable error								
Duplicate IP address	—	—	—	—				Depends on configuration (OFF, red, green)

Firmware Update

The table below illustrates the LED patterns on the controller during a firmware update done from the state NO CONFIGURATION or CLEAN:

Controller State	RUN	ERR	I/O	DL	ETH MS	ETH NS	FORCED I/O	SEC
Firmware update: Phase 1								 Cybersecurity not configured  Cybersecurity configured
Phase 2								Depends on configuration (OFF, red, green)
Phase 3								Depends on configuration (OFF, red, green)
Phase 4								Depends on configuration (OFF, red, green)

The table below illustrates the LED patterns on the controller during a firmware update done from the STOP state:

Controller State	RUN	ERR	I/O	DL	ETH MS	ETH NS	FORCED I/O	SEC
Firmware update: Phase 1						 EtherNet/ IP configured  EtherNet/ IP not configured		 Cyberse-curity configured
Phase 2								Depends on configura-tion (OFF, red, green)
Phase 3								Depends on configura-tion (OFF, red, green)
Phase 4								Depends on configura-tion (OFF, red, green)

The table below illustrates the LED patterns on the controller during a firmware update done from a recoverable error state:

Controller State	RUN	ERR	I/O	DL	ETH MS	ETH NS	FORCED I/O	SEC
Firmware update: Phase 1								 Cyberse-curity configured
Phase 2								Depends on configura-tion (OFF, red, green)
Phase 3								Depends on configura-tion (OFF, red, green)
Phase 4								Depends on configura-tion (OFF, red, green)

Ethernet Ports

Introduction

There are three RJ45 Ethernet ports on the front of the BMED581020 and BMED581020C controllers: one service port, and two device network ports. The ports share the characteristics described below.

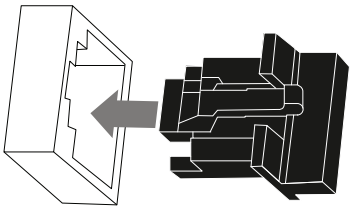
Common Characteristics

The three ports have the same RJ45 connector and use the same type of Ethernet cables.

NOTE: The three controller ports are connected to chassis ground, and the equipment requires an equipotential ground.

Dust Cover

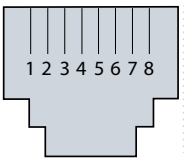
To keep dust from entering the unused Ethernet ports, cover the unused ports with the stopper:



Ethernet Ports

Each RJ45 connector has a pair of LED indicators:

The pin positions, pinouts, and cable connections are the same on the three RJ45 Ethernet ports:

Pin	Description	
1	TD+	Pinout: 
2	TD-	
3	RD+	
4	not connected	
5	not connected	
6	RD-	
7	not connected	
8	not connected	
—	shell/chassis ground	

NOTE: The TD pins (pins 1 and 2) and the RD pins (pins 3 and 6) can be reversed to allow the exclusive use of straight-through cables.

The ports have an auto MDIX capability that automatically detects the direction of the transmission.

Choose from these Ethernet cables to connect to the Ethernet ports:

- TCSECN3M3M••••: Cat 5E Ethernet straight-through shielded cable, rated for industrial use, CE- or UL-compliant
- TCSECE3M3M••••: Cat 5E Ethernet straight-through shielded cable, rated for industrial use, CE-compliant
- TCSECU3M3M••••: Cat 5E Ethernet straight-through shielded cable, rated for industrial use, UL-compliant

The maximum length for a copper cable is 100 m. For distances greater than 100 m, use fiber optic cable. The controller does not have fiber ports on it. You may use BMXNRP•••• fiber converter modules to handle the copper-fiber conversion.

Ethernet Ports LED Status

On the BMED581020 and BMED581020C controllers, the **ACT** LED is green. The **LNK** LED is either green or yellow, depending on the status:

LED	LED Status	Description
ACT	OFF	No activity is indicated on the Ethernet connection.
	ON / flashing	Data is being transmitted and received on the Ethernet connection.
LNK	OFF	No link is established at this connection.
	ON green	A 100 Mbps link* is established at this connection.
	ON yellow	A 10 Mbps link* is established at this connection.
* The 10/100 Mbps links support both half-duplex and full-duplex data transfer and autonegotiation.		

Grounding Considerations

⚠⚠DANGER

ELECTRICAL SHOCK

Wear personal protective equipment (PPE) when working with shielded cables.

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

Follow all local and national safety codes and standards.

The backplane for the M580 dPAC is common with the functional ground (FE) plane and must be mounted to a properly grounded mounting panel or support.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Connect the backplane to the functional ground (FE) of your installation.

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

Cybersecurity Rotary Switch

Introduction

A four-position rotary switch is located on the back of the module. Set this rotary switch to configure a mode for the controler.

NOTE: A plastic screwdriver is provided for your convenience; use it, or an equivalent, to change the position of the rotary switch. Avoid using metal screwdrivers.

Rotary Switch Settings

⚠WARNING

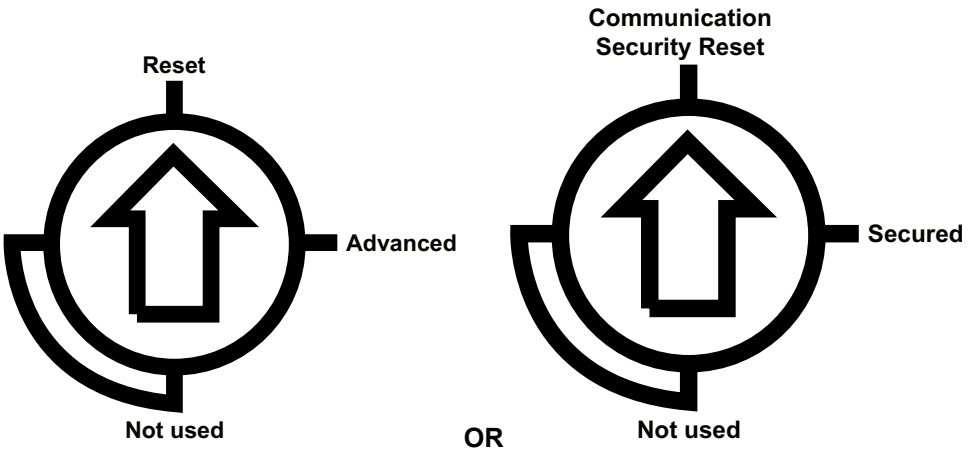
UNINTENDED EQUIPMENT OPERATION

Set the rotary switch only to the exact *clock position* that corresponds to your security configuration:

- *12 o'clock:* **Reset** or **Communication Security Reset**
- *3 o'clock:* **Advanced** or **Secured**
- *6 o'clock/9 o'clock:* **Not used**

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

A view of the four-position rotary switch on the back of the module, depending on the controller version:



Use the screwdriver to select a rotary switch position according to the table below:

Icon	Setting	Description
Reset or **Communication Security Reset**	Factory reset / out-of-box configuration is set.	The module resets to factory settings. The factory settings delete the boot project, the device configuration, and the persistent data. Then, the factory reset implements its out-of-box cybersecurity configuration.
Advanced or **Secured**	Advanced or Secured mode is on (default position).	The module is now in secured cybersecurity mode.
Not used		This rotary switch position is not used.

Changing the Rotary Switch Settings

Configure the mode for the module in the backplane:

Step	Action
1	Remove power from the controller and remove it from the backplane.
2	Change the rotary switch position to **Reset** or **Communication Security Reset**
3	Re-insert the controller in the backplane, apply power and wait 1 minute before proceeding to the next step. **Result**: The module performs a factory reset and is done when the RUN LED is steady green. **NOTE:** Refer to *LED Display* chapter in the document for more information.
4	Remove power from the controller and remove it from the backplane.
5	Change the rotary switch position to **Advanced** or **Secured**.
6	Re-insert the module in the backplane and apply power. **Result**: After a successful factory reset, the expected state of the RUN LED is flashing.

Standards and Certifications

Download

Click the link in the following table that corresponds to your preferred language to download standards and certifications (in PDF format) from www.se.com that apply to the modules in this product line.

Title	Languages
Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications	• English: EIO0000002726 • French: EIO0000002727 • German: EIO0000002728 • Italian: EIO0000002730 • Spanish: EIO0000002729 • Chinese: EIO0000002731

Installing the Controller on an M580 Backplane

Overview

This chapter explains how to install the controller on an M580 backplane.

Selecting Backplanes, Power Supplies, and Cables

Compatible Backplanes

Backplane reference	Description
BMEXBP0400 and BMEXBP0400H	4-slot Ethernet backplane, hardened version available
BMEXBP0602 and BMEXBP0602H	6-slot Ethernet backplane for redundant power supply, hardened version available
BMEXBP0800 and BMEXBP0800H	8-slot Ethernet backplane, hardened version available
BMEXBP1002 and BMEXBP1002H	10-slot Ethernet backplane for redundant power supply, hardened version available
BMEXBP1200 and BMEXBP1200H	12-slot Ethernet backplane, hardened version available
BMXXBP0400B and MXXBP0400H	4-slot backplane, hardened version available
BMXXBP0600 and BMXXBP0600H	6-slot backplane, hardened version available
BMXXBP0800 and BMXXBP0800H	8-slot backplane, hardened version available
BMXXBP1200 and BMXXBP1200H	12-slot backplane, hardened version available
BMXXBE1000 and BMXXBE1000H	Backplane expander, hardened version available
BMXXBE2005	Backplane expander kit

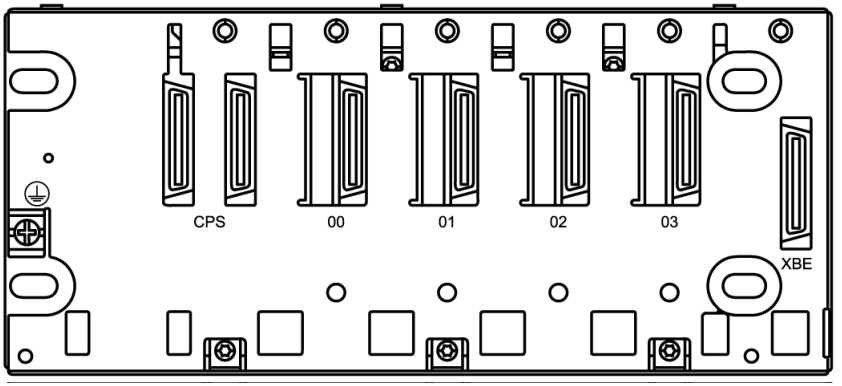
NOTE: When your installation has more than one local backplane, install the BMXXBE1000 backplane expander module in the slot marked **XBE** on the X80 backplane.

Verify that the controller is installed in the two slots marked **00** and **01** on the local backplane before energizing the system.

NOTE: For detailed information about X80 backplanes, including the installation procedure, refer to *Modicon X80 backplane and Power Supply Installation in EcoStruxure Automation Expert Systems* in the *SE.IoX80 Library*, which is located in the *EcoStruxure Automation Expert* main help.

Backplane Markings

Backplane example with slot markings:



Legend:

Legend marker	Description
CPS (Compatible Power Supply)	Backplane slots for installing an X80 power supply module
00, **01**, **02**, and **03**	Backplane slots for installing the controller and X80 I/O modules **NOTE:** The controller is installed in the two slots marked **00** and **01**.
XBE (X Bus expander module)	Slot for installing an X Bus expander module if you use an extended backplane

Compatible Power Supplies

Power supply reference	Description
BMXCPS2000 and BMXCPS2000H	100...240 VAC power supply, hardened version available
BMXCPS2010	Isolated 24 VDC power supply
BMXCPS3020and BMXCPS3020H	High power isolated 24-48 VDC power supply, hardened version available
BMXCPS3500 and BMXCPS3500H	High power 100...240 VAC power supply, hardened version available
BMXCPS3522 and BMXCPS3522H	High power 125 VDC power supply, hardened version available
BMXCPS3540T	High power 125 VDC power supply
BMXCPS4002 and BMXCPS4002H	High power 100...240 VAC power supply, hardened version available
BMXCPS4022 and BMXCPS4022H	Redundant 24-48 VDC power supply, hardened version available

NOTE: For detailed information about X80 backplanes, including installation procedures, refer to *Modicon X80 backplane and Power Supply Installation in EcoStruxure Automation Expert Systems* in the *SE.IoX80 Library*, which is located in the *EcoStruxure Automation Expert* main help.

Compatible Extension Cables

Cable reference	Description
BMXXBC008K	Backplane extension cable 0.8 m
BMXXBC015K	Backplane extension cable 1.5 m
BMXXBC030K	Backplane extension cable 3 m
BMXXBC050K	Backplane extension cable 5 m
BMXXBC120K	Backplane extension cable 12 m

Installing the Controller

Installation Precautions

Confirm that the power supplies are de-energized before installing the controller.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

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

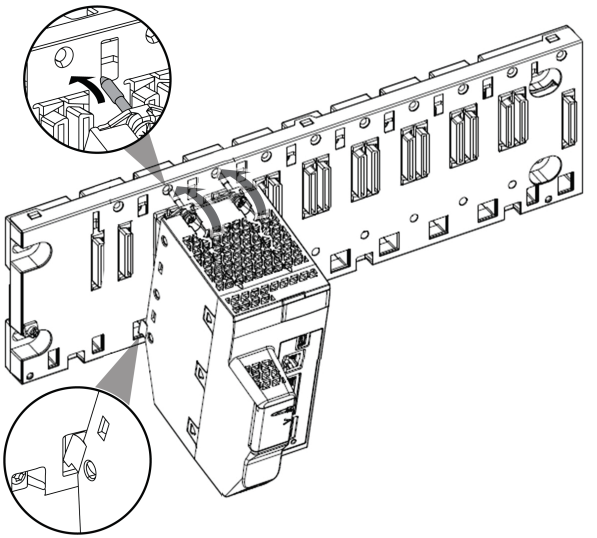
Failure to follow these instructions will result in death or serious injury.

Remove the protective cover from the backplane slot connectors before inserting the controller in the backplane.

Installing the Controller

Install the controller in the backplane slots marked **00** and **01**.

Follow these steps to install the controller:

Step	Action	Illustration
1	Verify that the power supply is disconnected.	–
2	Verify that: • the connectors protective covers are removed • the controller is placed on the slots marked **00** and **01**	
3	Position the locating pins situated at the rear of the module (on the bottom part) in the corresponding slots in the backplane.	
4	Swivel the module towards the top of the backplane so that the module sits flush with the back of the backplane. **Result:** The module is now set in position.	
5	Tighten the two screws on top of the controller to maintain the module in place on the backplane. tightening torque: 0.7...1.5 N•m (0.52...1.10 lbf-ft)	–

Configuring the Controller

To learn more about how to configure an M580 dPAC, including X80 I/O modules and faceplates, watch https://www.youtube.com/watch?v=B5fLULHHxKc&list=PLa7UGrWOTyjkvGehn-WZtJ9Aif36xTemR&index=14.

Main Rack Off / Extended Rack On

Output Changes

As soon as a power outage is detected:

- The outputs of the modules on the main backplane are set to zero.
- The outputs of the modules on the extended backplane are set to fallback.

When power is restored, the outputs on the extended backplane remain in the fallback position until they are updated by the task.

Extended Backplane

If a power outage occurs only on the main backplane where the controller is located, the outputs of the extended backplane are set to the fallback state as soon as the controller communication interruption is detected. The outputs remain in the fallback state until backplane communication resumes, and the controller has updated the output image table.

Firmware Update with EcoStruxure Automation Device Maintenance

Abstract

This chapter contains important information about the hardware/firmware/software delivery of the product Modicon M580 Distributed PAC. Read the chapter before you use the product or products that are described in here.

Product Identification

Firmware Identification

Version	Release Date
23.1	December 2023

Device Identification

Reference	Description	Software Version	Firmware Version	Date
BMED581020	Modicon M580 Distributed PAC (Standard)	23.1	23.1	December 2023
BMED581020C	Modicon M580 Distributed PAC (Conformal Coated)	23.1	23.1	December 2023

Firmware Upgrade Compatibility

Firmware upgrade / downgrade compatibility:

From \ To	20.1	20.2	21.1	21.2	22.0	22.1	23.0	23.1
20.1	N/A	Yes	No(1)	No(1)	No(1)	No(1)	No(1)	No(1)
20.2	Yes	N/A	No(1)	No(1)	No(1)	No(1)	No(1)	No(1)
21.1	No	No	N/A	Yes**	Yes**(2)	Yes**(2)	Yes**(2)	Yes**(2)
21.2	No	No	Yes*	N/A	Yes(2)	Yes(2)	Yes(2)	Yes(2)
22.0	No	No	No	No	N/A	Yes	Yes	Yes
22.1	No	No	No	No	Yes*	N/A	Yes	Yes
23.0	No	No	No	No	Yes*	Yes	N/A	Yes
23.1	No	No	No	No	Yes*	Yes	Yes	N/A

*You may not be able to downgrade the firmware version (even for minor revisions) if a later firmware version fixes vulnerabilities / security breaches. The previous firmware to which a downgrade may not be possible is referred to as excluded. The EcoStruxure™ Automation Device Maintenance (EADM) tool does not verify for excluded previous firmware versions and it returns an “403 Invalid package” error during installation if you try to downgrade to such a version.

**The firmware is upgraded in two steps so that the OPC UA factory configuration files are installed properly. That is, there is a need to install twice the same version consecutively. This is due to some Default Configuration files for OPC UA which have been integrated into the installation package and requires first the upgrade of the firmware to v21.2 in order for the second step to be deployed.

(1)You cannot upgrade from v20.2 or earlier to v21.1 because the firmware requires upgraded controller hardware.

(2)To upgrade from v21.2 or earlier to v22.0 or later contact your local Schneider Electric service representative.

Updating the Firmware

Introduction

EcoStruxure Automation Expert V23.1 requires compatible firmware for BMED581020 and BMED581020C modules.

If the firmware of those modules is earlier than V23.1, update the version following the installation guide provided for this update. This installation guide provides the required steps to perform the update.

NOTICE
INOPERABLE EQUIPMENT Do not attempt to install to the latest firmware without completing all steps of the installation process described in the present document. **Failure to follow these instructions can result in equipment damage.**

Step 1	Preparing the Device for Firmware Installation, page 42
Step 2	Installing the Temporary Firmware, page 45
Step 3	Installing the Latest Firmware, page 52

Follow the steps in the following table in the order they are presented for proper operation.

If the firmware version is ...	Then...
Earlier than V22.0.22174	Apply Step1, Step2, and Step3.
V22.0.22174 or later	Apply Step1 and Step3.

After upgrading, you will be unable to downgrade to any previous firmware version. Any attempt to downgrade or override the updated firmware will result in a detected “403 Invalid Package” error. Restart the controller.

During the installation process, your password is required.

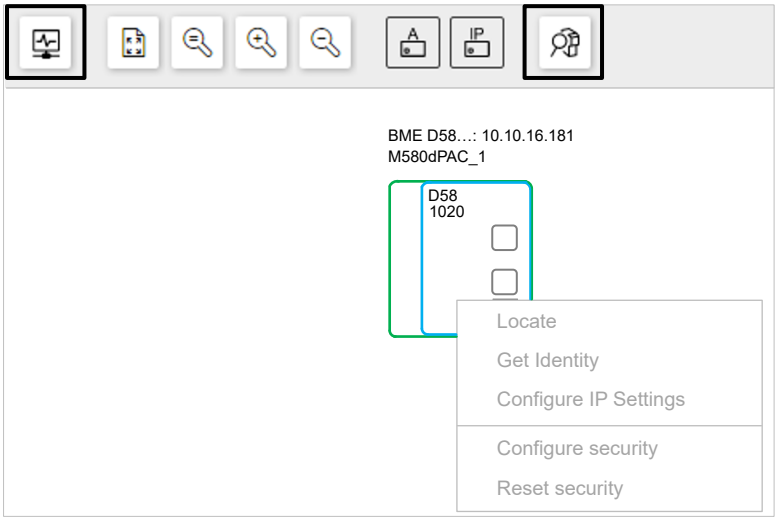
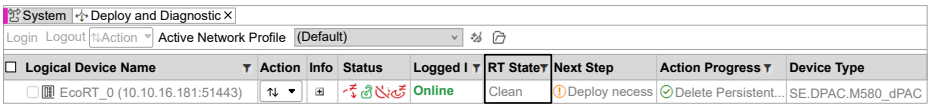
⚠WARNING
UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED EQUIPMENT OPERATION • Do not distribute passwords to unauthorized or otherwise unqualified personnel. • Limit access-rights to personnel essential to your application needs. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Installation Instructions

Step 1: Preparing the Device for Firmware Installation

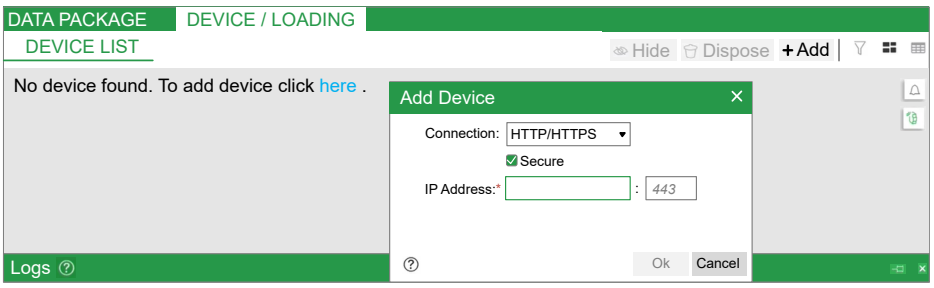
Follow these steps to set the device date:

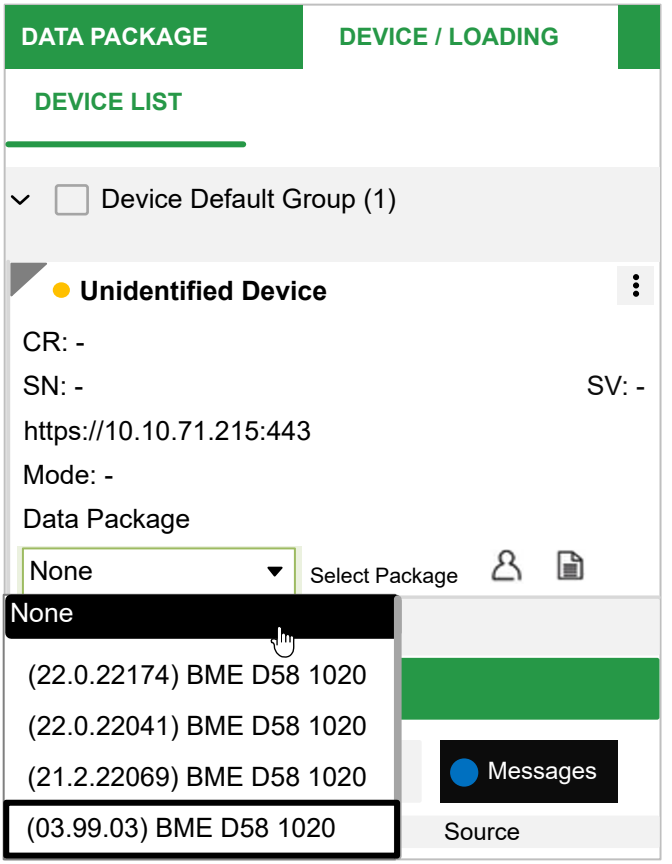
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Use the EcoStruxure™ Automation Device Maintenance (EADM) tool to upgrade the firmware of the controller. The tool enables you to:
Automatically or manually discover one or more modules in your project based on IP addresses.
Upgrade the latest firmware version to various modules in your network.
(More information about the EADM tool can be found in the EcoStruxure™ Automation Expert software main help.)</td></tr>
<tr><td>2</td><td>Set the device date to authenticate the firmware packages. You can use one of the following methods to set the date and time of your module:
Set up an NTP server and configure the device that you want to synchronize with the NTP server.
(More information about the NTP server configuration can be found in the EcoStruxure Automation Expert User Manual, NTP Server Configuration chapter).
OR
Use the factory reset setting, which, after a device restart, changes the date to the date of the firmware build, following the steps below:<table><tr><th>Step</th><th>Action</th></tr><tr><td>1</td><td>Remove the module from the rack.
NOTE: If you have not already installed the module in the rack, proceed to the next step.</td></tr><tr><td>2</td><td>Change the switch setting to Reset or Communication Security Reset, depending on the marketed version.</td></tr><tr><td>3</td><td>Re-insert the module in the rack to power it up in Reset or Communication Security Reset mode and wait 1 minute before proceeding to the next step.
Result: The module performs a factory reset and is properly powered when the RUN LED is steady green.</td></tr><tr><td>4</td><td>Remove the module from the rack again.</td></tr><tr><td>5</td><td>Change the switch setting to Advanced or Secured,depending on the marketed version.</td></tr><tr><td>6</td><td>Re-insert the module in the rack to power it up in the selected Advanced or Secured mode.
Result: The Run LED state expected after a reboot is flashing.</td></tr></table>(More information about the factory reset setting can be found in the Modicon M580 Distributed PAC Composite Automation Type Online Help, Cybersecurity Rotary Switch chapter).</td></tr>
</table>

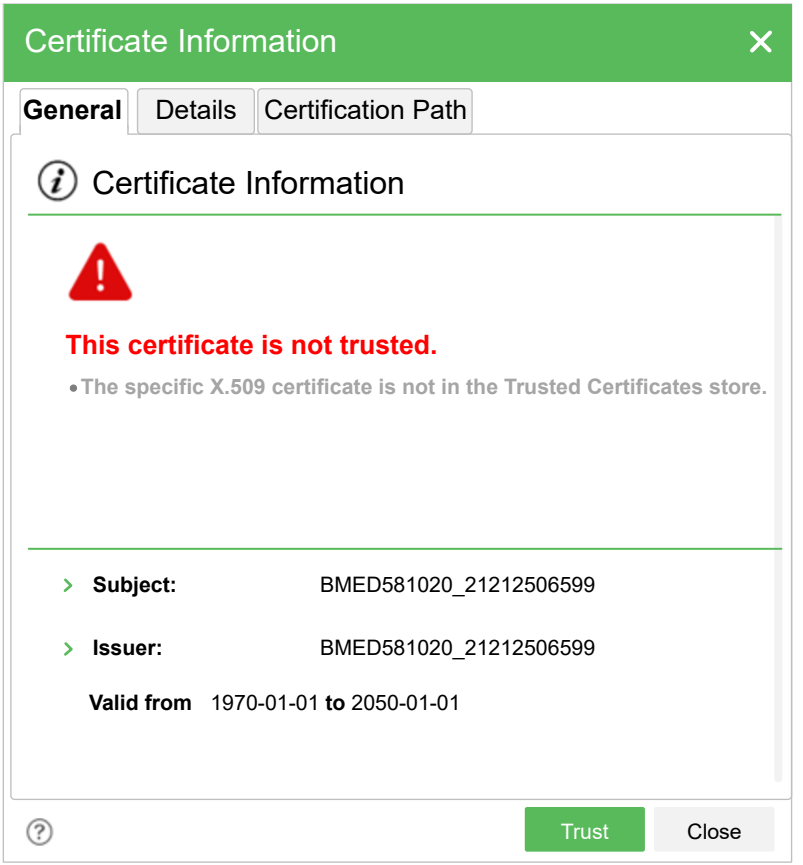
Step	Action
3	Before upgrading your firmware: • Confirm that the EcoStruxure Automation Expert version supports the firmware version you are installing. • Stop EcoStruxure Automation Expert monitoring in the Topological View. • Close EcoStruxure Automation Expert discovery view in the Topological View. Start/Stop Monitoring Open/Close Discovery View 
4	Before upgrading the firmware, confirm that the Modicon M580 Distributed PAC runtime state is **CLEAN**, **READY**, or **STOPPED** as follows: **Modicon M580 distributed PAC State** • CLEAN[1] • READY[1] • STOPPED[1] • RUNNING[2] • ONLINE CHANGE[2] • ERRORHALT[2] **Upgrade Status** 1 = ALLOWED 2 = REFUSED 

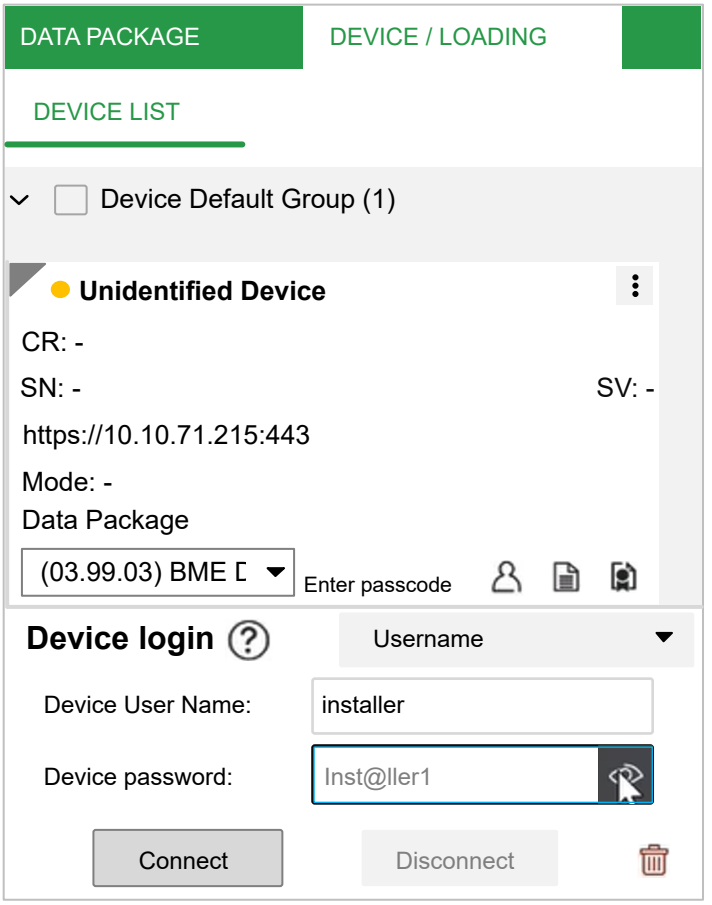
Step 2: Installing the Temporary Firmware

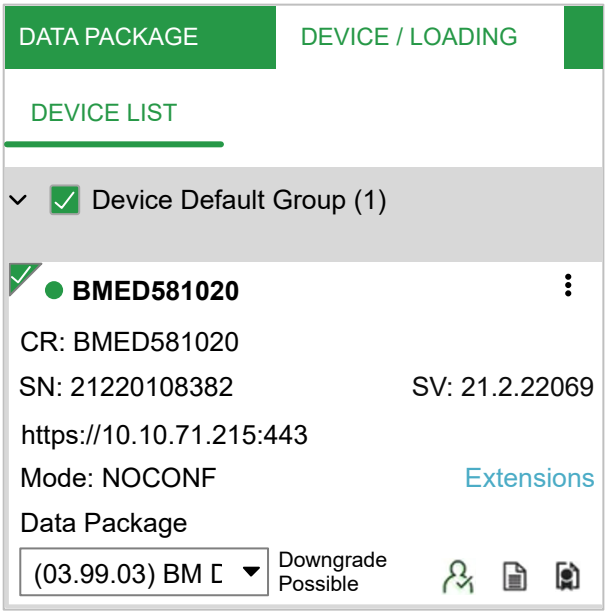
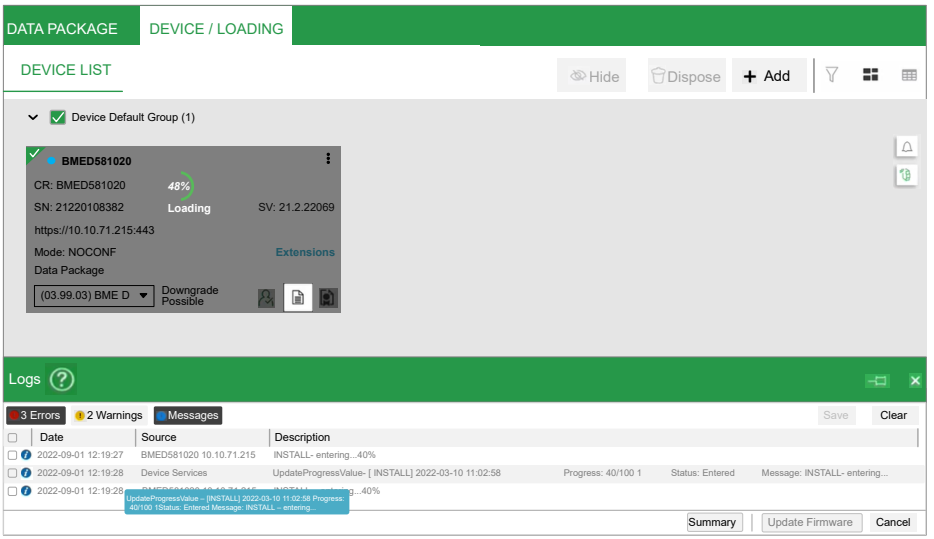
Follow these steps to install the temporary firmware:

Step	Action
1	Use the **Service Port** to connect the device that needs to be configured on the same network as the EcoStruxure™ Automation Device Maintenance (EADM) tool. **NOTE:** Some firewall software may block the discovery. If you are unable to discover the device, disable firewall. Consult your system administrator.
2	Click **Settings**. Confirm that the **Package Settings** are as follows: • **Local Repository**: the local folder from which the package is uploaded • **Remote Repository**: the remote folder from which the package is uploaded **NOTE:** Keep only one SEDP PACKAGE LOCATION. By default it is located in: C:\Users \Public\Documents\Schneider Electric\Data Packages
3	In the **Discovery:** field, select **Manual**. For detailed information on how to use the discovery function, refer to the EcoStruxure™ Automation Device Maintenance (EADM) user manual.
4	If no device is listed, click **To add a device click here**. The **Add Device** window is displayed and you can set the parameters. Confirm that the device settings are as follows: • **Connection** : HTTP/HTTPS • **Secure**: select to indicate it is activated • **IP Address**: type the IP address of your device **NOTE:** Use only IPv4 address for the installation. Then, click **OK**. 
5	In the **Data Package** list for device, select the required file: (03.99.03) BME D58 1020. **NOTE:** In order to have the desired firmware version available in the **Data Package** drop-down list, download it from the Schneider Electric home page www.se.com/ww/en/download/ and deposit it in the **Local Repository**.

Step	Action
	
6	Click the **Certificate information** icon  and then, if you agree to proceed, click **Trust**.

Step	Action
	
7	Click the **User** icon in the listed device. **NOTE:** The **User** icon remains grayed out until a package is selected and the certificate is trusted.
8	Click the **Device login** icon in the listed device. In the **Device login** dialog box, enter your credentials. Then click **Connect**. **NOTE:** If your device is not secured, use (Device User Name: installer; Device password: Inst@ller1), otherwise, use the credentials you configured.

Step	Action
	 The device status is now online (indicated by the small icon ●). The device is now ready for configuration.

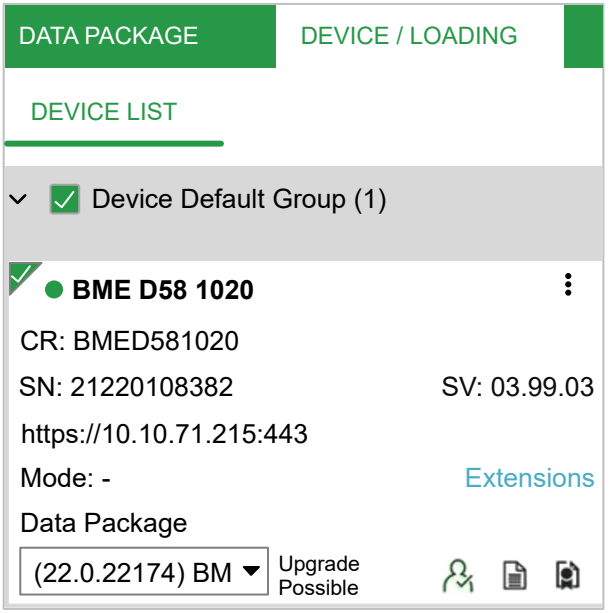
Step	Action
	
9	Verify that the selected package is (03.99.03) BMED581020.
10	Click **Update Firmware** at the bottom of the Main view. The EcoStruxure™ Automation Device Maintenance (EADM) tool will update the target device with the new firmware and notify you once finished. 

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td></td><td>Interrupting the update procedure before it is completed will cause the connection to be lost and can cause irreparable damage to the device.

NOTICE
INOPERABLE EQUIPMENT
• Do not power OFF the module or PC during the update of the firmware file.
• Do not shut down EcoStruxure™ Automation Device Maintenance (EADM) tool or disconnect the communication cable.
Failure to follow these instructions can result in equipment damage.

Wait while your device reboots. This may take several minutes and you may experience time-outs in the EcoStruxure™ Automation Device Maintenance (EADM) tool. During the reboot, your device will not be reachable.</td></tr>
<tr><td>11</td><td>After the temporary firmware is installed, your device will restart. During this restart, the ETH MS status LED will remain ON and orange for approximately 60 seconds, then the following status LEDs will flash:
• RUN
• ERR
• IO
Do not restart or remove power from the device after this step is finished.

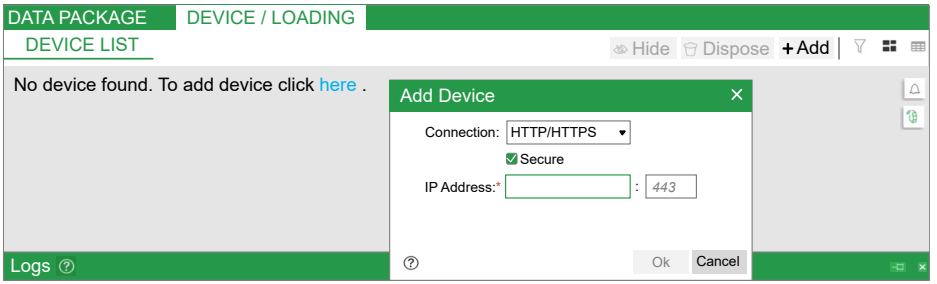
NOTICE
INOPERABLE EQUIPMENT
Do not restart or remove power from the device after this step is finished.
Failure to follow these instructions can result in equipment damage.</td></tr>
</table>

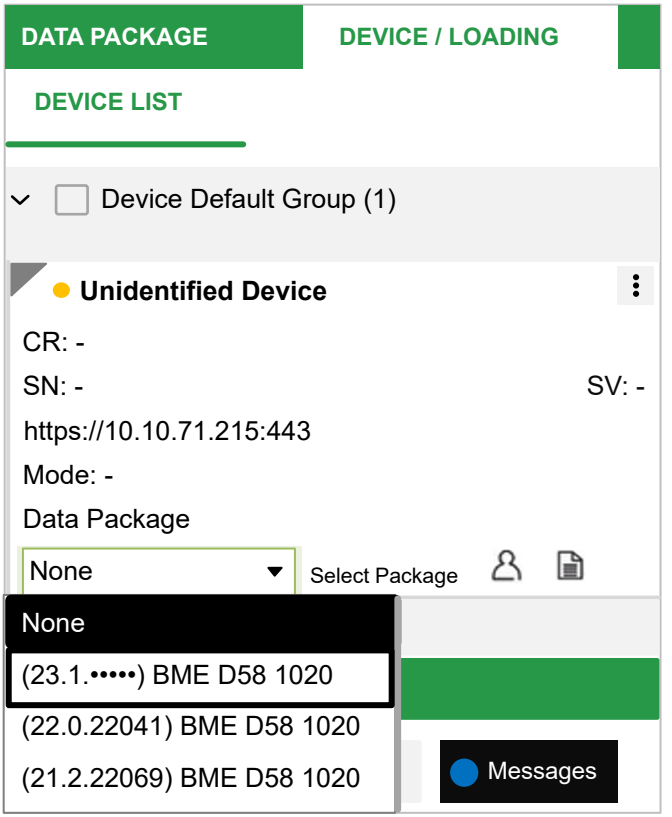
Step	Action
12	After the device restarted, confirm that the temporary firmware update is successfully done: • Click the **Certificate information** icon and then, if you agree to proceed, click **Trust** . • Click the **User** icon in the listed device. **NOTE:** The **User** icon remains grayed out until a package is selected and the certificate is trusted. • Click the **Device login** icon in the listed device. In the **Device login** dialog box, enter the credentials. Then click **Connect**. **NOTE:** If your device is not secured, use (Device User Name: loader; Device password: fwdownload), otherwise, use the credentials you configured.  **NOTE:** The device cannot be operated until **Step 3: Installing the Latest Firmware** is followed. Complete this step immediately.

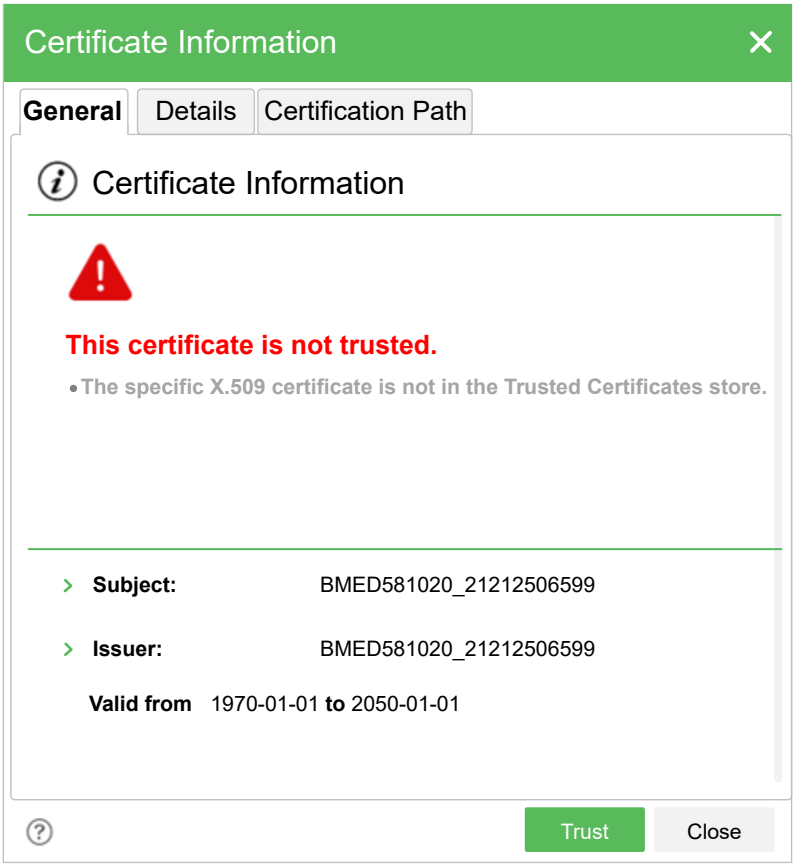
NOTE: Do not login or connect EcoStruxure Automation Expert to the Modicon M580 distributed PAC until all installation steps are completed.

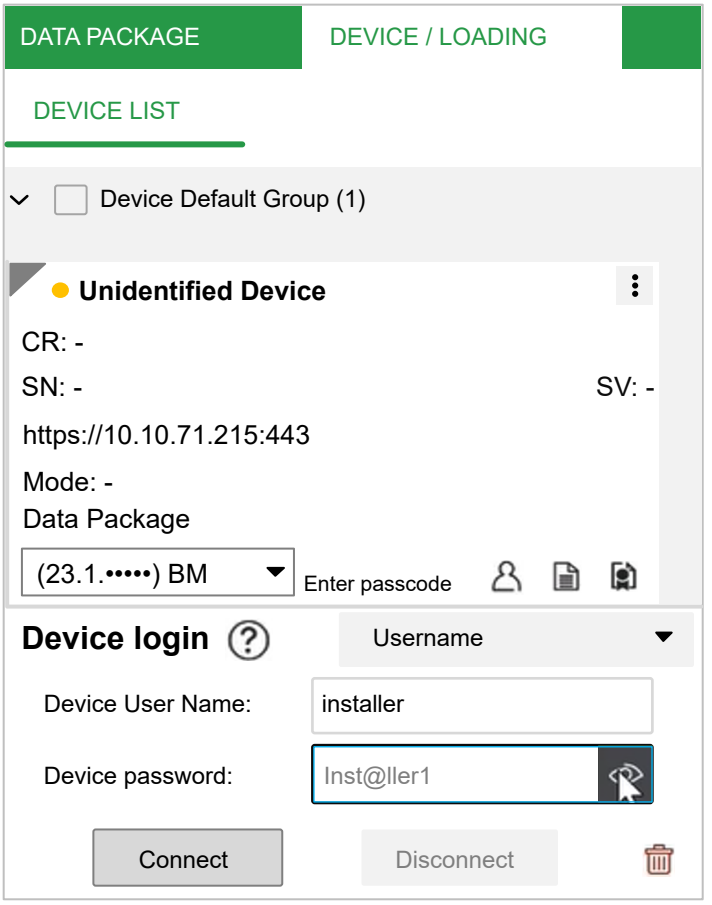
Step 3: Installing the Latest Firmware

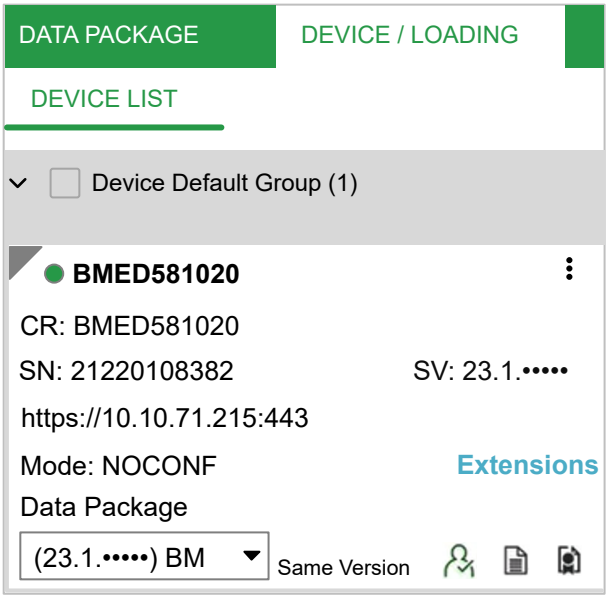
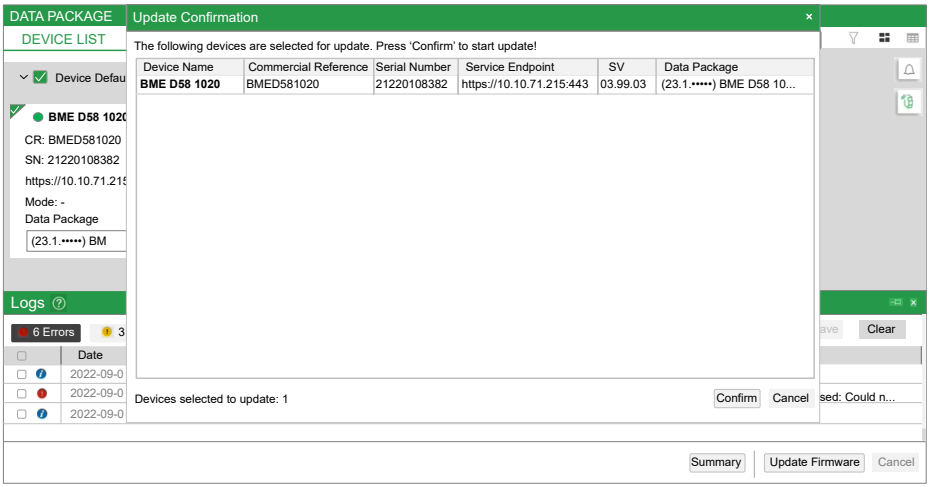
Follow these steps to install the latest firmware:

Step	Action
1	Use the **Service Port** to connect the device that needs to be configured on the same network as the EcoStruxure™ Automation Device Maintenance (EADM) tool. **NOTE:** Some firewall software may block the discovery. If you are unable to discover the device, disable firewall. Consult your system administrator.
2	Click **Settings**. Confirm that the package settings are as follows: • **Local Repository**: the local folder from which the package is uploaded • **Remote Repository**: the remote folder from which the package is uploaded **NOTE:** Keep only one SEDP PACKAGE LOCATION. By default it is located in: C:\Users \Public\Documents\Schneider Electric\Data Packages
3	In the **Discovery:** field, select **Manual**. For detailed information on how to use the discovery function, refer to the EcoStruxure™ Automation Device Maintenance (EADM) user manual.
4	If no device is listed, click **To add a device click here**. The **Add Device** window is displayed and you can set the parameters. During this step the device will only be reachable on its default IP address. Confirm that the device settings are as follows: • **Connection** : HTTP/HTTPS • **Secure**: select to indicate it is activated • **IP Address**: type the IP address of your device **NOTE:** Use only IPv4 address for the installation. Then, click **OK**. 
5	In the **Data Package** list for device, select the latest firmware version (23.1.•••••) BMED581020. **NOTE:** In order to have the desired firmware version available in the **Data Package** drop-down list, download it from the Schneider Electric home page (www.se.com/ww/en/download/) and deposit it in the **Local Repository**.

Step	Action
	
6	Click the **Certificate information** icon  and then, if you agree to proceed, click **Trust** .

Step	Action
	
7	Click the **User** icon in the listed device.
8	Click the **Device login** icon in the listed device. In the **Device login** dialog box, enter the credentials. Then click **Connect**. **NOTE:** If your device is not secured, your credentials are restored to (Device User Name: installer; Device password: Inst@ller1), otherwise, use the credentials you configured.

Step	Action
	 The device status is now online (indicated by the small icon). The device is now ready for configuration.

Step	Action
	
9	Click **Update Firmware** at the bottom of the Main view. The EcoStruxure™ Automation Device Maintenance (EADM) tool will update the target device with the new firmware and notify you once done. **NOTE:** Do not restart or remove power from the device during the update. If the EADM tool is unable to reconnect, restart the EcoStruxure™ Automation Device Maintenance (EADM) tool. 

Step	Action
10	After the firmware is installed, your device will restart. **NOTE:** Do not restart or remove power from the device after installing the temporary firmware. If the EADM tool is unable to reconnect, restart the EcoStruxure™ Automation Device Maintenance (EADM) tool.

Modules Compatible with a BMED581020 or BMED581020C Controller

Overview

The modules in an M580 network that are compatible with a BMED581020 or BMED581020C controller are described in this chapter so that you can construct your distributed equipment efficiently.

Modicon X80 Modules

Introduction

The following I/O modules can be mounted on X80 local backplanes with a BMED581020 and BMED581020C controller in an M580 distributed system.

NOTE: Conformally coated (hardened H) versions of many of these modules are also available. Refer to the specifications for hardened equipment in the *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications* guide.

Analog and Discrete I/O Modules

The following analog and discrete I/O modules are supported in Modicon X80 local backplanes containing a BMED581020 or BMED581020C controller.

Type of module	
Analog input	**Analog output**
BMXAMI0410 and BMXAMI0410H(1)	BMXAMO0210 and BMXAMO0210
BMXAMI0800 and BMXAMI0800H	BMXAMO0410 and BMXAMO0410H
BMXAMI0810 and BMXAMI0810H	BMXAMO0802 and BMXAMO0802H
BMXART0814 and BMXART0814H	BMEAHO0412
BMEAHI0812	
Discrete input	**Discrete output**
BMXDAI0814	BMXDAO1605
BMXDAI1604 and BMXDAI1604H	BMXDDO1602 and BMXDDO1602H

Type of module	
BMXDDI1602 and BMXDDI1602H	BMXDDO3202K
BMXDDI3202K	BMXDDO6402K
BMXDDI6402K	BMXDRA0805 and BMXDRA0805H
	BMXDRA0815 and BMXDRA0815H
	BMXDRA1605 and BMXDRA1605H
Analog input/output	**Discrete input/output**
BMXAMM0600 and BMXAMM0600H	BMXDDM16022 and BMXDDM16022H
BMEAHI0812 and BMEAHO0412	BMXDDM16025 and BMXDDM16025H
	BMXDDM3202K

(1) When the following module is used in the local backplane (containing a BMED581020 or BMED581020C controller), they require these versions or greater.

Module	Product version	Software version
BMXAMI0410 and BMXAMI0410H	PV5	SV1.1

Expert and Communication Module

The following module is supported in an M580 dPAC system:

Module	Module type
BMXEHC0800	Counting sensor module

For details about this module, refer to the *SE.IoX80 CAT Library* in the *EcoStruxure Automation Expert online help*.

Remote I/O Adapter Module

The following module is supported in a dual network M580 dPAC system:

Module	Module type
BMECRD0100	Remote I/O adapter module that manages RIO communication with the BMED581020 controller

For details about this module, refer to the *SE.IoX80 CAT Library* in the *EcoStruxure Automation Expert online help*.

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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