Catalog | July 2025



Modicon M580

PLC/PAC for process, high-availability, and safety solutions

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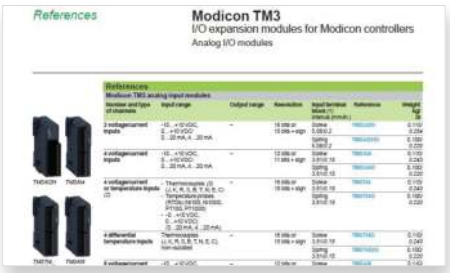
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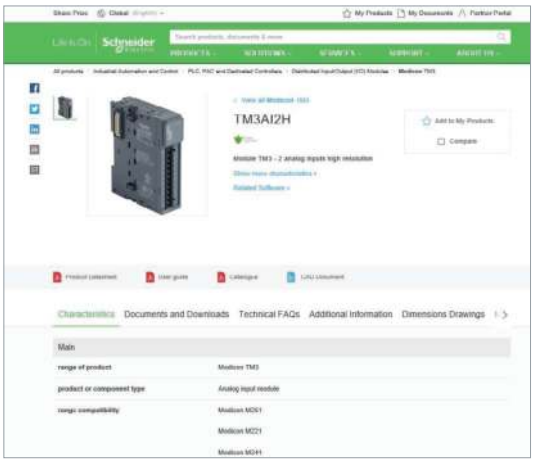
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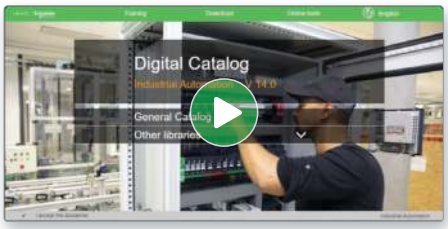


Each commercial reference presented in a catalog contains a hyperlink. Click on it to obtain the technical information of the product:

- Characteristics, Dimensions and drawings, Mounting and clearance, Connections and schemas, Performance curves
- Product image, Instruction sheet, User guide, Product certifications, End of life manual



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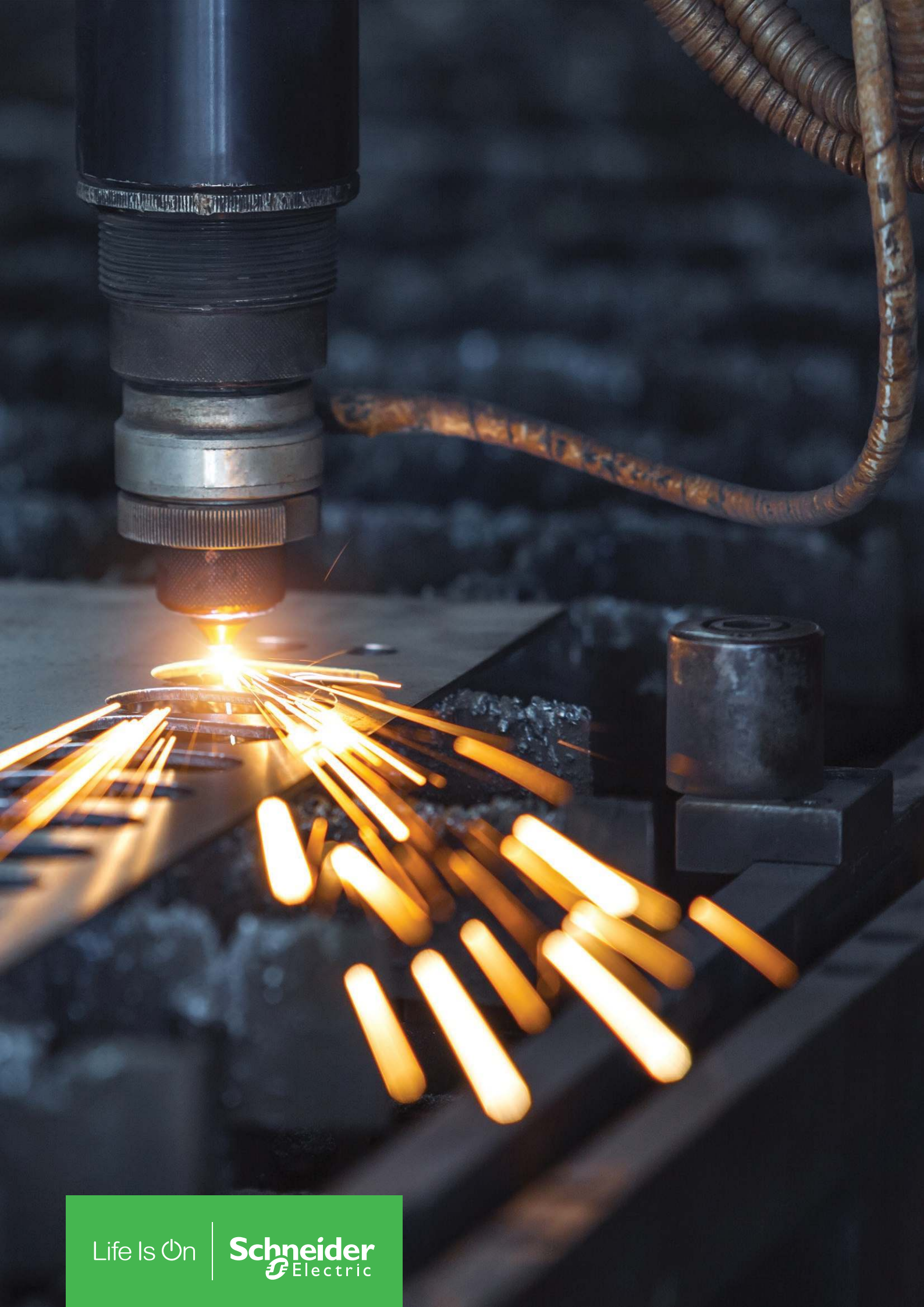
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EcoStruxure™
Innovation At Every Level

Schneider Electric's IoT-enabled, plug-and-play, open, secure, interoperable architecture and platform, in Industries, Infrastructures, Data Centers, and Buildings.

Innovation at every level

EcoStruxure is built on a three-tier technology stack that delivers innovation at every level, ranging from connected products to edge control, as well as Software, apps, analytics, and services.

This approach, combined with our hybrid segment strategy, enhances your value in safety, reliability, operational efficiency, sustainability, and connectivity across six areas of expertise:

- Power
- IT
- Building
- Machine
- Plant
- Grid

Enhanced safety

With the release of Modicon M580 Safety, Schneider Electric further enhances the EcoStruxure platform.

This strengthens our position as one of the most trusted industrial safety vendors, with thousands of Modicon and Triconex safety systems safeguarding the most critical industrial processes worldwide.

Cybersecurity solutions

Having robust cybersecurity protection is essential, and Schneider Electric's solutions can provide it for any business type or industry.

Our vendor-agnostic services, delivered by skilled professionals, protect your entire critical infrastructure. We assist in assessing your risks, implementing tailored cyber solutions, and maintaining your onsite defenses over time, while also integrating the necessary IT policies and requirements.

This sets us apart and gives you a significant advantage.

Dedicated architectures and IoT

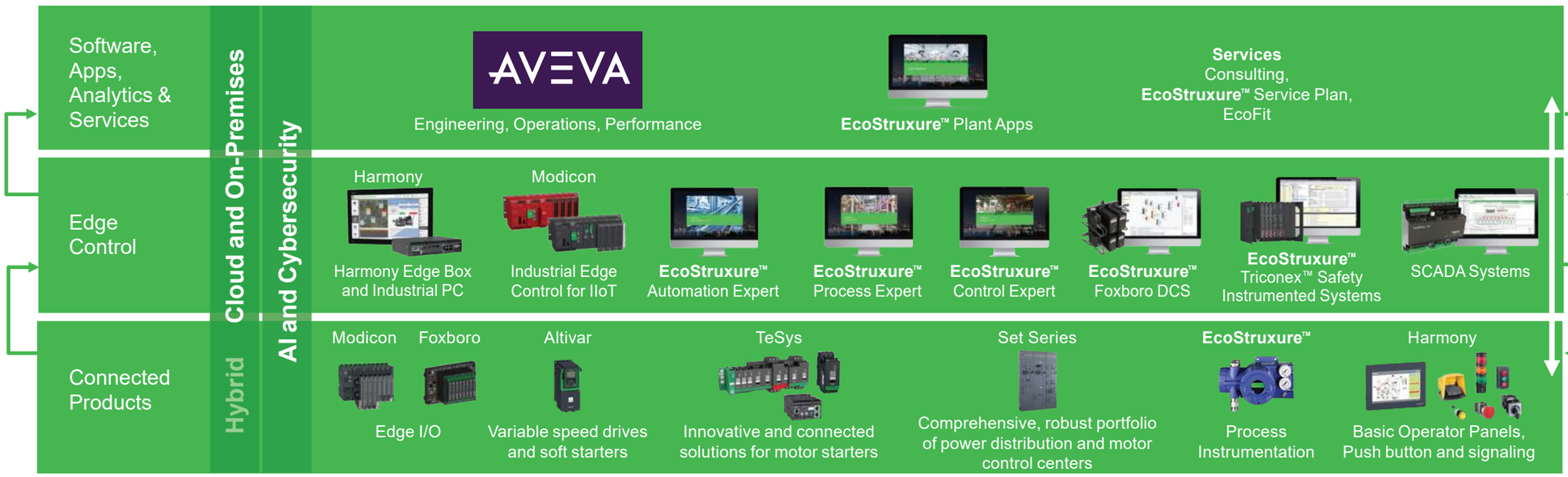
We tailor our solutions in the form of dedicated reference architectures for various types of plants:

- Management systems
- Power systems
- Data center systems
- Industrial plant and machine systems
- Smart grid systems

The Industrial Internet of Things (IIoT) enhances these technologies even further. That's why we offer our customers an IoT-enabled architecture and platform that delivers simple, reliable, productive, and cost-effective solutions.

EcoStruxure™
Innovation At Every Level
Plant

EcoStruxure™ Architecture



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Modicon M580 automation platform

1

Modicon M580 ePAC

PAC and Safety PLC with built-in Ethernet for process, high-availability, and safety solutions

Modicon M580 ePACs (Ethernet programmable automation controllers) offer efficiency, resiliency, enhanced cybersecurity, and safety for automated operations. They are designed with an Ethernet backbone to optimize connectivity and data transparency. Like the Modicon M340 offer, they support the common I/O modules from the Modicon X80 range, which can be easily integrated into their architecture. The powerful processors offer high levels of computation for complex networked communication, data concentration, and control applications.

Standardization on common Modicon X80 in-rack I/O



Reliability

Reliable operations

No single point of failure

- Operations continue in most critical situations
- If an error is detected, automatic switch-over from the primary to the backup controller

High-availability

- Modicon M580 high-availability system based on redundancy of Modicon M580 processors
- Highly scalable architecture for increased overall system availability:
  - Redundant processors (Hot Standby)
  - Redundant power supplies
  - Duplicated communication networks (module redundancy) and link redundancy
  - Redundant switches
- Ring topology with 50 ms recovery time
- PLC availability enhanced by Ethernet link providing a redundant path
- Automatic takeover of alternative equipment in case of a shortcoming happening on one control device
- High-availability system used where no interruption of the process can be tolerated
- Typical applications include critical infrastructure, utilities, and continuous process plants

Increase the reparability of the system with no extra hardware or engineering effort



All Modicon M580 products are being changed from white to gray (in progress)

+ Open and secure solution based on standards

Modicon M580 automation platform
Resilient operations

Efficiency

OPC UA

EtherNet/IP ODVA

ODVA organization: Supports network technologies built on EtherNet/IP

FDT

FDT technology: A widely-accepted international standard in the automation industry

Efficient operations

Scalable network architecture

- Open architecture with direct Ethernet connection on backplane
- Ability to mix local, remote, and distributed equipment on the same Ethernet field network with complete software integration and embedded EtherNet/IP and Modbus/TCP I/O scanner in CPU
- OPC UA module for data-driven operations
- Interface to other popular fieldbus and device networks, including AS-Interface, serial (Modbus, Character), PROFIBUS, CANopen, and HART

Reliable and robust

- Advanced integration of electrical power system and RTU capabilities with IEC 61850, IEC60870-5-101/104, and DNP3
- Based on proven in-rack Modicon X80 I/O
- Compliance with a large number of international environmental standards
- Easy evolution during operations without stopping your process via change configuration on the fly functions (CCOTF)
- Hardened products for severe environments to withstand dust, extreme temperature, shocks, and vibrations beyond IEC standards

Optimized maintenance

- Native module diagnostics (DDT)
- Fast device replacement (FDR) to simplify operations and troubleshooting
- Predictive maintenance for power supplies to reduce maintenance time to a minimum

Easy configuration with online tool

- Select your Modicon M580 system configuration in three simple steps using the online EcoStruxure Modicon PLC Configurator (standalone local I/O only).



Click on the pictogram to access Modicon PLC Configurator online

Smooth modernization

- Software converter tools to modernize legacy code to Modicon M580: tools are embedded into EcoStruxure Control Expert or additional tools are available (UMAC, EcoStruxure Control Engineering)
- Legacy cabling can be adapted through hardware kits to connect existing I/O to Modicon M580 or Quantum S908 RIO bus managed by Modicon M580
- Fieldbuses and communication protocols used in legacy Modicon platforms are fully supported by Modicon M580, including Modicon S908 RIO, Modbus Plus, Ethway, Global Data, and Interbus-S
- Dedicated service teams can support modernization



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+ Modify your process and architecture during runtime

Modicon M580 automation platform
Safe operations



Safer operations

Certified Modicon M580 Safety offer

- Modicon M580 Safety offer:
  - Machine Safety (PLe/Cat4)
  - Process Safety (SIL3)
  - Safety for Railway applications (CENELEC SIL4)
- Modicon M580 Safety is certified by TÜV Rheinland

Various architecture options

- Standalone or redundant Safety controllers
- Embedded CIP Safety service facilitates integration of smart safety devices in the Modicon M580 Safety architecture
- Simple configuration of CIP Safety devices thanks to a ready-to-use DTM catalog

Clear distinction between safety and process with dual processing capabilities

Common safety

- Good practices dictate that control systems must be designed to keep process control functions separate and operationally independent from safety functions. This is usually done using a controller for the process and a separate system for safety.
- Our solution offers dual processing capability to control safety and process functions independently, as required by best practices.
- No need to design, install, and maintain different PACs for process control and safety
- Same tools, wiring methods, and I/O structures as in the Modicon M580 Standard offer

+ Open and secure solution based on standards

Modicon M580 automation platform
Secure operations

More secure operations

Cybersecurity-ready

The Modicon M580 is Schneider Electric's most cyber-secure platform thanks to its advanced built-in cybersecurity features recognized by an Achilles Level 2 certification:

- Protection against growing cyberattacks in the industrial space
- The Modicon M580 controller is certified CSPN by ANSSI (French National Cybersecurity Agency)
- With the Modicon M580 hardware platform:
  - Unused services can be disabled
  - Remote access to PLC can be controlled
  - Communications between Modicon M580 Controller and engineering station with EcoStruxure Control Expert can be secured via a specific HTTPS channel: Secure Engineering Link
  - IPSEC protocols (IKEv2) also help secure all protocols for communication to SCADA and administration networks
  - Secure boot for firmware integrity check is performed
  - Firmware is encrypted and signed
  - Trusted Platform Module to store cryptographic keys
  - EcoStruxure Control Expert executable files check the integrity of Modicon M580 programming software
- Traceability of security events:
  - Modicon M580 processor, communication modules, and EcoStruxure Control Expert implement a SYSLOG client
- Native secure protocols such as OPC UA, DNP3, and IEC 60870-5-104 can be used for SCADA or enterprise communications
- Modicon Managed switches comes with IEC62443-4-2 SL1 certificates

Achilles Level 2 certification

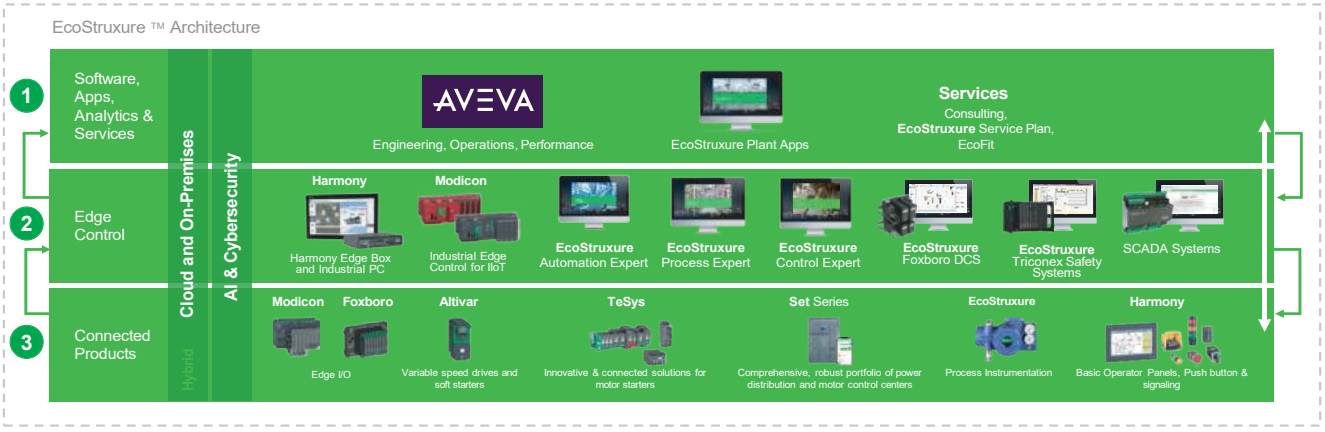
Schneider Electric provides a wide range of security-related solutions and services. Please consult the following pages on our website:

- Cybersecurity services
- Industrial Cybersecurity solutions

+ Modify your process and architecture during runtime

Modicon M580 automation platform
EcoStruxure Plant architecture

Winning associations in EcoStruxure Plant architecture





PLC modernization and migration solutions catalog

Modicon M580 Ethernet PACs, at the Edge Control layer of our EcoStruxure architecture, have strong associations with the following:

1 Apps, Analytics and Services layer

- Integrated Control and Software Solutions with AVEVA System platform. For more details, see our website.
- Modicon Installed Base Services
  - Schneider Electric provides smooth modernization paths to migrate existing wired legacy I/O to Modicon M580. For more details, contact our Customer Care Center or see our website.
  - See the PLC modernization and migration solutions catalog.

2 Edge Control layer

- EcoStruxure Process Expert:
  - DCS for hybrid industries: Single automation system, based on Modicon M580 controllers, to engineer, operate, and maintain the entire infrastructure for a sustainable, productive, and market-agile plant
- AVEVA Plant SCADA (formerly Citect)
  - Manages time-stamped events through OPC server in a system approach
  - Displays Ecostruxure Control Expert diagnostics buffers
  - Integrates objects quickly and easily to provide advanced diagnostic information
- Ecostruxure Foxboro DCS
  - Integration of Modicon M580 PAC systems (used in packaged units or utilities) into the main DCS to reduce engineering costs

3 Connected product layer

- X80 Partner modules
  - See our Technology Partner Program Web page
- HMI Harmony range
  - Web server access, multiple screens on Ethernet backbone, diagnostic buffers supported by Vijeo Designer, export of EcoStruxure Control Export data to Vijeo Designer
- Altivar variable speed drives and TeSys motor management system
  - Integration of a tool for setup, commissioning, and diagnostics through FDT/DTM
  - Single entry point, DFB function blocks, predefined profiles, and implicit data structure (DDT) to reduce engineering time
  - Integrated Ethernet port for integration into many network topologies (ring, star, tree, and linear)
  - Dual port offering easy connection and media redundancy (ring topology)
  - Standard, proven Ethernet protocols: Modbus/TCP and EtherNet/IP
  - Fast device replacement (FDR) and main standard Ethernet services (RSTP, SNMP, DHCP, QoS, HTTP Web server)
- Pact Series and PowerLogic (IEDs)
  - Integration of Schneider Electric Pact Series breakers and switches, as well as PowerLogic power meters and protection relays via IEC 61850 protocol support into Modicon M580

Technology Partner
Schneider Electric

+ Open and secure solution based on standards

Modicon M580 automation platform

Certifications and standards, market segments

Certifications and standards

Depending on the model, Modicon M580 controllers comply with the following standards:

- International certifications: CE, UL, CSA, RCM, EAC, UKCA
- Certified for Hazardous Location Class I Division 2 Groups ABCD and for ATEX/UKEX/IECEx zone 2/22 (depending on the model, see pages 8/2 to 8/9)
- Marine: IACS E10 and agencies: ABS, BV, DNV, GL, LR, RINA, RMRS, and CCS
- Power generation market: IEC 61000-6-5, IEC 61850-3
- See pages 8/2 to 8/9 for more information.

International certifications

Marine

Hazardous locations

Functional safety

Market segments

The Modicon PAC platforms (Modicon M340 and Modicon M580) supported by common Modicon X80 modules are designed to meet the requirements of the following vertical segments:

Water & waste water

Mining, minerals & metals

Consumer Packaged Goods

Energies & Chemicals

Transportation

Power generation

Discrete manufacturing

Data centers

Modicon M580 automation platform



Modicon M580 automation platform

Presentation

The Modicon M580 automation platform allows two types of architecture: standard applications and high-availability applications. These architectures are available for both standard and Safety applications.

The processors can manage Modicon X80 modules in a single-rack or multi-rack Ethernet PAC station. Their slots can be equipped with:

- Discrete I/O modules
- Analog and HART I/O modules
- Expert modules (weighing, time-stamping, counting, etc.)
- Communication modules:
  - EtherNet/IP and Modbus/TCP, OPC UA, IEC 61850, RTU (DNP3, IEC 60870)
  - AS-Interface, Serial link (Modbus), PROFIBUS, and CANopen

Backplanes exist in two declinations (X-bus or dual-profile X-bus and Ethernet). Several power supply options are available (standalone or redundant).

Modicon M580 automation platform applications are designed and programmed by EcoStruxure Control Expert engineering tool.

The Modicon M580 automation platform meets the needs of specialist applications such as:

- Manufacturing and large infrastructure
- Water and Waste Water (WWW)
- Consumer Packaged Goods (CPG)
- Mining, Minerals, Metals (MMM)
- Oil & Gas (O&G)
- Data centers
- Power generation

Processors

The **BMEP58●●●●/BMEH58●●●●** processor range constitutes the core of a complete control solution based on Modicon M580 specific and compatible modules and backplanes. The QR code printed on the front panel provides access to the product datasheet and serial number.



BMEP582020 standalone processor

Standalone processors

The standalone **BMEP58●●●●** processor is a modular automation processor that physically occupies two module slots on a backplane.

BMEP58●●●● processors can be installed on **BMEXBP●●●●** dual Ethernet and X-bus backplanes and **BMXXBP●●●●** (PV02 or later) X-bus backplanes. Using the redundant power supply **BMXCPS4002●** in the dual power supply backplane **BMEXBP0602/1002** provides higher system availability.

The nine processors in this range have different memory capacities, processing speeds, number of I/O, number of supported local racks, and embedded Ethernet port functions (see page 2/11).



BMEH584040 redundant processor

Redundant processors

The redundant **BMEH58●●●●** processors are dedicated to high-availability architectures and physically occupy two module slots on a backplane.

BMEH58●●●● processors can be installed on **BMEXBP●●●●** dual Ethernet and X-bus backplanes, **BMXXBP●●●●** (PV02 or later) X-bus backplanes, and the dual power supply backplanes **BMEXBP0602/1002** (allowing the use of redundant power supplies **BMXCPS4002●**).

Modicon M580 automation platform



BMEP582040S processor



BMEH584040S processor

Processors *(continued)*

Safety processors (standalone or redundant)

The standalone and redundant **BME●58●040S** Safety processors are an extension of the standard processors. They have the same characteristics and performance as their corresponding and respective non-Safety related processors, but they allow further integration of specific Safety-related functions for the process industry sector, machinery, and the rail sector that make Safety processors using Safety I/O modules compliant with the following safety standards:

- up to Safety Integrity Level 3 (SIL3) for the process industry sector according to IEC 61508/IEC 61511
- up to Category 4, Performance Level “e” (Cat.4/PLe) for the safety of machinery according to ISO 13849
- up to SILCL3 for the safety of machinery according to IEC 62061
- up to SIL4 for functional safety in the rail industry according to EN 50126, EN 50128, and EN 50129

Based on common Safety, they are able to manage Safety I/O modules for Safety functions described in the Safety logic, together with non-interfering Modicon X80 I/O modules for non-Safety related functions. Safety processors can communicate over Ethernet with Safety protocols.
The main differentiating features between standalone and redundant Safety processors are:

- Standalone Safety processors embed the CIP Safety communication protocol to allow openness to third-party Safety devices.
- Redundant **BMEH58●040S** Safety processors are dedicated to high-availability architectures for functional safety and critical processes.



BMEP586040 processor

Processor performance

The Modicon M580 standalone processor supports up to eight local racks (depending on the CPU performance level), using existing Modicon X80 modules and accessories. The Modicon M580 processor must be installed in the main rack, which can be a dual (Ethernet and X-bus) bus rack. Modicon M580 PLCs can support up to seven expansion racks of 4, 6, 8, 12, or 16 slots for a single power supply and 6 or 10 slots for a dual power supply. These standalone and redundant processors physically occupy two module slots on a backplane.

The processors can manage Modicon X80 modules in a single- or multi-rack Ethernet PAC station. Their slots can be equipped with:

- Discrete I/O modules
- Analog I/O modules
- Counter modules
- Communication modules: Ethernet Modbus/TCP network, EtherNet/IP network, Modbus SL
- AS-Interface actuator/sensor buses and RTU (remote terminal unit) serial link
- Expert modules

The nine standalone processors and three redundant processors (Hot Standby system) have different memory capacities, processing speeds, number of I/O, number of supported local racks, and embedded Ethernet port functions (see page 2/11).

The Modicon M580 processor range offers the choice of six memory levels from 4 MB to 64 MB (see page 2/9 for more information).

It also offers the choice of two types of Ethernet device network port:

- For **BMEP58●●20** processors: distributed I/O ports (DIO) to connect distributed equipment
- For **BMEP58●●40** and **BMEH58●●40** processors: distributed I/O ports (DIO) to connect distributed equipment and remote I/O ports (RIO) to connect remote equipment

This range also offers different performance levels: **BMEP5840●●** processors are twice as fast as **BMEP5830●●** processors, which are themselves twice as fast as **BMEP5810●●** and **BMEP5820●●** processors. With the new processor models, **BMEP585040/BMEP586040** processors have 20% higher calculating speed than **BMEP5840●●** processors.

An optional 4 GB SD memory card **BMXRMS004GPF** is used with Modicon M580 processors for application and data storage.



Click on the pictogram to access Modicon PLC Configurator online

Modicon PLC Configurator

Select your Modicon M580 system configuration in three simple steps using the online EcoStruxure Modicon PLC Configurator (standalone local I/O only)

Modicon M580 automation platform



Modicon X80 modules



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Modicon X80 modules

Modicon X80 modules serve as the common base for automation platforms by simply adding a dedicated processor such as the Modicon M580 or Modicon M340. They may also:

- Form part of a Quantum Ethernet I/O architecture as an Ethernet RIO (EIO) drop with a CRA adapter module (140CRA31200 or 140CRA31908)
- Form an Ethernet Modbus/TCP DIO drop with a PRA module

The Modicon X80 modules are available in a single- or multi-rack configuration. A Modicon X80 drop may also accept automation platform-dedicated modules (communication, application-specific, etc.).
One Modicon X80 drop may support two racks separated by a distance of up to 30 m/*98 ft*.

Modicon X80 modules are common to several automation platforms, which helps to reduce maintenance and training costs as this offer comprises:

- A single range of spare parts in stock
- Training common to several PLCs

Based on the latest I/O technology, Modicon X80 modules offer:

- High-quality ruggedness and compactness
- Compliance with international certifications (ATEX, IEC, etc.)
- A wide selection of modules: Discrete or analog I/O, expert modules, communication modules, etc.

Note: *For further information, please consult the "Modicon X80" catalog available on our website.*

Dedicated modules

HART integrated analog I/O modules



HART integrated analog input module

The Highway Addressable Remote Transducer (HART) protocol is the global standard for sending and receiving digital information across analog wires between smart devices and a control or monitoring system. The standard is controlled by the HART Communications Foundation.

HART integrated analog I/O modules can be added on the backplane of the Modicon M580 processor.

These HART modules offer 8 channels per input module and 4 channels per output module. HART integrated analog I/O modules allow the integration of HART-enabled instruments into the network architecture.

Each Modicon M580 main rack can support up to 6 HART I/O modules and each Modicon X80 RIO drop can support up to 7 HART I/O modules.

HART analog I/O modules are only supported by dual Ethernet and X-bus backplanes (main rack or RIO drop).

Note: *For further information, please consult the "Modicon X80" catalog available on our website.*

IEC 61850 module



IEC 61850 module

The **BMENOP0300** module is used to implement an engineering approach by enabling IEC 61850-compliant data exchange across industrial automation and energy management applications.

The **BMENOP0300** module can provide different services under different roles, serving primarily in the following use case:

- Electrical device integration (module acts as an MMS client to communicate with IEDs and supports GOOSE)
- IEC 61850-based process control (process control objects modeled with IEC 61850 (hydro, DERs, etc.)). The module acts at the same type as a server to communicate with the SCADA and as a client to communicate with the IEDs.
- Integration of a Modicon M580 acting as a data concentrator into other electrical automation systems (module uses the IEC 61850 server functionality)

OPC UA module



OPC UA module

The **BMENUA0100** OPC UA module is an Ethernet communication module with an embedded OPC UA server for communication with OPC UA clients, including SCADA.

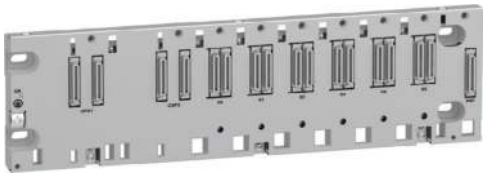
It brings high-performance OPC UA capabilities to Modicon M580 ePAC systems allowing up to 10 OPC UA clients to be connected, 50,000 items to be monitored, and hot and warm redundancy to be managed in non-transparent modes, as well as certificate authority for cybersecure authentication.

With its dual cybersecurity and transparency capabilities, it also provides a platform of choice to connect a Modicon M580 system securely to the control network. It supports IPV6. It also brings OPC UA client capability, thus allowing data coming from different OPC UA servers to be aggregated or peer-to-peer communication between PLCs to be enabled.

Modicon M580 automation platform



8-slot Ethernet + X-bus backplane



6-slot dual power supply backplane

Types of backplane

Backplanes for standard applications

Modicon M580 processors can work in either an X-bus rack or a dual (Ethernet and X-bus) rack.The Modicon Ethernet backplanes, which provide X-bus connection and Ethernet connectivity, are available with 4, 8, and 12 slots.

A single configuration can support up to seven standard **BMX** racks used as expansion racks in addition to the main rack, separated by a cumulative distance of up to 30 m/*98 ft*.

An Ethernet RIO (EIO) drop is composed of one or two racks that can be either a BMX X-bus rack or a BME Ethernet rack. The expansion rack can only be a BMX X-bus rack. All Ethernet backplanes are available in a version suitable for use in harsh environments.

An Ethernet switch is embedded in the Ethernet backplane. This switch is connected to several slots on the backplane. In the case of 12-slot backplanes, not all slots have Ethernet connectivity. Only 8 slots are available for Ethernet, but they are placed in several locations along the rack for maximum flexibility of use (see page 2/11).

Backplanes for high-availability applications

- For higher availability, Modicon M580 processors or Modicon X80 drops can work in a dual power supply backplane **BMEXBP●●02**, which supports the redundant power supply **BMXCPS●●●2●** in pairs.
- Dual power supply backplanes are available with 6 and 10 dual (Ethernet and X-bus) slots, in which a maximum of 4 out of the 6 slots and 8 out of the 10 slots are available for Ethernet.

***Note**: It is not possible to plug a standard power supply into a dual power supply backplane; the dual power supply backplane is only compatible with the redundant power supply. However, a single redundant power supply can be plugged into the standard backplane.*

Ethernet backplanes

The Modicon dual backplanes provide X-bus connection and Ethernet connectivity. One Ethernet switch is embedded in the backplane with connectivity to some slots on the backplane. There are two types of Ethernet backplane: for standard applications with one power supply module inserted, up to 12 modules will be supported. For high-availability applications with two power supply modules for redundancy, 6 or 10 modules will be supported. Not all slots have Ethernet connectivity in the case of 12-slot backplanes.

Using such connectivity, Ethernet-based modules (both Schneider Electric and third-party) can communicate with any other module or device that is reachable via the Ethernet and IP networks.

An additional connector is added to some slots of the backplane, next to the X-bus connector.

The Ethernet backplane provides multiple communication buses compared with the X-bus backplane to improve connectivity on the backplane. These buses can be connected to Ethernet modules and used to communicate different types of data for different purposes (see page 2/11).

The following communication buses are present in Ethernet backplanes:
- X-bus
- Ethernet

Expanded backplanes

To expand the configuration using additional racks, a bus expansion module (**BMXXBE1000**) and X-bus cables are required (see chapter 2 of the Modicon X80 catalog).

The expanded backplane can be either a standard backplane, including a power supply module and supporting up to 12 modules, or a dual power supply backplane, including two redundant power supply modules and supporting up to 10 modules.

However, an expanded backplane can only be an X-bus backplane, plugged with the basic I/O modules, and is not compatible with all the advanced function modules (such as HART or weighing). Please refer to the compatibility table for more information (see page 1/18).

It is also possible to expand a drop backplane.

Each rack will be assigned a physical address using four micro switches located on the bus expansion module:
- The main rack containing the processor will be assigned address 0
- The other racks will be assigned addresses 1 to 7

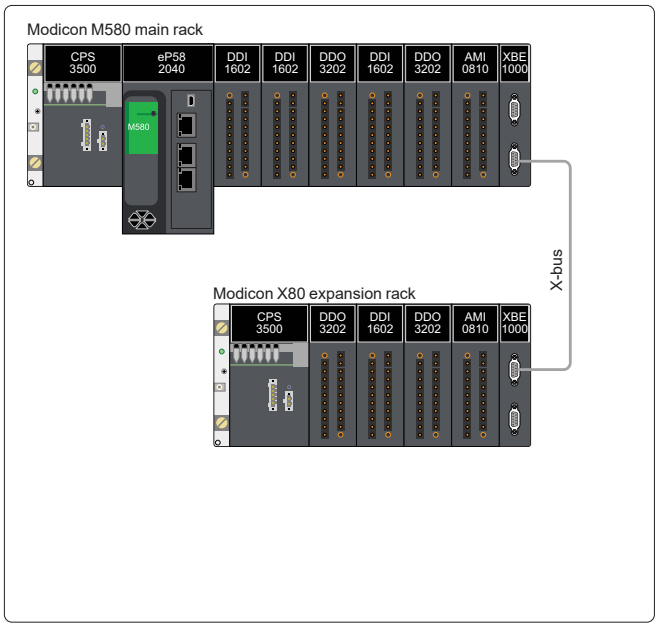
Modicon M580 automation platform

Different architectures

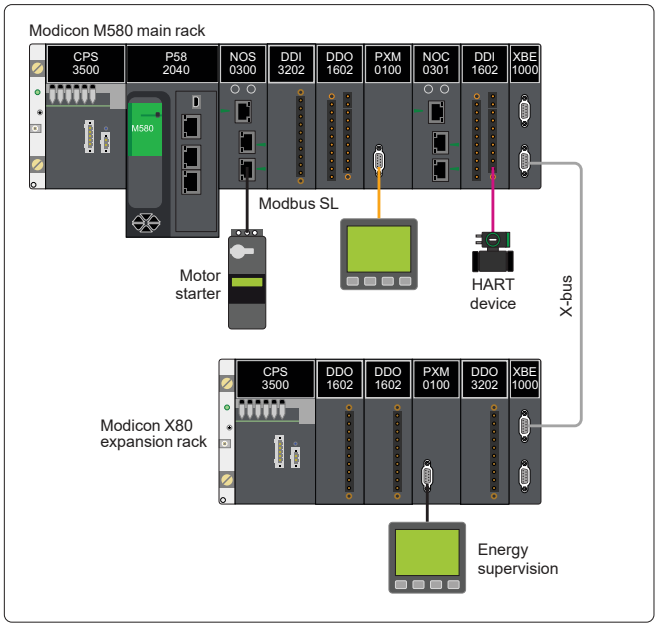
The Modicon M580 ePAC offers different embedded networks to meet various architecture needs:

- Standard Ethernet DIO ports on **BMEP58●●20** processors for local I/O architecture, integrated fieldbus architecture, and distributed I/O architecture
- Dual Ethernet RIO ports on **BMEP58●●40** processors for remote I/O architecture

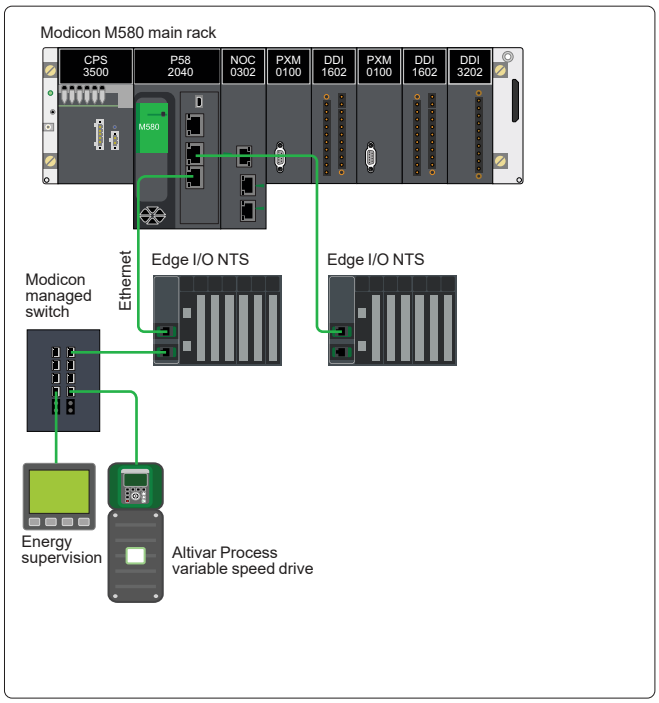
Local I/O architecture: Composed of hardwired I/O; mainly compact topology



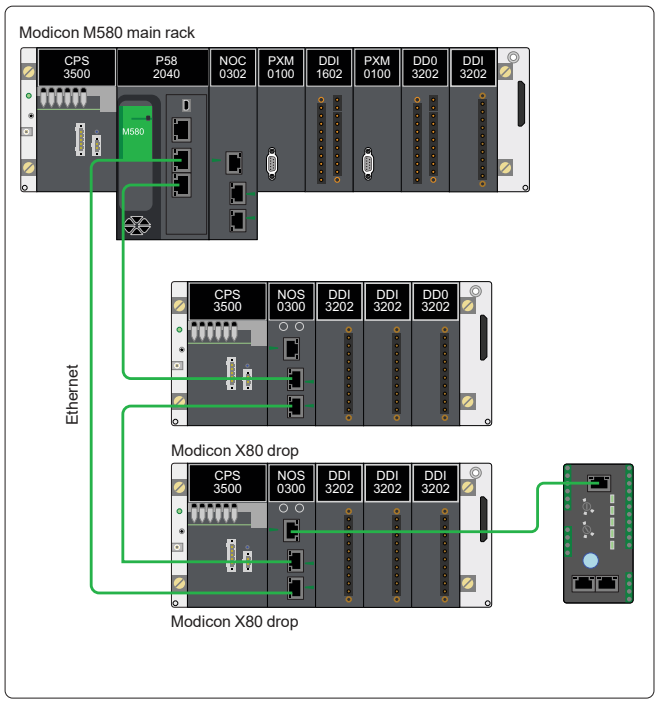
Integrated fieldbus architecture: Composed of devices distributed over fieldbuses; mainly compact topology



Distributed I/O architecture: Composed of devices distributed over Ethernet; ideal for mainly distributed topologies



Remote I/O architecture: Uses Ethernet racks. Composed of remote devices and featuring remote functions, such as fieldbus master



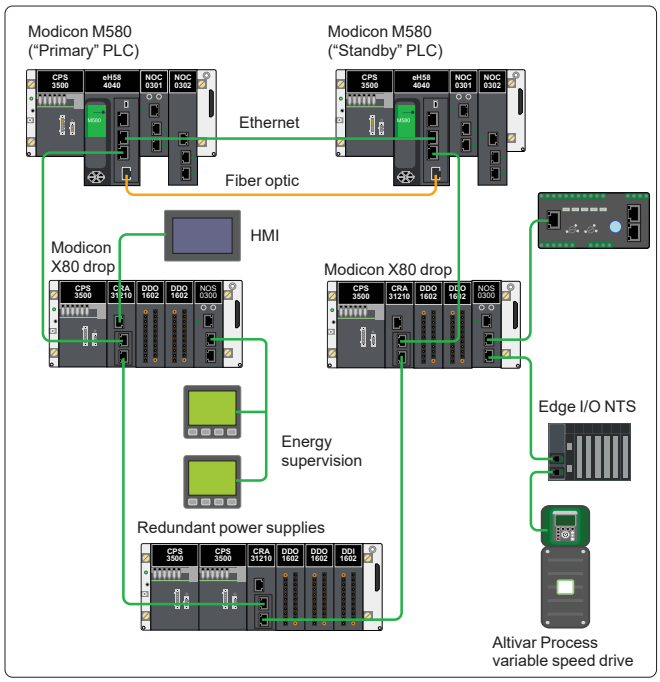
Modicon M580 automation platform

High-availability architectures

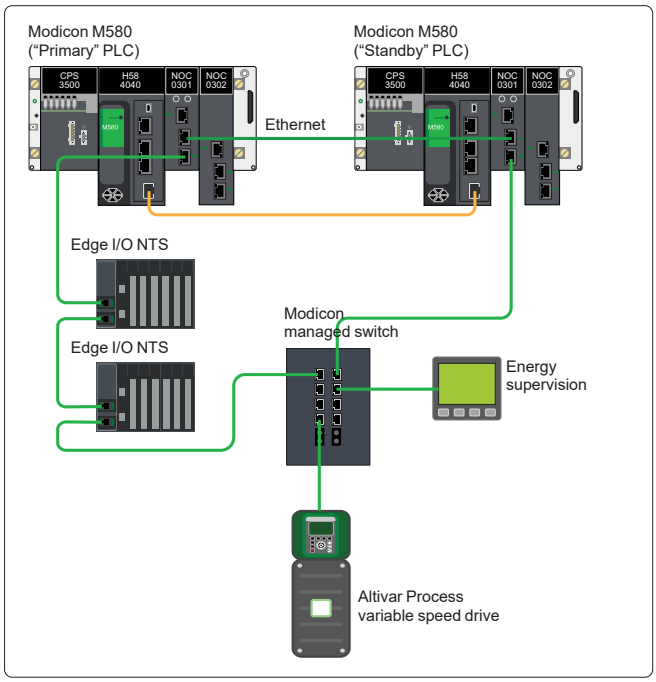
With **BMEH58●●40** processors dedicated to the Hot Standby system, high-availability architectures are used for more demanding applications:

- Remote I/O
- Distributed I/O
- Mixed RIO/DIO

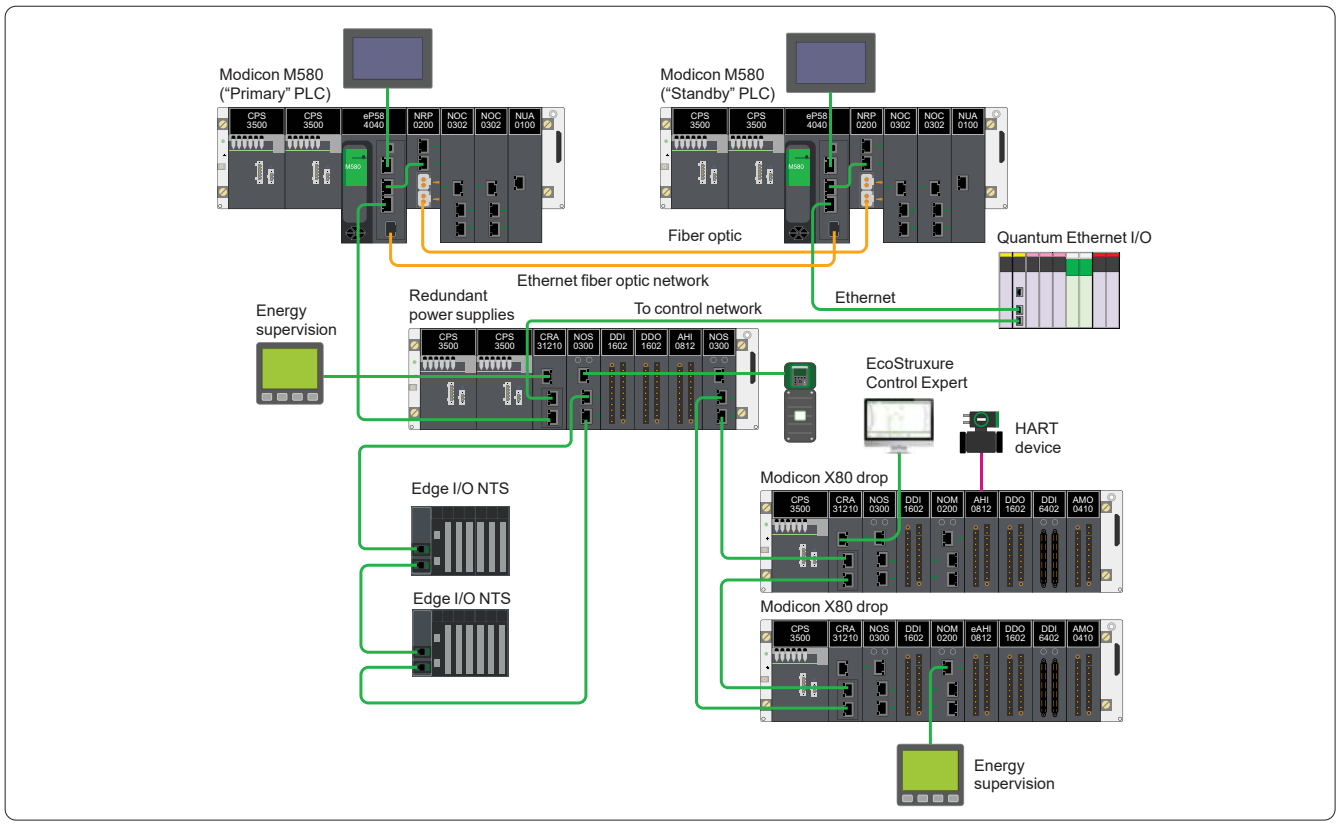
Remote I/O architecture: Composed of remote devices and featuring remote functions



Distributed I/O architecture: Composed of distributed devices under HSBY structure



Mixed RIO/DIO architecture: Composed of a complex architecture with remote I/O and distributed I/O, making it a particularly flexible solution for connection to a wider range of devices

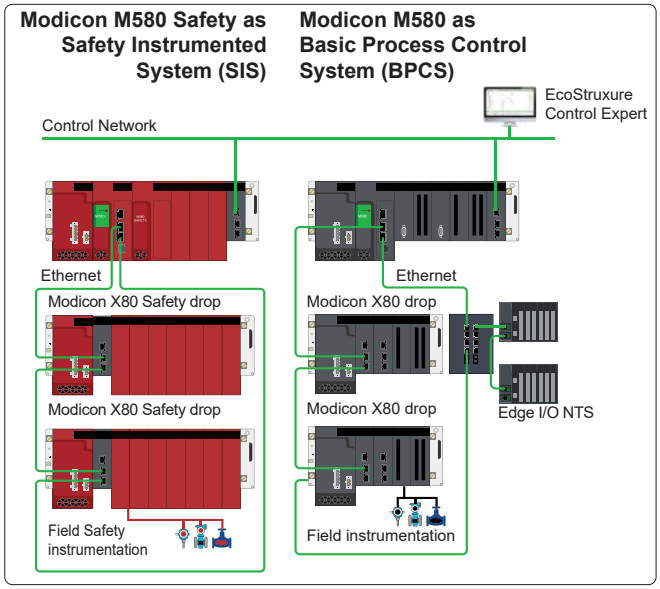


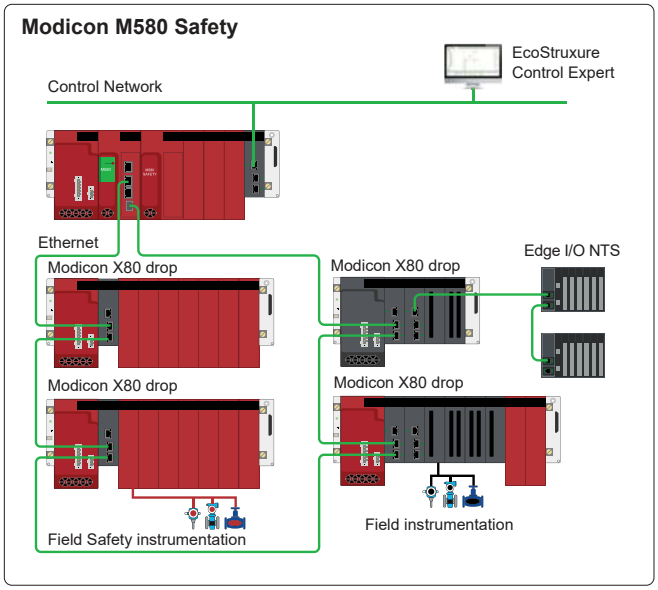
Modicon M580 automation platform

Safety architectures

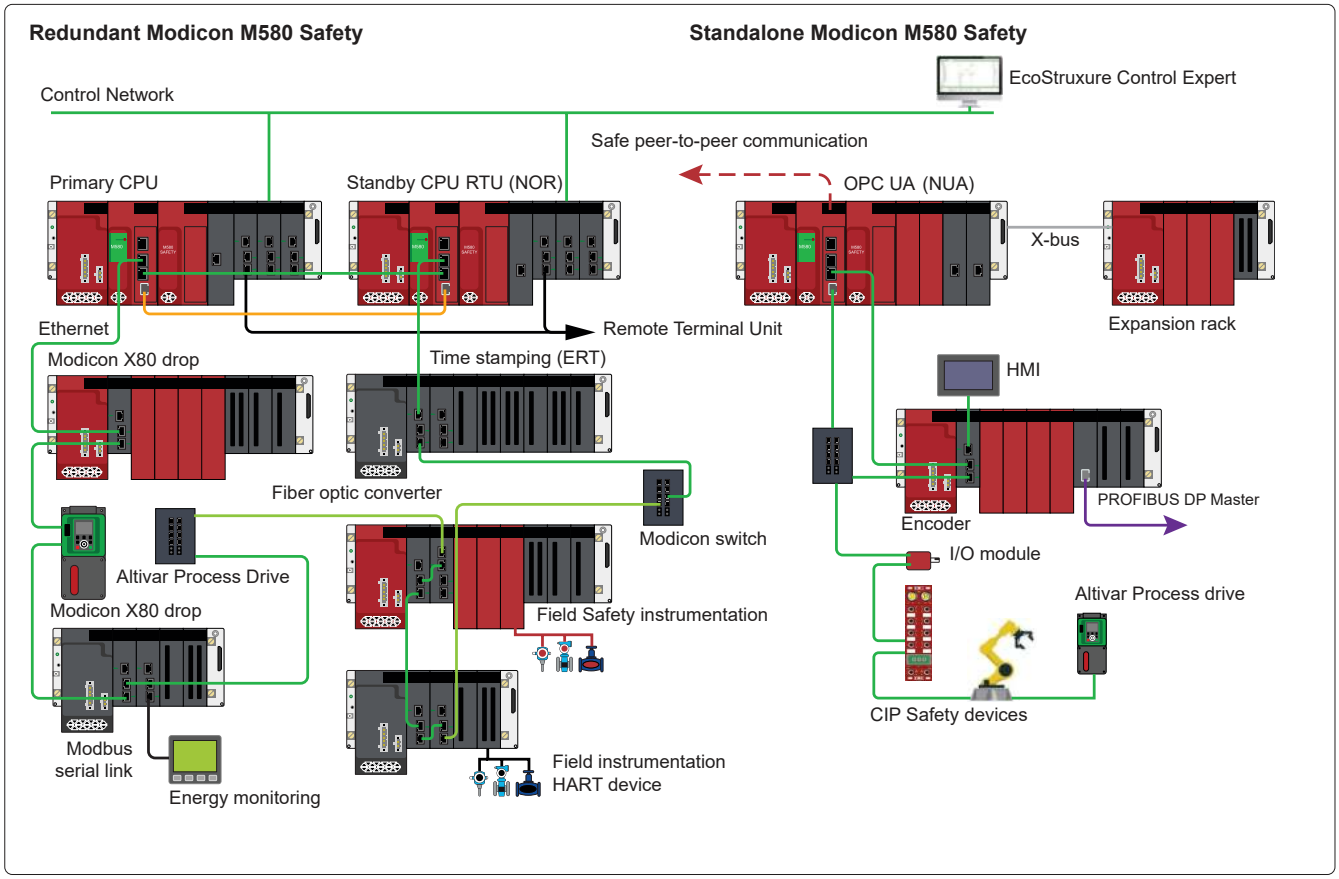
Integrated Safety architecture: Based on two separed systems: Modicon M580 Safety as a Safety Instrumented System (SIS) and a Modicon M580 as Basic Process Control System (BPCS), both engineered with EcoStruxure Control Expert

Common Safety architecture: Based on a single Modicon M580 Safety PAC acting as a Safety Instrumented system (SIS) with Modicon X80 Safety I/O as well as Basic Process Control System (BPCS) with Modicon X80 I/O





Complex Safety architecture: Mixed standard and high-availability Safety architecture with RIO, DIO and CIP Safety devices



Modicon M580 automation platform



EcoStruxure Control Expert engineering station



MKTED2140504EN

Design and setup of Modicon M580 applications

EcoStruxure Control Expert *(1)* is required to set up an application with all Modicon M580 controllers. The EcoStruxure Control Expert and Unity Pro function block software libraries make it possible to meet the needs of specialist applications in various fields of application, such as:

- Water and Waste Water (WWW)
- Consumer Packaged Goods (CPG)
- Mining, Minerals, Metals (MMM)
- Oil & Gas (O&G)

To set up Modicon M580 automation platform processors, you need EcoStruxure Control Expert or Unity Pro Large or Extra Large programming software identical to the one used to set up Modicon M340, Modicon Premium, and Modicon Quantum automation platforms.

Depending on requirements, you may also need:

- Unity EFB toolkit software for developing EF and EFB libraries in C language
- Unity SFC View software for viewing and diagnostics of applications written in Sequential Function Chart (SFC) or Grafcet language
- Graphical Unity DIF matching software for comparing two applications configured with EcoStruxure Control Expert or Unity Pro
- Unity Loader software or EcoStruxure Automation Device Maintenance for updating EcoStruxure Control Expert and Unity Pro projects and device firmware

The function block software libraries provide Modicon M580 processors with the processing capability required to meet the needs of specialist applications in the field of process control via programmable control loops (EF and EFB libraries).

This software also offers the following features:

- References
- Implicit type conversion, IEC 61131-3 proposition
- Security Editor on server
- Improved log file
- A trending tool that is synchronized on each PLC scan
- DFB providing information on users logged on to the PLC
- Data file (dtx) backup with application backup (sta/stu or zef)
- Password protection for the application running on the PLC
- Macro function

Note: *For further information, please consult the "Modicon PAC Engineering and Operation Software" catalog available on our website.*

Treatment for harsh environments

If the Modicon M580 automation platform needs to be used in a harsh environment, the ruggedized offer provides processors, power supply modules, and I/O modules on X-bus and racks with a protective coating applied to their electronic cards (see page 7/2).

This treatment improves the card insulation qualities and their resistance to:

- Condensation
- Dusty atmospheres (conducting foreign particles)
- Chemical corrosion, in particular when used in sulfurous atmospheres (oil refinery, purification plant, etc.) or atmospheres containing halogens (chlorine, etc.)

This protection, combined with appropriate installation and maintenance, enables Modicon M580 products to be used in harsh chemical environments such as types 3C2 and 3C3 as described in standard IEC/EN 60721-3-3.

The functional and electrical characteristics of the coated modules are identical to those of the non-coated versions.

With coated modules, the Modicon M580 automation platform may be used in harsh environments or within a range of operating temperatures from -25 to +70 °C/ *-13 to +158 °F*.

Some Modicon M580 modules are also ATEX-certified.

(1) EcoStruxure Control Expert software continues the range of Unity Pro software and corresponds to versions ≥ 14 of Unity Pro.

Modicon PAC offer for plant automation

Standard and severe environments*



> Modicon M580

ePAC (PLC)

Standard or Safety with standalone or redundant coprocessor



Communication and Edge modules

OPC UA, ECN, IEC 61850, IEC 60870-5-101/104, DNP3, EtherNet/IP, Modbus/TCP



Communication modules

IEC 60870-5-101/104, DNP3, EtherNet/IP, Modbus/TCP





> Modicon M340

PAC (PLC)

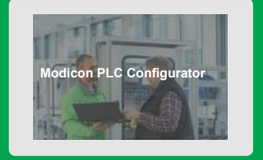
Standard or Performance

Modbus serial link, Modbus/TCP, or CANopen



* Most of Modicon products exist in hardened (H) or coated (C) versions to support severe environments

Configure with online tool:



Click on the pictogram to access Modicon PLC Configurator online

Pilot with EcoStruxure:



EcoStruxure™
Innovation At Every Level



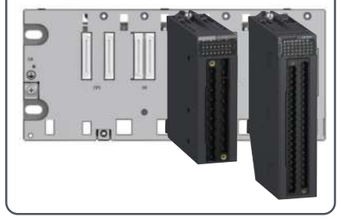
> Modicon X80

I/O modules

From 4 to 64 channels, discrete or analog (including temperature and HART), Standard and Safety

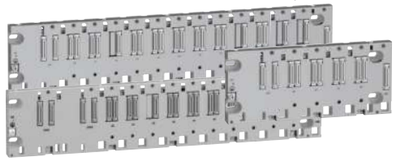


Short-form module (100 mm/3.94 in) *Long-form module (131 mm/5.16 in)*



Backplanes

From 4 to 16 slots, single bus (X-bus) or dual bus (X-bus and Ethernet), for redundant or standalone power supply



Power supplies

Standard or Safety, AC or DC, standalone or redundant



Communication modules

AS-i, Modbus/ASCII serial link, CANopen, PROFIBUS DP, fiber converter, Ethernet switch



Expert modules

Counter, time-stamping, motion control, frequency input,weighing, and diagnostics...



I/O expansion modules

Remote I/O adapter for Modicon M580





> Modicon Networking

Ethernet Switches

Managed or unmanaged



Modicon M580/M340 platforms and Modicon X80 modules

Product compatibility according to network architecture and platform

For safety product compatibility, please refer to page 3/6

Product type	Product main feature	Commercial reference *(1)*	Module type	Modicon M340	Modicon M580								Modicon M580/M340
					Local rack with CPU				Modicon X80 drops on Ethernet remote I/O				Modicon X80 drops on distributed I/O
					Standalone CPU		Redundant CPU		Standalone or redundant CPU				N/A
					X-bus backplane *(2)* BMXXBP●●●●	Dual X-bus and Ethernet backplane BMEXBP●●●●	X-bus backplane *(2)* BMXXBP●●●●	Dual X-bus and Ethernet backplane BMEXBP●●●●	X-bus backplane *(2)* BMXXBP●●●●		Dual X-bus and Ethernet backplane BMEXBP●●●●		X-bus backplane BMXXBP●●●●, Dual X-bus and Ethernet backplane BMEXBP●●●●
									BMXCRA31200	BMXCRA31210	BMECRA31210	BMECRA31310	BMXPRA0100
Modicon X80 power supplies	Standalone power supply	**BMXCPS2000**	100...240 V ∿, 20 W	■	■	■	■	■	■	■	■	■	■
		BMXCPS2010	24 V ⎓, 17 W	■	■	■	■	■	■	■	■	■	■
		BMXCPS3020 (H)	24...48 V ⎓, 32 W	■	■	■	■	■	■	■	■	■	■
		BMXCPS3500 (H)	100...240 V ∿, 36 W	■	■	■	■	■	■	■	■	■	■
		BMXCPS3540T	125 V ⎓, 36 W	■	■	■	■	■	■	■	■	■	■
	Redundant power supply	**BMXCPS4002 (H)**	100...240 V ∿, 40 W	■	■	■	■	■	■	■	■	■	■
		BMXCPS4022 (H)	24...48 V ⎓, 40 W	■	■	■	■	■	■	■	■	■	■
		BMXCPS3522 (H)	125 V ⎓, 40 W	■	■	■	■	■	■	■	■	■	■
Modicon X80 backplanes	X-bus backplane	**BMXXBP0400 (H)**	4 slots	■	■		■		■	■			■
		BMXXBP0600 (H)	6 slots	■	■		■		■	■			■
		BMXXBP0800 (H)	8 slots	■	■		■		■	■			■
		BMXXBP1200 (H)	12 slots	■	■		■		■	■			■
		BMXXBP1600 (H)	16 slots	■	■		■		■	■			■
	Dual X-bus and Ethernet backplane	**BMEXBP0400 (H)**	4 slots	■		■		■			■	■	■
		BMEXBP0800 (H)	8 slots	■		■		■			■	■	■
		BMEXBP1200 (H)	12 slots	■		■		■			■	■	■
	Dual X-bus and Ethernet backplane with power redundancy	**BMEXBP0602 (H)** *(3)*	6 slots	■		■		■			■	■	■
		BMEXBP1002 (H) *(3)*	10 slots	■		■		■			■	■	■
	Rack expansion	**BMXXBE1000 (H)** *(4)*	Expansion module	■	■	■	■	■	■	■	■	■	■
		BMXXBE2005 *(5)*	Expansion kit	■	■	■	■	■	■	■	■	■	■
	Accessories	**BMXXEM010** *(6)*	Protective cover	■	■	■	■	■	■	■	■	■	■
Modicon X80 discrete modules	Discrete input AC	**BMXDAI0805**	8 inputs, 200…240 V∿	■	■	■			■	■	■	■	■
		BMXDAI0814	8 inputs, 100...120 V∿	■	■	■			■	■	■	■	■
		BMXDAI1602 (H)	16 inputs, 24 V∿/ ⎓	■	■	■			■	■	■	■	■
		BMXDAI1603 (H)	16 inputs, 48 V∿	■	■	■			■	■	■	■	■
		BMXDAI1604 (H)	16 inputs, 100...120 V∿	■	■	■			■	■	■	■	■
		BMXDAI1614 (H)	16 inputs, 100...120 V∿	■	■	■			■	■	■	■	■
		BMXDAI16142	16 inputs, 100...120 V∿	■	■	■			■	■	■	■	■
		BMXDAI1615 (H)	16 inputs, 200…240 V∿	■	■	■			■	■	■	■	■
	Discrete output AC	**BMXDAO1605 (H)**	16 outputs, 100…240 V∿	■	■	■			■	■	■	■	■
		BMXDAO1615 (H)	16 outputs, 24…240 V∿	■	■	■			■	■	■	■	■
	Discrete input DC	**BMXDDI1602 (H)**	16 inputs, 24 V ⎓	■	■	■			■	■	■	■	■
		BMXDDI1603 (H)	16 inputs, 48 V ⎓	■	■	■			■	■	■	■	■
		BMXDDI1604T	16 inputs, 125 V ⎓	■	■	■			■	■	■	■	■
		BMXDDI3202K (H)	32 inputs, 24 V ⎓	■	■	■			■	■	■	■	■
		BMXDDI3203 (H)	32 inputs, 48 V ⎓	■	■	■			■	■	■	■	■
		BMXDDI3232 (H)	32 inputs, 12/24 V ⎓	■	■	■			■	■	■	■	■
		BMXDDI6402K (H)	64 inputs, 24 V ⎓	■	■	■			■	■	■	■	■
	Discrete mixed I/O	**BMXDDM16022 (H)**	8 inputs, 24 V ⎓; 8 outputs, 24 V ⎓	■	■	■			■	■	■	■	■
		BMXDDM16025 (H)	8 inputs, 24 V ⎓; 8 outputs, relay 24…240 V∿/24 V ⎓	■	■	■			■	■	■	■	■
		BMXDDM3202K	16 inputs, 24 V ⎓; 16 outputs, 24 V ⎓	■	■	■			■	■	■	■	■
	Discrete output DC	**BMXDDO1602 (H)**	16 outputs, 24 V ⎓	■	■	■			■	■	■	■	■
		BMXDDO1612 (H)	16 outputs, 24 V ⎓ negative	■	■	■			■	■	■	■	■
		BMXDDO3202 (H)	32 outputs, 24 V ⎓	■	■	■			■	■	■	■	■
		BMXDDO3202K (C)	32 outputs, 24 V ⎓	■	■	■			■	■	■	■	■
		BMXDDO6402K (C)	64 outputs, 24 V ⎓	■	■	■			■	■	■	■	■
	Discrete Output Relay	**BMXDRA0804T**	8 outputs, 100…150 V∿	■	■	■			■	■	■	■	■
		BMXDRA0815 (H)	8 outputs, 24…240 V∿/24...125 V ⎓	■	■	■			■	■	■	■	■
		BMXDRA1605 (H)	16 outputs, 24…240 V∿/24 V ⎓	■	■	■			■	■	■	■	■
		BMXDRC0805 (H)	8 outputs, 24…240 V∿/24...125 V ⎓	■	■	■			■	■	■	■	■

(1) Optional versions: (C) - "Coated", (H) - "Hardened", and (T) - "Extended Temperature"
*(2) **BMXXBP●●●●** with PV02 or later required*
(3) Not compatible with single power supplies

Not compatible	*Compatible*

(4) Extended rack can be on any type of backplane, but only X-bus modules (BMX) can be used
(5) Extended rack kit
(6) Protective cover for unoccupied slots on backplane

Modicon M580/M340 platforms and Modicon X80 modules

Product compatibility according to network architecture and platform

For safety product compatibility, please refer to page 3/6

Product type	Product main feature	Commercial reference *(1)*	Module type	Modicon M340	Modicon M580								Modicon M580/M340
					Local rack with CPU				Modicon X80 drops on Ethernet remote I/O				Modicon X80 drops on distributed I/O
					Standalone CPU		Redundant CPU		Standalone or redundant CPU				N/A
					X-bus backplane *(2)* BMXXBP●●●●	Dual X-bus and Ethernet backplane BMEXBP●●●●	X-bus backplane *(2)* BMXXBP●●●●	Dual X-bus and Ethernet backplane BMEXBP●●●●	X-bus backplane *(2)* BMXXBP●●●●		Dual X-bus and Ethernet backplane BMEXBP●●●●		X-bus backplane BMXXBP●●●●, Dual X-bus and Ethernet backplane BMEXBP●●●●
									BMXCRA31200	BMXCRA31210	BMECRA31210	BMECRA31310	BMXPRA0100
Modicon X80 analog modules	Analog High-level Input	**BMXAMI0410 (H)**	4 voltage/current inputs	■	■	■			■	■	■	■	■
		BMXAMI0800	8 voltage/current inputs	■	■	■			■	■	■	■	■
		BMXAMI0810 (H)	8 voltage/current inputs	■	■	■			■	■	■	■	■
		BMEAHI0812 (H)	8 current inputs, HART			■					■	■	
	Analog Low-level Input	**BMXART0414 (H)**	4 RTD, thermocouple and voltage inputs	■	■	■			■	■	■	■	■
		BMXART0814 (H)	8 RTD, thermocouple and voltage inputs	■	■	■			■	■	■	■	■
	Analog Mixed I/O	**BMXAMM0600 (H)**	4 voltage/current inputs & 2 voltage/current outputs	■	■	■			■	■	■	■	■
	Analog High-level Output	**BMXAMO0210 (H)**	2 voltage/current outputs	■	■	■			■	■	■	■	■
		BMXAMO0410 (H)	4 voltage/current outputs	■	■	■			■	■	■	■	■
		BMXAMO0802 (H)	8 current outputs	■	■	■			■	■	■	■	■
		BMEAHO0412 (C)	4 current outputs, HART			■					■	■	
Modicon X80 Expert modules	SSI encoder interface	**BMXEAE0300 (H)**	3 channels	■	■	■			■	■	■	■	
	Counter	**BMXEHC0200 (H)**	2 channels	■	■	■				■	■	■	
		BMXEHC0800 (H)	8 channels	■	■	■				■	■	■	
	Time Stamping	**BMXERT1604T/H**	16 inputs , 24...125 V ⎓	■	■	■				■	■	■	
	Motion Control	**BMXMSP0200**	2 channels	■	■	■							
	Frequency Input	**BMXETM0200H**	2 channels	■	■	■				■	■	■	
	Weighing *(3)*	**PMESWT0100**	1 channel			■					■		
Communication modules *(4)*	Modicon X80	**BMXNOM0200 (H)**	Serial link	■	■	■				■	■	■	■
		BMXEIA0100	AS-Interface	■	■	■				■	■	■	
		BMECXM0100 (H)	CANopen			■					▲	▲	
		BMXNRP0200 (C)	Fiber converter, multimode	■	■	■	■	■	■	■	■	■	■
		BMXNRP0201 (C)	Fiber converter, single mode	■	■	■	■	■	■	■	■	■	■
		PMEPXM0100 (H)	PROFIBUS DP			■		■			▲	▲	
		BMENOS0300 (C)	Ethernet switch			■		■			■		
	Modicon M580	**BMENOC0301 (C)**	Ethernet			■		■					
		BMENOC0302 (H)	Ethernet			■		■					
		BMENOC0311 (C)	Ethernet FactoryCast			■		■					
		BMENOC0321 (C)	Ethernet control router			■		■					
		BMENOP0300	IEC 61850			■		■					
		BMXNGD0100	Ethernet Global Data		■	■							
		BMENUA0100 (H)	OPC UA			■		■					
		BMENOR2200H	Advanced RTU			■		■					
	Modicon M580/M340	**BMXNOR0200H**	RTU	■	■	■							
	Modicon M340	**BMXNOE0100 (H)**	Ethernet	■									■
		BMXNOE0110 (H)	Ethernet FactoryCast	■									
		BMXNOC0401	Ethernet	■									
Edge Module	Edge compute node	**BMEECN0100H**	Edge compute node			■							
Modicon X80 I/O expansion modules	RIO drop adapter	**BMXCRA31200**	X-bus, Standard										
		BMXCRA31210 (C)	X-bus, Performance										
		BMECRA31210 (C)	Ethernet, Performance										
		BMECRA31310 (H)	Ethernet, Performance									■	
	DIO drop adapter	**BMXPRA0100**	Peripheral										■

(1) Optional versions: (C) - "Coated", (H) - "Hardened", and (T) - "Extended Temperature"
*(2) **BMXXBP●●●●** with PV02 or later required*
(3) Products by our Technology Partners; see more information on our partner website page
(4) According to the module type, the communication module description is included in the Modicon X80 catalog, Modicon M580 catalog, or Modicon M340 catalog.

Not compatible	*Compatible*	*Only compatible in the standalone configuration of remote Modicon X80 drop*

1

Contents

2 - Processors

Processor selection guide . . . . . page 2/2

- **Processor offer presentation** ..... page 2/6
- **Standalone processors** ..... page 2/7
- **Redundant processors** ..... page 2/8
- **Memory structure** ..... page 2/9
- **Secure Engineering Link** ..... page 2/10
- **References** ..... page 2/11

2

Modicon M580 automation platform

Modicon M580 standalone processors

Modicon M580 automation platform			BMEP5810 model	BMEP5820 models		BMEP5830 models		BMEP5840 models		BMEP5850 model	BMEP5860 model
											
Racks		Local racks (main + expansion)	4			8					
		Remote I/O drops *(1)*	Not supported		8	Not supported	16	Not supported	16	31	
Local X80 I/O *(2) (3)*		Discrete I/O channels	1,024	2,048		3,072		4,096		5,120	6,144
		Safety discrete I/O channels	Not supported								
		Analog I/O channels	256	512		768	768	1,024	1,024	1,280	1,536
		Safety analog I/O channels	Not supported								
		Application-specific channels *(4)*	36	72		108	108	144	144	180	216
Combined local and remote X80 I/O *(3)*		Discrete I/O channels	1,024	2,048	10,240	3,072	19,456	4,096	20,480	36,864	37,888
		Safety discrete I/O channels	Not supported								
		Analog I/O channels	256	512	2,560	768	4,864	1,024	5,120	9,216	9,472
		Safety analog I/O channels	Not supported								
		Application-specific channels *(4)*	36	72	360	108	684	144	720	1,296	1,332
Distributed equipment (DIO, CSIO)	EtherNet/IP or Modbus TCP devices (scanned by CPU)		61	125	61	125	61	125	61		
	EtherNet/IP or Modbus TCP devices (scanned by CPU and Ethernet modules)	BMENOC301/ BMENOC302/ BMENOC311	317	381	317	509	445	637	573		
	CIP Safety devices (scanned by CPU)		Not supported								
Integrated communication ports		Ethernet service port (RJ45)	Engineering and Maintenance console (EcoStruxure Control Expert, Web browser, external tools), HMI, SCADA, distributed equipment (DIO)								
		Ethernet device network dual ports (RJ45) - RSTP	DIO network (DIO scanner)		RIO network (RIO/DIO scanner)	DIO network (DIO scanner)	RIO network (RIO/DIO scanner)	DIO network (DIO scanner)	RIO network (RIO/DIO scanner)		
		Mini-B USB port	Programming port for Engineering Console (EcoStruxure Control Expert)								
Communication	Ethernet networks	**Max. cumulative number of:** Ethernet communication modules *(6)*	2			3		4		6 *(7)*	
		Max. cumulative number of: Ethernet communication modules including BMXNOR/BMXNGD	2			3		4		8 *(8)*	
	EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module BMENOC0301	2			3		4			
		Advance NOC module BMENOC0302	2			3		4		6	
	FactoryCast	FactoryCast module BMENOC0311	2			3		4			
	IP Forwarding	Ethernet control router BMENOC0321	2								
	IEC 61850	IEC 61850 module BMENOP0300	2			3		4			
	OPC UA	OPC UA module BMENUA0100	2								
	DNP3 Serial/NET, IEC 60870-5-101/104	Advanced RTU module BMENOR2200H	2			3		4			
	DNP3 Serial/IEC 60870-5-101	RTU module BMXNOR0200H	2			3		4		8	
	Global Data	Global Data module BMXNGD0100	2			3		4			
	AS-Interface	AS-Interface module BMXEIA0100	2	4	4 *(5)*	6	6 *(5)*	8	8 *(5)*		
	Serial link (Modbus and Character mode)	Serial link module BMXNOM0200	Each BMXNOM0200 channel counts as an application-specific channel								
	CANopen	CANopen module BMECXM0100	Each BMECXM0100 counts as a distributed I/O device (DIO)								
	PROFIBUS DP	PROFIBUS DP module PMEPXM0100	2			4		6			10
Edge Module		Edge Compute module BMEECN0100H	2								
Internal memory capacity		Program process (MB)	4	8		12		16		24	64
		Data process (KB)	384	768		1,024		2,048		4,096	Up to 64 MB
		Data storage (GB)	4								
No. of K instructions executed per ms		100% Boolean (Kinstr/ms)	40							50	
		65% Boolean + 35% fixed arithmetic (Kinstr/ms)	30							40	
Product compatibility with Quantum		Support of Quantum Ethernet I/O (QEIO) and Quantum S908 Coax Remote I/O	No						Yes		
References			**BMEP581020**	**BMEP582020**	**BMEP582040**	**BMEP583020**	**BMEP583040**	**BMEP584020**	**BMEP584040**	**BMEP585040**	**BMEP586040**
Pages			2/11								

(1) A remote I/O drop can be either an X80 RIO drop (RIO) or a Quantum Ethernet I/O drop (QEIO). One X80 RIO drop can support up to two racks (via X-bus extension).
(2) Local Modicon X80 I/O are localized in local racks (main or expansion). Redundant controllers do not support local X80 IO.
(3) Maximum number of I/O channels (discrete, Safety discrete, analog, and Safety analog) and application-specific channels is not cumulative.
(4) Application-specific channels include counters, time-stamping, SSI encoder, motion control, serial link, and frequency input modules.
*(5) With **BMEP58●040** CPUs, additional **BMXEIA0100** modules can be installed in remote drops: 2 per drop and with a maximum of 16 **BMXEIA0100** modules.*
(6) Ethernet communication modules include BMENOC03●1 (note the varying maximum number of NOC based on PV version), BMENOR, BMENOP, BMENUA, BMEECN, and BMENOC0302.
(7)The maximum number of BME communication modules can reach 6 when combined with two modules from the following types: BMENUA, BMEECN, and BMENOC0302.
(8) If the configuration has already reached six, like the above Ethernet modules, then you can add an additional two BMX modules (BMXNOR/BMXNGD).

Modicon M580 automation platform

Modicon M580 redundant processors

Modicon M580 automation platform				BMEH5820 model	BMEH5840 model	BMEH5860 model
						
Racks		Local racks (main + expansion)		1		
		Remote I/O drops *(1)*		8	16	31
Local X80 I/O *(2) (3)*		Discrete I/O channels		Not supported		
		Safety discrete I/O channels				
		Analog I/O channels				
		Safety analog I/O channels				
		Application-specific channels *(4)*				
Combined local and remote X80 I/O *(3)*		Discrete I/O channels		8,192	16,384	31,744
		Safety discrete I/O channels		Not supported		
		Analog I/O channels		2,048	4,096	7,936
		Safety analog I/O channels		Not supported		
		Application-specific channels *(4)*		288	576	1,116
Distributed equipment (DIO, CSIO)	EtherNet/IP or Modbus TCP devices (scanned by CPU)			61		
	EtherNet/IP or Modbus TCP devices (scanned by CPU and Ethernet modules)		BMENOC301/ BMENOC302/ BMENOC311	317	573	573
	CIP Safety devices (scanned by CPU)			Not supported		
Integrated communication ports		Ethernet service port (RJ45)		Engineering and Maintenance console (EcoStruxure Control Expert, Web browser, external tools), HMI, SCADA, distributed equipment (DIO)		
		Ethernet device network dual ports (RJ45) - RSTP		RIO network (RIO/DIO scanner)		
		Mini-B USB port		Programming port for Engineering Console (EcoStruxure Control Expert)		
Communication	Ethernet networks	**Max. cumulative number of:** Ethernet communication modules *(8)*		2	4	6 *(9)*
		Max. cumulative number of: Ethernet communication modules including BMXNOR/BMXNGD		2	4	8 *(10)*
	EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module	BMENOC0301	2	4	
		Advance NOC module	BMENOC0302	2	4	6
	FactoryCast	FactoryCast module	BMENOC0311	2	4	
	IP Forwarding	Ethernet control router	BMENOC0321	2		
	IEC 61850	IEC 61850 module	BMENOP0300	2	4	
	OPC UA	OPC UA module	BMENUA0100	2		
	DNP3 Serial/NET, IEC 60870-5-101/104	Advanced RTU module	BMENOR2200H	2	4	
	DNP3 Serial/IEC 60870-5-101	RTU module	BMXNOR0200H	– *(5)*		
	Global Data	Global Data module	BMXNGD0100	– *(5)*		
	AS-Interface	AS-Interface module	BMXEIA0100	– *(6)*	– *(6)*	
	Serial link (Modbus and Character mode)	Serial link module	BMXNOM0200	*(7)*		
	CANopen	CANopen module	BMECXM0100	– *(5)*		
	PROFIBUS DP	PROFIBUS DP module	PMEPXM0100	2	6	10
Internal memory capacity		Program process (MB)		8	16	64
		Data process (KB)		768	2,048	Up to 64 MB
		Data storage (GB)		4		
No. of K instructions executed per ms		100% Boolean (Kinstr/ms)		40		50
		65% Boolean + 35% fixed arithmetic (Kinstr/ms)		30		40
Product compatibility with Quantum		Support of Quantum Ethernet I/O (QEIO) and Quantum S908 Coax Remote I/O		No	Yes	
References				**BMEH582040**	**BMEH584040**	**BMEH586040**
Pages				2/12		

(1) A remote I/O drop can be either an X80 RIO drop (RIO) or a Quantum Ethernet I/O drop (QEIO). One X80 RIO drop can support up to two racks (via X-bus extension).
(2) Local X80 I/O are localized in local racks (main or expansion). Redundant controllers do not not support local X80 I/O.
(3) Maximum number of I/O channels (discrete, Safety discrete, analog, and Safety analog) and application-specific channels is not cumulative.
(4) Application-specific channels include counters, time-stamping, SSI encoder, motion control, serial, and frequency input modules.
(5) Not supported with redundant controllers.
*(6) Only supported in remote I/O drops and with a maximum of 16 **BMXEIA0100** modules.*
(7) Only supported in remote I/O drops.
(8) Ethernet communication modules include BMENOC03● 1 (note the varying maximum number of NOC based on PV version), BMENOR, BMENOP, BMENUA, BMEECN, and BMENOC0302.
(9)The maximum number of BME communication modules can reach 6 when combined with two modules from the following types: BMENUA, BMEECN, and BMENOC0302.
(10) If the configuration has already reached six, like the above Ethernet modules, then you can add an additional two BMX modules (BMXNOR/BMXNGD).

More technical information on www.se.com

Modicon M580 automation platform
Modicon M580 processors



Modicon M580 configuration

Presentation

Modicon M580 **BMEP58** modular processors form the core of a complete control solution based on Modicon M580 specific and compatible modules and racks. These standalone processors physically occupy two module slots (0 and 1) on a backplane.

Modicon M580 **BMEH58** redundant processors form the core of high-availability architectures (Hot Standby system) for more demanding applications, to provide overall higher availability *(1)*.

The processors can manage the Modicon X80 I/O platform in a single-rack or multi-rack Ethernet PAC station. Their slots can be equipped with:
- Discrete I/O modules
- Analog I/O modules
- Counter modules
- Communication modules: Ethernet Modbus/TCP network, EtherNet/IP network, Modbus serial link, AS-Interface actuator/sensor buses, and RTU (remote terminal unit) serial link
- Expert modules

The Modicon M580 processor range offers the choice of six memory levels:
- 4 MB for **BMEP581020** processor
- 8 MB for **BME●5820●0** processors
- 12 MB for **BMEP5830●●** processors
- 16 MB for **BME●5840●0** processors
- 24 MB for **BMEP585040** processor
- 64 MB for **BME●586040** processors

An optional 4 GB SD memory card **BMXRMS004GPF** is used with Modicon M580 processors for application and data storage. Each processor has a USB terminal port for connecting to a programming terminal. A temporary connection to an HMI is possible via the USB port *(2)*.

In addition, depending on the model, these processors offer the following (non-cumulative) maximums on their local racks:
- Up to 6,144 discrete I/O
- Up to 1,536 analog I/O
- Up to 216 application-specific channels *(3)* (process counter, motion control, and serial link or RTU)
- 1 Ethernet service port
- 2 Ethernet device network ports
- DIO ports (distributed equipment) for all processors
- RIO ports (remote equipment) for **BME●58●●40** processors
- 4 extended master AS-Interface V3 actuator/sensor buses, profile M4.0

Applications can be downloaded to the Modicon M580 processor when EcoStruxure Control Expert *(4)* is connected either via a local communication module, or directly to the processor through USB or Ethernet, or to the Ethernet ports of **BM●CRA312●0** Ethernet drop adapters and Modicon DRS (dual ring switch) switches.

(1) The application in a standalone processor can be migrated into a redundant processor as easy as one click in EcoStruxure Control Expert.
(2) Please refer to the HMI catalogs on our website.
(3) By using remote drops, these limits can be extended to the maximum configuration managed by one Modicon M580 station.
(4) Unity Pro software in earlier versions.

Modicon M580 automation platform

Modicon M580 processors

Standalone processors



BMEP5810●●/20●●/30●●/40●●



BMEP585040/6040

Description of BMEP58●●●● processors

BMEP58●●●● processors include:

1 Display block comprising eight LEDs with various combinations to provide quick diagnostics of the processor status:
- RUN LED (green): processor in operation (program execution)
- ERR LED (red): processor or system detected error
- I/O LED (red): detected I/O module error
- DL LED (green): firmware download in progress
- BACKUP LED (red): backup memory (internal or card)
- ETH MS LED (bi-color green/red): indicates the Ethernet port configuration status
- ETH NS LED (bi-color green/red): indicates the Ethernet connection status
- FORCED I/O (bi-color green/red): I/O status forced by the processor

2 Mini-B USB port for connecting to a programming terminal

3 RJ45 Ethernet port that allows diagnosis of Ethernet ports and provides access to external tools, devices, and distributed I/O devices

5 Slot equipped with an optional SD memory card for application and data storage (an LED, located behind the door, indicates access to the memory card) *(1)*

6 Printed serial number, product version, and MAC address on the front panel of the processor

7 Two hooks and two screws for mechanical attachment and grounding connection to the backplane

8 Two connectors for electrical connection to a Modicon X80 backplane (X-bus only or Ethernet backplane)

BMEP58●●20 processors

4 **BMEP58●●20** processors have dual RJ45 Ethernet ports for connection to the distributed equipment (DIO)

BMEP58●●40 processors

4 **BMEP58●●40** processors have dual RJ45 Ethernet ports for connection to the remote I/O drops (EIO) and distributed equipment (through DRS) *(2)*.

USB terminal port

The USB port **2**, offering a useful data rate of 480 Mbps, is compatible with EcoStruxure Control Expert *(4)* programming software, OPC Factory Server (OFS), and Harmony HMI terminals *(3)*.

BMEP58 processors can be connected to a USB bus comprising several peripheral devices. However:
- Only one processor can be connected to the USB bus
- No device on the USB bus can be controlled by the PLC (modem, printer)

Ethernet backplanes

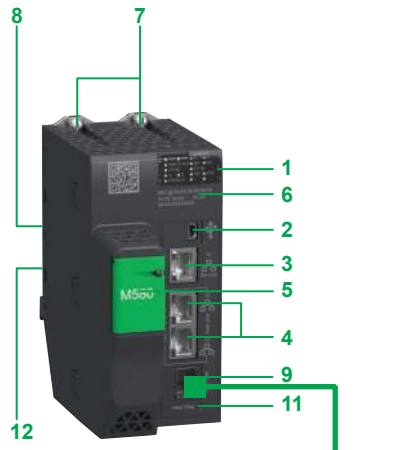
The new range of Ethernet backplanes features embedded Ethernet and X-bus connectivity. With 4, 8, and 12 slots for a standard power supply or 6 and 10 slots for a redundant power supply, these two connectors allow the existing Modicon M580/X80 modules to be incorporated into a Modicon M580 architecture.

*(1) The **BMEP585040/BMEP586040** models have a different door, which can be locked to prevent removal of the SD card.*
*(2) DRS: Dual ring switches. Supported switches: **MCSESM083F23F1/MCSESM103F2CU1/MCSESM103F2CS1/TCSESM083F23F1/TCSESM063F2CU1/TCSESM063F2CS1**.*
(3) Please refer to the HMI catalogs on our website.
(4) Unity Pro software in earlier versions.

Modicon M580 automation platform

Modicon M580 processors

Redundant processors



BMEH58●●40

BMEH58●●40

Description of BMEH58●●●● processors

BMEH58●●●● processors include:

1 Display block comprising 13 LEDs with various combinations to provide quick diagnostics of the processor status:
- RUN LED (green): processor in operation (program execution)
- ERR LED (red): processor or system detected error
- I/O LED (red): detected I/O module error
- DL LED (green): firmware download in progress
- REMOTE RUN (green): indicates the RUN status of the remote processor
- BACKUP LED (red): backup memory (internal or card)
- ETH MS LED (bi-color green/red): indicates the Ethernet port configuration status
- ETH NS LED (bi-color green/red): indicates the Ethernet connection status
- A (green): indicates the local CPU A/B/Clear rotary switch is set to “A”
- B (green): indicates the local CPU A/B/Clear rotary switch is set to “B”
- PRIM (green): indicates the primary status of the processor
- STBY (green): indicates the standby status of the processor
- FORCED I/O (red): I/O status forced by the processor

2 Mini-B USB port for connecting to a programming terminal

3 RJ45 Ethernet port that allows diagnosis of Ethernet ports and provides access to external tools, devices, and distributed I/O devices

5 Slot equipped with an optional SD memory card for application and data storage (an LED, located behind the door, indicates access to the memory card; the door can be locked to prevent removal of the SD card)

6 Printed serial number, product version, and MAC address on the front panel of the processor

7 Two hooks and two screws for mechanical attachment and grounding connection to the backplane

8 Two connectors for electrical connection to a Modicon X80 backplane (X-bus only or Ethernet backplane)

9 Slot for SFP socket supporting copper or fiber-optic Hot Standby link connection

10 Hot Standby communication link cable (copper or fiber optic depending on SFP socket type)

11 LED indicating the Hot Standby link status

12 Rotary switch for processor identification

BMEH58●●40 processors

4 **BMEH58●●40** processors have dual RJ45 Ethernet ports for connection to the remote I/O drops (EIO) and distributed equipment (DIO).

USB terminal port

The USB port **2**, offering a useful data rate of 480 Mbps, is compatible with EcoStruxure Control Expert *(2)* programming software, OPC Factory Server (OFS), and Harmony HMI terminals *(1)*.

BMEH58 processors can be connected to a USB bus comprising several peripheral devices. However:
- Only one processor can be connected to the USB bus.
- No device on the USB bus can be controlled by the PLC (modem, printer).

PF151924A_FCLF-852021-3



490NAC0100

PF151925A_FTLF1421P1xTL_new



490NAC0201

SFP sockets

SFP sockets are used to choose the medium of the Hot Standby link. The two types each have a unique reference. Transmission between the primary CPU and the redundant CPU can be either:
- Copper if the **490NAC0100** SFP socket is used
- Fiber optic if the **490NAC0201** SFP socket is used

Ethernet backplanes

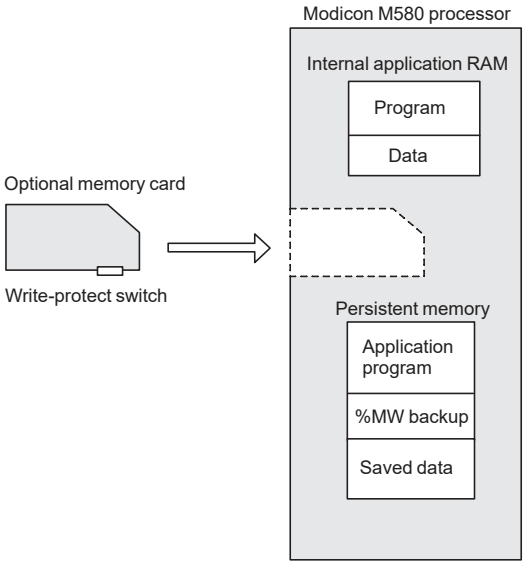
The new range of Ethernet backplanes features embedded Ethernet and X-bus connectivity. With 4, 8, and 12 slots for a standard power supply or 6 and 10 slots for a redundant power supply, these two connectors allow the existing Modicon M580/X80 modules to be incorporated into a Modicon M580 architecture.

(1) Please refer to the HMI catalogs on our website.
(2) Unity Pro software in earlier versions.

Modicon M580 automation platform

Modicon M580 processors

Memory structure



Modicon M580 application storage

Memory structure

Internal memory capacity

The internal application RAM of Modicon M580 processors stores and executes the application program. This RAM has no battery backup, which means data could be lost in the event of a power outage. To avoid data loss, the application can be backed up in the persistent memory. The internal memory provides a maximum capacity of 64 MB for program and data, and 4 GB for data storage.

The internal persistent memory is used by the firmware to register:

- the value of application variables
- the system state
- application backup
- a copy of %MW values

An optional memory card, **BMXRMS004GPF**, is used for application backup and data storage. It is formatted by Schneider Electric.

BMXRMS004GPF SD memory card

Modicon M580 processors support an optional 4 GB memory card **BMXRMS004GPF**. The SD memory card is of "industrial grade" and formatted for use with Modicon M580 only. The Modicon M580 does not support memory cards from Modicon M340. This card withstands operating temperatures of -40 to +85 ºC/ *-40 to +185 °F* and has 10 years of file retention capacity.
EcoStruxure Control Expert *(1)* programming software helps the application designer manage the structure and memory space of the Modicon M580 automation platform.

Protecting the application

If necessary, it is possible to limit access to the application (in terms of reading and modifying the program) by only loading the executable code in the PLC.
Additionally, a memory protection bit, set in configuration mode, is also available to help prevent any program modification (via the programming terminal or downloading).
The user has function blocks to help protect know-how by means of a signature that can be loaded and stored in the Modicon M580 processor module's flash memory card (code not executed if the signature is not present).

Modifying the program in online mode

As with the Modicon Premium and Quantum platforms (with EcoStruxure Control Expert *(1)* software), the online program modification function is available on the Modicon M580 automation platform. It has the option of adding or modifying the program code and data in different places in the application in a single modification session (thus helping to ensure that modification is homogenous and consistent with the controlled process). A dedicated memory area of the application internal RAM authorizes these program modification or addition sessions while complying with the recommendation to structure the application program in several, reasonably-sized sections.

The CCOTF (Change Configuration On The Fly) function is used to add or remove discrete or analog I/O modules to/from a Modicon M580 CPU in a local or remote I/O drop in RUN mode. It enables Ethernet RIO drops to be added in RUN mode. The addition of a complete Modicon M580 Ethernet RIO drop in RUN mode requires EcoStruxure Control Expert or Unity Pro V8.0 or higher on standalone processors and EcoStruxure Control Expert or Unity Pro V11.0 or higher on redundant processors.

The CCOTF function avoids interrupting processes and helps to reduce production costs. It also enables the configuration parameters of pre-existing and new Modicon M580 analog and discrete I/O modules to be modified online in both a local or remote I/O drop.

(1) Unity Pro software in earlier versions.

Modicon M580 automation platform

Modicon M580 processors

Secure Engineering Link

Secure Engineering Link

End-to-end secure communications

An automation system can be very vulnerable to cyberattacks when programming and/or monitoring operations are performed. To help prevent these attacks, the Modicon M580 system includes a specific HTTPS channel for establishing secure communications between EcoStruxure Control Expert and Modicon M580 processors (standalone and redundant non-Safety CPUs *(1)*) at control level: Secure Engineering Link.

Programming and/or monitoring operations are thus secured through:

- Modicon M580 controller authentication (self-signed certificate with public key)
- Data flow encryption between between EcoStruxure Control Expert and the Modicon M580 controller
- EcoStruxure Control Expert client authentication by requiring a login/password to establish the HTTPS tunnel

The Secure Engineering Link provides enforced integrity and confidentiality and offers anti-replay capacities. It provides centralized certificate management for large applications.

Configuration

The Secure Engineering Link is configured as follows:

- On the EcoStruxure Control Expert side, two dedicated new drivers are available ("HTTPS" and "HTTPS via USB")
- On the Modicon M580 controller side, three Engineering Link modes are available:
  - **Enforced mode**, with the highest level of security. Only secured protocols (HTTPS) are accepted by the CPU and Modbus TCP port (502) is closed.
  - **Filtered mode**, a hybrid mode for applying cybersecurity on the engineering link, and non-secure connectivity on links to SCADA or other controllers.
  - **Full access mode**, with no restricted conditions, all communication drivers and SCADA in Modbus TCP (port 502) are accepted.

Requirements

Secure Engineering Link functionality is available for:

- Modicon M580 CPUs with firmware version ≥ V4.20
- EcoStruxure Control Expert software version ≥ V16

Modicon M580 standard CPUs with product version > V3.0 can be upgraded to benefit from the Secure Engineering Link conditions.

Use cases *(2)*

Modicon M580 system		Controller alone	Controller + NOCs (NOC301, NOC0302, NOC311, NOC321)		Controller + NOCs (NOC301, NOC311, NOC321)		Controller + NOC321		Controller + NUA (Sec mode)			Controller + BMXNOR			Controller + BMENOR			Controller + NOP			Controller + NOP		
Communication adapter parameter			Backplane Port enabled		Backplane Port disabled		IP Forwarding		IP Forwarding			Backplane Isolated			Backplane Port isolated			Backplane Port enabled without IP Forwarding			Backplane Port disabled IP Forwarding		
Topology		EcoStruxure SCADA			EcoStruxure SCADA				EcoStruxure SCADA									EcoStruxure SCADA						
Security mode																										
Engineering Link	HTTPS or HTTPS via USB	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓	-	-	-	-	-	-	-	✓	✓	✓	-	-	-
	Modbus TCP monitoring	✓	✓	-	✓	✓	-	✓	✓	-	✓	✓	-	✓	✓	-	✓	✓	-	✓	✓	-	✓	✓	-	✓	✓	-
	Modbus TCP programming	✓	-	-	✓	-	-	✓	-	-	✓	-	-	✓	-	-	✓	-	-	✓	-	-	✓	-	-	✓	-	-

Legend

- *Full access mode Yes/No*
- *Filtered mode Yes/No*
- *Enforced mode Yes/No*

(1) Modicon M580 Safety CPUs will benefit from the Secure Engineering Link in firmware release V4.21.

(2) See complete communication adapter compatibility matrix in the "Modicon Controller Systems Cybersecurity User Guide" (EIO0000001999).

Modicon M580 automation platform

Modicon M580 processors

Standalone processors



BMEP58●●●●

References

Modicon M580 standalone processors

Local I/O capacity	Maximum number of Ethernet modules	Device ports	Service port	Reference	Weight kg/*lb*
1,024 discrete I/O **256 analog I/O** **36 application-specific channels** 4 MB integrated (memory program)	2 Ethernet networks	2 DIO	1	BMEP581020	0.849/*1.872*
2,048 discrete I/O **512 analog I/O** **72 application-specific channels** 8 MB integrated (memory program)	2 Ethernet networks	2 DIO	1	BMEP582020	0.849/*1.872*
		2 RIO/DIO	1	BMEP582040	0.849/*1.872*
3,072 discrete I/O **768 analog I/O** **108 application-specific channels** 12 MB integrated (memory program)	3 Ethernet networks	2 DIO	1	BMEP583020	0.849/*1.872*
		2 RIO/DIO	1	BMEP583040	0.849/*1.872*
4,096 discrete I/O **1,024 analog I/O** **144 application-specific channels** 16 MB integrated (memory program)	4 Ethernet networks	2 DIO	1	BMEP584020	0.849/*1.872*
		2 RIO/DIO	1	BMEP584040	0.849/*1.872*
5,120 discrete I/O **1,280 analog I/O** **180 application-specific channels** 24 MB integrated (memory program)	4 Ethernet networks	2 DIO	1	BMEP585040	0.849/*1.872*
6,144 discrete I/O **1,536 analog I/O** **216 application-specific channels** 64 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEP586040	0.849/*1.872*

SD memory card

Description	Processor compatibility	Capacity	Reference	Weight kg/*lb*
SD memory card (optional) *(1)*	All processors	4 GB (for application backup and data storage)	BMXRMS004GPF	0.002/*0.004*

PF106120



BMXRMS004GPF

Separate parts

Description	Use		Length m/*ft*	Reference	Weight kg/*lb*
	From	To			
Terminal port/ USB cordsets	Mini-B USB port on Modicon M580 processor	Type A USB port on: - PC terminal - Harmony HMI graphic terminal	1.8/*5.91*	BMXXCAUSBH018	0.065/*0.143*
			4.5/*14.76*	BMXXCAUSBH045	0.110/*0.243*

PF106185



BMXXCAUSBH0●●

(1) Memory card, used for:
- Backing up the program, constants, symbols, and data
- File storage

Modicon M580 automation platform

Modicon M580 processors

Redundant processors



BMEH58●●●●



BMEH58●040K Hot Standby kit

References *(continued)* (1)

Modicon M580 redundant processors

Memory capacity	Maximum number of Ethernet modules	Device ports	Service port	Reference	Weight kg/*lb*
8 MB integrated (memory program)	2 Ethernet networks	2 RIO/DIO	1	BMEH582040	0.849/ *1.872*
16 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEH584040	0.849/ *1.872*
64 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEH586040	0.849/ *1.872*

Accessories

Description	Use	Cable medium	Reference	Weight kg/*lb*
HSBY link SFP socket (one reference for one socket)	To be inserted in pair in 2 **BMEH58●●40** redundant processors	RJ45 copper	490NAC0100	–
	To be inserted in pair in 2 **BMEH58●●40** redundant processors	Single-mode fiber	490NAC0201	–

Hot Standby kits

Description	Composition	Reference	Weight kg/*lb*
Hot Standby kit with 2 HSBY processors and 2 SFP sockets	- 2 **BMEH582040** redundant Modicon M580 processors - 2x **490NAC0100** RJ45 SFP sockets	BMEH582040K	–
	- 2 **BMEH584040** redundant Modicon M580 processors - 2x **490NAC0100** RJ45 SFP sockets	BMEH584040K	–

(1) For additional characteristics, see our website.

Contents

3 - Safety

Safety processor selection guide . . . . . *page 3/2*

■ **Safety product compatibility table** ..... *page 3/6*

■ **Standalone Safety processors**

□ Overview, architecture ..... *page 3/8*

□ Safety level ..... *page 3/9*

□ CIP safety ..... *page 3/10*

□ Description, references ..... *page 3/11*

■ **Redundant Safety processors (HSBY)**

□ Overview, architecture, Safety level ..... *page 3/12*

□ Description, references ..... *page 3/13*

Modicon M580 automation platform

Modicon M580 Safety standalone processors

Modicon M580 automation platform				BMEP582040S + BMEP58CPROS3 mandatory coprocessor *(1)*	BMEP584040S + BMEP58CPROS3 mandatory coprocessor *(1)*	BMEP586040S + BMEP58CPROS3 mandatory coprocessor *(1)*
						
Racks		Local racks (main + extension)		4	8	
		Remote I/O drops *(2)*		8	16	31
Local X80 I/O *(3) (4)*		Discrete I/O channels		2048	4096	6144
		Safe discrete I/O channels		668	1456	1456
		Analog I/O channels		512	1024	1536
		Safe analog I/O channels		128	272	272
		Application-specific channels *(5)*		72	144	216
Combined Local and Remote X80 I/O *(4)*		Discrete I/O channels		10240	20480	37888
		Safe discrete I/O channels		3632	7344	12864
		Analog I/O channels		2560	5120	9472
		Safe analog I/O channels		672	1360	2380
		Application-specific channels *(5)*		360	720	1080
Distributed equipment (DIO, CSIO)	EtherNet/IP or Modbus TCP devices (scanned by CPU)			61		
	EtherNet/IP or Modbus TCP devices (scanned by CPU and Ethernet modules)		BMENOC301/ BMENOC311	317	445	445
	CIP safety devices (scanned by CPU)			16	64	128
Integrated communication ports		Ethernet service port (RJ45)		Engineering and Maintenance console (EcoStruxure Control Expert, Web browser, external tools), HMI, SCADA, Distributed equipment (DIO, CSIO)		
		Ethernet device network dual ports (RJ45) - RSTP		RIO network (RIO/DIO/CSIO scanner)		
		USB type mini B port		Programming port for Engineering Console (EcoStruxure Control Expert)		
Communication	Ethernet networks	**Max. cumulative number of:** Ethernet communication modules *(11)*		2	4	5 *(12)*
		Max. cumulative number of: Ethernet communication modules including BMXNGD		2	4	8 *(13)*
	EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module	BMENOC0301	2	3	
	FactoryCast	FactoryCast module	BMENOC0311	2	3	
	IP Forwarding	Ethernet control router	BMENOC0321	2		
	IEC 61850	IEC 61850 module	BMENOP0300	2	4	
	OPC UA	OPC UA module	BMENUA0100	2		
	DNP3 NET / IEC 60870-5-104	Advanced RTU module	BMENOR2200H *(6)*	2	4	
	DNP3 Serial / IEC 60870-5-101	RTU module	BMXNOR0200H	– *(7)*		
	Global Data	Global Data module	BMXNGD0100	2	4	
	AS-Interface	AS-Interface module	BMXEIA0100	4 *(8)*	8 *(8)*	
	Serial Link (Modbus and Character)	Serial link module	BMXNOM0200	Each **BMXNOM0200** channel counts as an application-specific channel *(9)*		
	CANopen	CANopen module	BMECXM0100	Each **BMECXM0100** counts as a Distributed equipment (DIO)		
	PROFIBUS DP	PROFIBUS DP module	PMEPXM0100	2	6	10
Edge Module		Edge Compute module	BMEECN0100H	2		
Internal memory capacity		Program process (MB)		8	16	64
		Program safe (MB)		2	4	16
		Data process (KB)		768	2048	up to 64MB *(10)*
		Data safe (KB)		512	1024	1024
		Data storage (GB)		4		
No. of K instructions executed per ms		100% Boolean (Kinstr/ms)		40		60
		65% Boolean + 35% fixed arithmetic (Kinstr/ms)		30		40
Product compatibility with Quantum		Support of Quantum Ethernet I/O (QEIO) and Quantum S908 Coax Remote I/O		No	Yes	
References				**BMEP582040S**	**BMEP584040S**	**BMEP586040S**
Pages				3/11		

(1) The mandatory coprocessor must be ordered separately.
(2) A Remote I/O drop can be either a X80 RIO Drop (RIO) or Quantum Ethernet I/O drop (QEIO). One X80 RIO Drop can support up to 2 racks (via X-bus extension).
(3) Local X80 I/O are localized in local racks (main or extension). Redundant controllers do not not support Local X80 I/O.
(4) Maximum number of I/O channels (Discrete, Safe Discrete, Analog and Safe Analog) as well as application-specific channels is not cumulative.
(5) Application-specific channels include counters, time-stamping, SSI encoder, Motion control, Serial and Frequency input modules.
(6) Maximum number of BMENOR modules is not cumulative with other Ethernet network modules.
(7) Not supported with safety controllers.
(8) Additional BMXEIA0100 modules can be installed in remote drops : 2 per drop and with a maximum of 16 BMXEIA0100 modules.
(9) Only supported in non-safety related Remote I/O drops.
(10) BMEP586040S CPU features a global memory pool of 64 Mbytes for Program process (non-safe), Data process (non-safe non-retain data only), Program safe, and Data safe.
(11) Ethernet communication modules include BMENOC03●1 (note the varying maximum number of NOC based on PV version), BMENOR, BMENOP, BMENUA, and BMEECN.
(12)The maximum number of BME communication modules can reach five when combined with two modules from the following types: BMENUA, and BMEECN.
(13) If the configuration has already reached five, like the above Ethernet modules, then you can add an additional three BMXNGD modules.

More technical Information on www.se.com

Modicon M580 automation platform

Modicon M580 Safety redundant processors

Modicon M580 automation platform				BMEH582040S + BMEP58CPROS3 mandatory coprocessor *(1)*	BMEH584040S + BMEP58CPROS3 mandatory coprocessor *(1)*	BMEH586040S + BMEP58CPROS3 mandatory coprocessor *(1)*
						
Racks		Local racks (main + extension)		1		
		Remote I/O drops *(2)*		8	16	31
Local X80 I/O *(3) (4)*		Discrete I/O channels		Not supported		
		Safe discrete I/O channels				
		Analog I/O channels				
		Safe analog I/O channels				
		Application-specific channels *(5)*				
Combined Local and Remote X80 I/O *(4)*		Discrete I/O channels		8192	16384	31744
		Safe discrete I/O channels		2944	5888	11408
		Analog I/O channels		2048	4096	7936
		Safe analog I/O channels		544	1088	2108
		Application-specific channels *(5)*		288	576	1116
Distributed equipment (DIO, CSIO)	EtherNet/IP or Modbus TCP devices (scanned by CPU)			61		
	EtherNet/IP or Modbus TCP devices (scanned by CPU and Ethernet modules)		BMENOC301/ BMENOC311	317	436	436
	CIP safety devices (scanned by CPU)			– *(9)*		
Integrated communication ports		Ethernet service port (RJ45)		Engineering and Maintenance console (EcoStruxure Control Expert, Web browser, external tools), HMI, SCADA, Distributed equipment (DIO)		
		Ethernet device network dual ports (RJ45) - RSTP		RIO network (RIO/DIO scanner)		
		USB type mini B port		Programming port for Engineering Console (EcoStruxure Control Expert)		
Communication	Ethernet networks	**Max. cumulative number of:** Ethernet communication modules *(12)*		2	3	5 *(13)*
		Max. cumulative number of: Ethernet communication modules including BMXNGD		2	3	8 *(14)*
	EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module	BMENOC0301	2	3	
	FactoryCast	FactoryCast module	BMENOC0311	2	3	
	IP Forwarding	Ethernet control router	BMENOC0321	2		
	IEC 61850	IEC 61850 module	BMENOP0300	2	3	
	OPC UA	OPC UA module	BMENUA0100	2		
	DNP3 NET / IEC 60870-5-104	Advanced RTU module	BMENOR2200H *(6)*	2	4	
	DNP3 Serial / IEC 60870-5-101	RTU module	BMXNOR0200H	– *(7)*		
	Global Data	Global Data module	BMXNGD0100	– *(9)*		
	AS-Interface	AS-Interface module	BMXEIA0100	4 *(8)*	8 *(8)*	
	Serial Link (Modbus and Character)	Serial link module	BMXNOM0200	Each **BMXNOM0200** channel counts as an application-specific channel *(10)*		
	CANopen	CANopen module	BMECXM0100	– *(9)*		
	PROFIBUS DP	PROFIBUS DP module	PMEPXM0100	2	6	10
Internal memory capacity		Program process (MB)		8	16	64
		Program safe (MB)		2	4	16
		Data process (KB)		768	2048	Up to 64MB *(11)*
		Data safe (KB)		512	1024	1024
		Data storage (GB)		4		
No. of K instructions executed per ms		100% Boolean (Kinstr/ms)		40		50
		65% Boolean + 35% fixed arithmetic (Kinstr/ms)		30		40
Product compatibility with Quantum		Support of Quantum Ethernet I/O (QEIO) and Quantum S908 Coax Remote I/O		No	Yes	
References				**BMEH582040S**	**BMEH584040S**	**BMEH586040S**
Pages				3/13		

(1) The mandatory coprocessor must be ordered separately.
(2) A Remote I/O drop can be either a X80 RIO Drop (RIO) or Quantum Ethernet I/O drop (QEIO). One X80 RIO Drop can support up to 2 racks (via X-bus extension).
(3) Local X80 I/O are localized in local racks (main or extension). Redundant controllers do not not support Local X80 IO.
(4) Maximum number of I/O channels (Discrete, Safe Discrete, Analog and Safe Analog) as well as application-specific channels is not cumulative.
(5) Application-specific channels include counters, time-stamping, SSI encoder, Motion control, Serial and Frequency input modules.
(6) Maximum number of BMENOR modules is not cumulative with other Ethernet network modules.
(7) Not supported with safety controllers.
(8) Only supported in Remote I/O drops : 2 per drop and with a maximum of 16 BMXEIA0100 modules.
(9) Not supported with safety redundant controllers.
(10) Only supported in Remote I/O drops.
(11) BMEH586040S CPU features a global memory pool of 64 Mbytes for Program process (non-safe), Data process (non-safe non-retain data only), Program safe, and Data safe.
(12) Ethernet communication modules include BMENOC03●1 (note the varying maximum number of NOC based on PV version), BMENOR, BMENOP, BMENUA, and BMEECN.
(13)The maximum number of BME communication modules can reach five when combined with two modules from the following types: BMENUA, and BMEECN.
(14) If the configuration has already reached five, like the above Ethernet modules, then you can add an additional three BMXNGD modules.

Modicon M580 platform and Modicon X80 modules

Safety product compatibility according to network architecture and platform

For non safety product compatibility, please refer to page 1/18

Product type	Product main feature	Commercial reference *(1)*	Module type	Modicon M580 Safety							
				Local rack with Safety CPU and coprocessor (X-bus + Ethernet backplanes BMEXBP are mandatory for Safety CPU and coprocessor)		Modicon X80 drops on Ethernet remote I/O				Modicon X80 drops on distributed I/O	
				Standalone CPU	Redundant CPU (HSBY)	Standalone or redundant CPU (HSBY)				Standalone CPU	
				X-bus + Ethernet backplane BMEXBP●●●●		X-bus backplane BMXXBP●●●●		X-bus + Ethernet backplane BMEXBP●●●●		X-bus backplane BMXXBP●●●●	
						BMXCRA31200	BMXCRA31210	BMECRA31210	BMECRA31310	BMXPRA0100	
Modicon X80 Safety power supplies	Redundant Safety power supply	**BMXCPS4002S**	100...240 V ∿, 40 W	■	■		■	■			
		BMXCPS4022S	24...48 V ⎓, 40 W	■	■		■	■			
		BMXCPS3522S	100...150 V ⎓, 40 W	■	■		■	■			
Modicon X80 backplanes	X-bus backplane	**BMXXBP0400 (H)**	4 slots			■	■			■	
		BMXXBP0600 (H)	6 slots			■	■			■	
		BMXXBP0800 (H)	8 slots			■	■			■	
		BMXXBP1200 (H)	12 slots			■	■			■	
		BMXXBP1600 (H)	16 slots			■	■			■	
	X-bus + Ethernet backplane	**BMEXBP0400 (H)**	4 slots	■	■			■			
		BMEXBP0800 (H)	8 slots	■	■			■			
		BMEXBP1200 (H)	12 slots	■	■			■			
	X-bus + Ethernet, dual power supply backplane	**BMEXBP0602 (H)** *(2)*	6 slots	■	■			■			
		BMEXBP1002 (H) *(2)*	10 slots	■	■			■			
	Rack expansion	**BMXXBE1000 (H)***(3)*	Module	■	■	■	■	■		■	
		BMXXBE2005 *(4)*	Kit	■	■	■	■	■		■	
	Accessories	**BMXXEM010** *(5)*	Protective cover	■	■	■	■	■			
Safety I/O	Safety analog input	**BMXSAI0410**	4 channels	■			■	■			
	Safety discrete input	**BMXSDI1602**	16 channels	■			■	■			
	Safety discrete output	**BMXSDO0802**	8 channels	■			■	■			
	Safety Output Relay	**BMXSRA0405**	4 channels	■			■	■			
I/O expansion	RIO drop adapter	**BMXCRA31200**	X-bus, Standard			■					
		BMXCRA31210 (C)	X-bus, Performance				■				
		BMECRA31210 (C)	Ethernet, Performance					■			
		BMECRA31310 (H)	Ethernet, Performance								
	DIO drop adapter	**BMXPRA0100**	Peripheral							■	

(1) Optional versions: (C) - "Coated", (H) - "Hardened".
(2) Not compatible with single power supplies.
(3) Extended rack can be any type of rack, but only X-bus modules (BMX) can be used.
(4) Extended rack kit.
(5) Protective cover for unoccupied slots on backplane.

Compatible | **Not compatible**

Note: *All Modicon X80 Safety modules are compatible with the Modicon M580 Safety ePAC only.*

Modicon M580 automation platform
Safety
Modicon M580 Safety standalone processors



Modicon M580 Safety configuration with a mix of Modicon X80 Standard & Safety I/O

Presentation

Overview

The Modicon M580 Safety processor is a Modicon M580 programmable automation controller (PAC) with embedded Safety modules and functions; it is available as a standalone PAC or a redundant PAC (HSBY).

A standalone PAC includes a single CPU with a Safety coprocessor that is mandatory for dual execution.

It is based on Modicon X80 modules and on the EcoStruxure Control Expert *(1)* environment:

- Modicon M580 Safety CPU and coprocessor
- Redundant Safety power supplies
- Safety local and remote I/O
- Safety communications
- Software libraries for process and machine safety

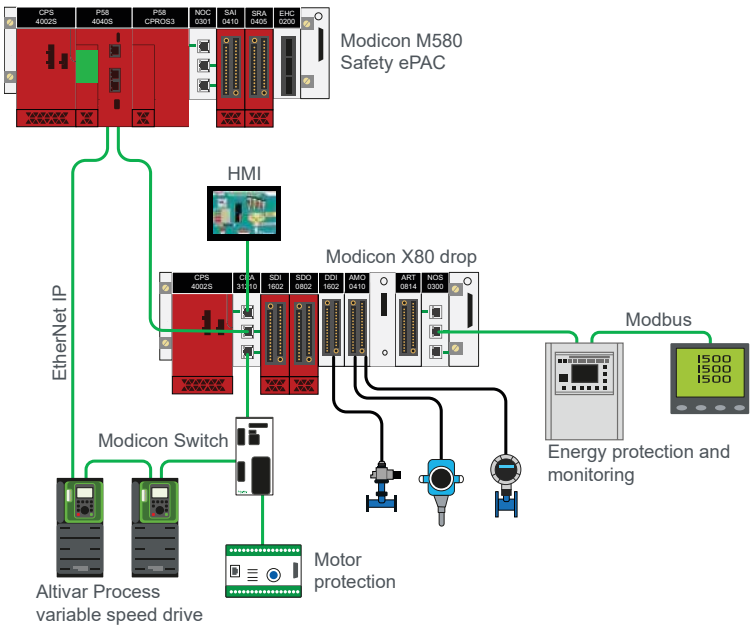
Modicon X80 Safety modules are only compatible with the Modicon M580 Safety processor.

Architecture

The Modicon M580 Safety PAC is a safety-related system certified by TÜV Rheinland. It ensures safe operation while optimizing costs.

The Modicon M580 Safety processor allows a mix of architectures:

- It manages both Safety and non-Safety applications
- Safety and process control functions are separate
- It integrates process and machine safety functions



Modicon M580 Safety standalone topology

Modicon M580 automation platform
Safety
Modicon M580 Safety standalone processors

Presentation *(continued)*

Safety level

The Modicon M580 Safety PAC improves system reliability thanks to a unique combination between built-in cybersecurity and safety features:

- Isolated Safety memory cells
- Online error code correction
- Security watchdog
- Clock monitoring
- Safety application executed in a dedicated core
- Memory isolation helping to secure access to Safety and non-Safety memory
- Safety memory different from the standard CPU

Any failure in the standard application does not impact the Safety application.

Safety applications using the Modicon M580 Safety PAC comply with:

- up to Safety Integrity Level 3 (SIL3) for the process industry sector according to IEC 61508/IEC 61511
- up to Category 4, Performance Level “e” (Cat.4/PLe) for the safety of machinery according to ISO 13849
- up to SILCL3 for the safety of machinery according to IEC 62061
- up to SIL4 for functional safety in the rail industry according to EN 50126, EN 50128, and EN 50129

The Safety level is achieved by dual execution of the Safety application, using both the **BMEP58•040S** processor and the **BMEP58CPROS3** coprocessor.

(1) Unity Pro software in earlier versions.

Modicon M580 automation platform
Safety
Modicon M580 Safety standalone processors

Presentation

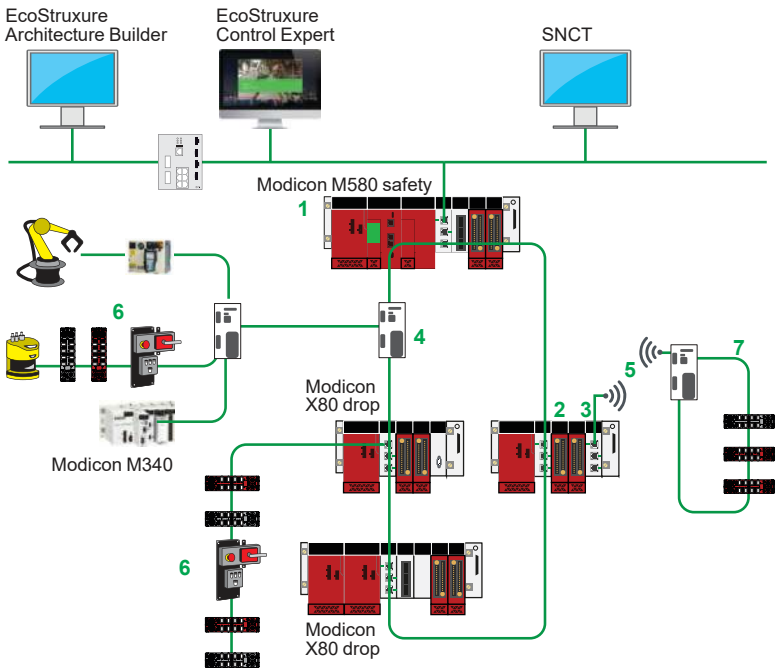
CIP Safety

Modicon M580 Safety standalone CPUs embed a CIP Safety service over EtherNet/IP protocol in order to facilitate integration of smart safety devices in the Modicon M580 Safety architecture, with a unique software platform for Modicon M580 processes.

As an ODVA-conformant service, CIP Safety opens access over EtherNet/IP to third-party Safety products, compliant up to SIL3/PLe for process and machine, and SIL4 for railway.
A full ready-to-use DTM catalog is provided for the sake of device configuration, including most devices available on CIP Safety. If a new device must be installed and is not included in the DTM catalog, an ESD file from the device supplier can be imported.

In order to guarantee CIP Safety compliance, CIP Safety devices ("targets") **6** must be placed so as to be accessible as DIO devices, according to the following rules:
- Placed through the Service ports of Modicon M580 Safety CPU **1** and Modicon X80 CRA modules **2**
- Placed through a Modicon X80 BMENOS module **3** or the dual ring switches (DRS) **4**
- A CIP Safety target cannot be scanned by a Modicon X80 BMENOC Ethernet module
- The target must be placed in the same Ethernet network and IP domain as the Modicon M580 Safety CPU

The ring topology **7** is enabled with DLR protocol.

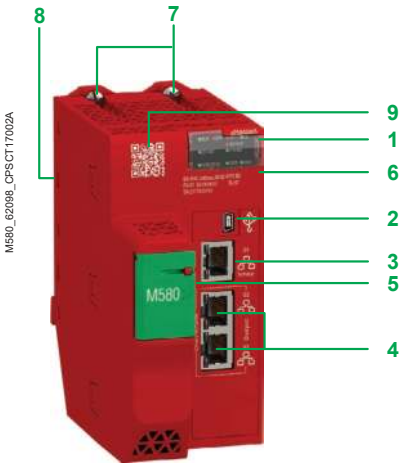


The CIP Safety service is available with standalone *(1)* Safety CPUs with firmware version V3.10 or later and EcoStruxure Control Expert V14.1. Depending on the CPU type, up to 16/64/128 CIP Safety devices can be connected to the CPU, in addition to other DIO devices. To ensure optimum performance of this architecture, a compromise must be made between the maximum number of CIP Safety I/O (up to 128) and the maximum number of RIO drops (up to 31). Recommended topologies are detailed in the table below:

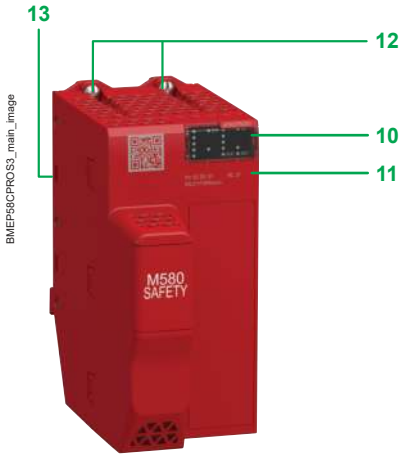
Description	BMEP582040S			BMEP584040S			BMEP586040S		
	CSIO devices	DIO devices	RIO drops	CSIO devices	DIO devices	RIO drops	CSIO devices	DIO devices	RIO drops
Maximum recommended remote topology	10	10	8	32	10	16	Number of (CSIO + RIO + 0,5*DIO) ≤ 128		
Maximum recommended distributed topology	16	61	2	64	61	2			

(1) Modicon M580 Safety redundant CPUs (HSBY) do not support CIP Safety.

Modicon M580 automation platform
Safety
Modicon M580 Safety standalone processors



BMEP58●040S



BMEP58CPROS3



BMEP58●040S

Description of Modicon M580 Safety processor and coprocessor

BMEP58●040S processor

BMEP58●040S processors include:

1 Display block comprising eight LEDs with various combinations to provide quick diagnostics of the processor status:
- RUN LED (green): processor in operation (program execution)
- ERR LED (red): processor or system detected error
- I/O LED (red): detected I/O module error
- DL LED (green): firmware download in progress
- BACKUP LED (red): backup memory (internal or card)
- ETH MS LED (bi-color green/red): indicates the Ethernet port configuration status
- ETH NS LED (bi-color green/red): indicates the Ethernet connection status
- FORCED I/O (bi-color green/red): I/O status forced by the processor

2 Mini-B USB port for connecting to a programming terminal

3 RJ45 Ethernet port that allows diagnosis of Ethernet ports and provides access to external tools, devices, and distributed I/O devices

4 Dual RJ45 Ethernet ports for connection to the remote I/O drops (EIO) and distributed equipment (through DRS) *(1)*

5 Slot equipped with an optional SD memory card for application and data storage: an LED, located behind the door, indicates access to the memory card *(2)*

6 Printed serial number, product version, and MAC address

7 Two hooks and two screws for mechanical attachment and grounding connection to backplane

8 Two connectors for electrical connection to a Modicon M580 rack (X-bus and Ethernet backplane)

9 QR code that provides access to the product datasheet

BMEP58CPROS3 coprocessor

The coprocessor is mandatory with the Safety processor. The **BMEP58CPROS3** coprocessor includes:

10 Display block comprising two LEDs to provide quick diagnostics of the coprocessor status:
- ERR LED (red): detected coprocessor or system error
- DL LED (green): firmware download in progress

11 Printed serial number and product version on the front panel of the coprocessor

12 Two hooks and two screws for mechanical attachment and grounding connection to backplane

13 Two connectors for electrical connection to a Modicon M580 rack (X-bus and Ethernet backplane)

References

Modicon M580 Safety processors

Local I/O capacity	Maximum number of Ethernet modules	Device ports	Service port	Reference	Weight kg/*lb*
2,048 discrete I/O 512 analog I/O 72 application-specific channels 2/8 MB integrated (Safety/non-Safety memory program)	2 Ethernet networks	2 RIO/DIO	1	BMEP582040S	0.849/ *1.872*
4,096 discrete I/O 1,024 analog I/O 144 application-specific channels 4/16 MB integrated (Safety/non-Safety memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEP584040S	0.849/ *1.872*
6,144 discrete I/O 1,536 analog I/O 216 application-specific channels 16/64 MB integrated (Safety/non-Safety memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEP586040S	0.849/ *1.872*
	–	–	–	BMEP58CPROS3	0.849/ *1.872*

(1) DRS: Dual ring switches. Supported Modicon switches: ***TCSESM083F23F1/063F2CU1/063F2CS1***

(2) ***BMEP58●040S*** *processors have a door that can be locked to prevent removal of the SD card.*

Modicon M580 automation platform
Safety
Modicon M580 Safety redundant processors (HSBY)



Modicon M580 Safety configuration with the full safety rack

Presentation

Overview

The Modicon M580 Safety is a Modicon M580 programmable automation controller (PAC) with embedded safety modules and functions; it is available as a standalone PAC or a redundant PAC (HSBY) .
A redundant PAC (HSBY) is based on two identically configured CPUs linked to each other and to the same remote I/O network. A Safety coprocessor is mandatory for dual execution; if one CPU stops communications, the other assumes control of the I/O system. It is based on Modicon X80 modules and the EcoStruxure Control Expert *(1)* environment:

- Modicon M580 Safety CPU and coprocessor
- Redundant safety power supplies
- Safety local and remote I/O
- Safety communications
- Software libraries for process and machine safety

Modicon X80 Safety modules are only compatible with the Modicon M580 Safety processor.

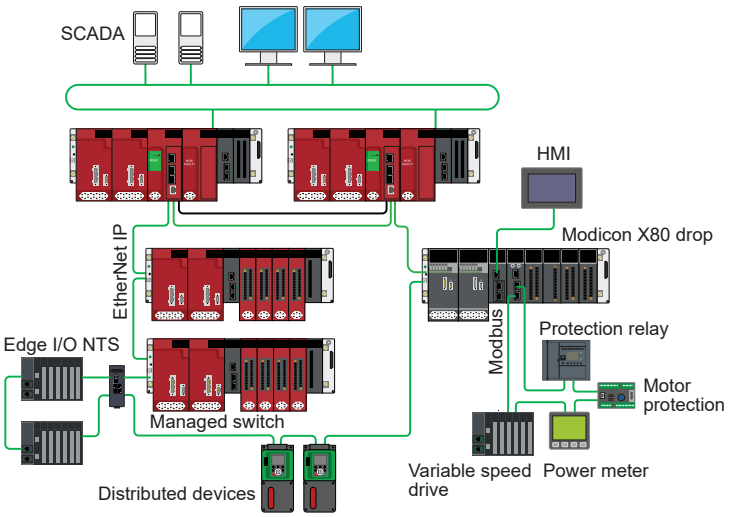
In a high-availability architecture (HSBY), it is not possible to place I/O and expert modules in the local rack (together with a CPU).

Architecture

The Modicon M580 Safety PAC is a safety-related system certified by TÜV Rheinland. It ensures safe operation while optimizing costs.

The Modicon M580 Safety processor allows a mix of architectures:

- It manages both Safety and non-Safety applications
- Safety and process control functions are separate
- It integrates process and machine safety functions



Modicon M580 Safety redundant topology

Safety level

Modicon M580 Safety improves system reliability thanks to a unique combination of built-in cybersecurity and safety features:

- Isolated Safety memory cells
- Online error code correction
- Security watchdog
- Clock monitoring
- Safety application executed in a dedicated core
- Memory isolation helping to secure access to Safety and non-Safety memory
- Safety memory different from the standard CPU

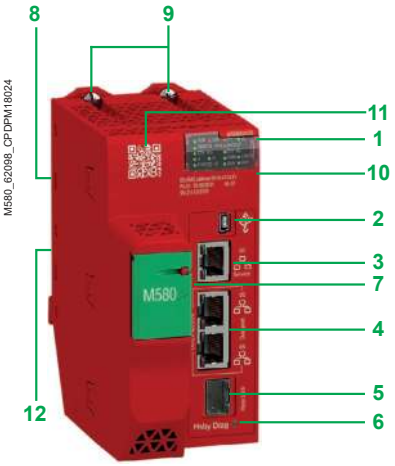
Any failure in the standard application does not impact the Safety application. Safety applications using the M580 Safety PAC comply with:

- up to Safety Integrity Level 3 (SIL3) for the process industry sector according to IEC 61508/IEC 61511
- up to Category 4, Performance Level “e” (Cat.4/PLe) for the safety of machinery according to ISO 13849
- up to SILCL3 for the safety of machinery according to IEC 62061
- up to SIL4 for functional safety in the rail industry according to EN 50126, EN 50128, and EN 50129

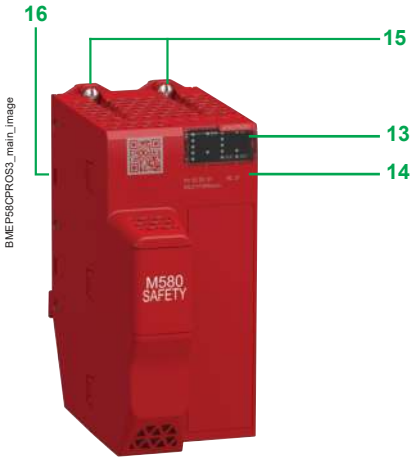
The Safety level is achieved by dual execution of the Safety application, using both the **BMEH58●040S** processor and the **BMEP58CPROS3** coprocessor.

(1) Unity Pro software in earlier versions.

Modicon M580 automation platform
Safety
Modicon M580 Safety redundant processors (HSBY)



BMEH58●040S



BMEP58CPROS3



BMEH58●040S

Description of Modicon M580 Safety redundant processor (HSBY) and coprocessor

BMEH58●040S processor

BMEH58●040S processors feature:

1 Display block comprising 15 LEDs with various combinations to provide quick diagnostics of the processor status:
- RUN LED (green): processor in operation (program execution)
- ERR LED (red): detected processor or system error
- I/O LED (red): detected I/O module error
- DL LED (green): firmware download in progress
- REMOTE RUN LED (green): peer processor in operation (program execution)
- BACKUP LED (red): backup memory (internal or card)
- ETH MS LED (bi-color green/red): indicates the Ethernet port configuration status
- ETH NS LED (bi-color green/red): indicates the Ethernet connection status
- A LED (green): processor ID set to A
- B LED (green): processor ID set to B
- PRIM LED (green): processor acting as primary
- STBY LED (green): processor acting as standby
- FORCED I/O (red): I/O values overridden by the user
- SRUN LED (green): processor in Safety mode
- SMOD LED (green): processor in maintenance mode

2 Mini-B USB port for module configuration via PC running EcoStruxure Control Expert

3 RJ45 Ethernet port that allows diagnosis of Ethernet ports and provides access to external tools, devices, and distributed I/O devices

4 Dual RJ45 Ethernet ports for connection to the remote I/O drops (EIO) and distributed equipment (through DRS) *(1)*

5 SFP socket for copper or fiber-optic Hot Standby link connection

6 Hot Standby status link LED

7 Slot equipped with an optional SD memory card for application and data storage: an LED, located behind the door, indicates access to the memory card *(2)*

8 Two connectors for electrical connection to an M580 backplane (X-bus and Ethernet backplane)

9 Two hooks and two screws for mechanical attachment and grounding connection to backplane

10 Printed serial number, product version, and MAC address on the front panel of the processor

11 QR code that provides access to the product datasheet

12 Rotary switch for processor identification

BMEP58CPROS3 coprocessor

The coprocessor is mandatory with the Safety processor. The **BMEP58CPROS3** coprocessor includes:

13 Display block comprising two LEDs to provide quick diagnostics of the coprocessor status:
- ERR LED (red): detected coprocessor or system error
- DL LED (green): firmware download in progress

14 Printed serial number and product version on the front panel of the coprocessor

15 Two hooks and two screws for mechanical attachment and grounding connection to backplane

16 Two connectors for electrical connection to an M580 backplane (X-bus and Ethernet backplane)

References

Modicon M580 Safety redundant processors (HSBY)

Local I/O capacity	Maximum number of Ethernet modules	Device ports	Service port	Reference	Weight kg/*lb*
8 MB integrated (Safety/ non-Safety memory program)	2 Ethernet networks	2 RIO/DIO	1	BMEH582040S	0.849/ *1.872*
16 MB integrated (Safety/ non-Safety memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEH584040S	0.849/ *1.872*
64 MB integrated (Safety/ non-Safety memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEH586040S	0.849/ *1.872*

*(1) DRS: Dual ring switches. Supported Modicon Switches: **TCSESM083F23F1/063F2CU1/ 063F2CS1***

*(2) **BMEH58●040S** processors have a door that can be locked to prevent removal of the SD card.*

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  - Modbus/TCP and EtherNet/IP network module ..... *page 4/16*
  - FactoryCast network module ..... *page 4/16*
  - Ethernet control router ..... *page 4/16*
- **OPC UA communication**
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- **RTU communication**
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* For all remaining communication modules compatible with Modicon M580, please refer to the Modicon X80 catalog.

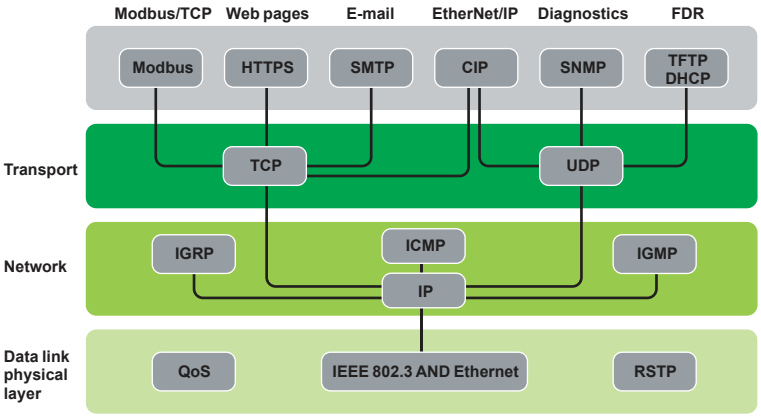
Modicon M580 automation platform

Industrial Ethernet services

Modicon M580 communication services

Presentation

EcoStruxure Plant Ethernet architectures provide transparent communication services to the entire operation through the implementation of standard, unmodified Ethernet protocols and services.



In addition to the typical Ethernet services (HTTPS, BOOTP, DHCP, etc.), Ethernet communication modules are equipped with automation-specific services, such as:

- Device scanning using Modbus TCP and EtherNet/IP
- Messaging using Modbus TCP and EtherNet/IP
- Automatic replacement device configuration using FDR (Fast Device Replacement)
- Extensive diagnostics through SNMP
- Clock synchronization using NTP
- E-mail alarm notification via SMTP
- Packet prioritization using QoS
- Ring topology redundancy through RSTP

Note: *The above services may not be offered on all devices. Please refer to the Selection Guide and References pages for a comprehensive list of the services offered by each device.*

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Functions

Ethernet basic services

HTTPS (RFC 2818)

HTTP (HyperText Transfer Protocol) is used to transmit Web pages between a server and a browser. HTTP has been used on the Web since 1990. HTTPS (Hyertext Transfer Protocol Secure) is to use TLS to secure HTTP connections over the internet. Web servers embedded in Schneider Electric automation products provide easy access to information and diagnostics from anywhere on the network. HTTPS is also used to transfer firmware image files for some modules (e.g., M580 controller, BMENOC0302, BMENOR2200H, BMENUA0100, etc.) for firmware upgrade purposes.

BOOTP/DHCP (RFC1531)

BOOTP/DHCP is used to provide devices with IP parameters automatically. This avoids having to manage each device address individually by transferring this management to a dedicated IP address server.
DHCP (Dynamic Host Configuration Protocol) is used to assign configuration parameters to devices automatically. DHCP is an extension of BOOTP.

Schneider Electric devices can be:
- BOOTP clients, allowing the IP address to be retrieved automatically from a server, or
- BOOTP servers, allowing the device to distribute IP addresses to the network stations

FTP (File Transfer Protocol) & TFTP (Trivial File Transfer Protocol) (RFCs 959, 2228, and 2640)

File transfer protocols such as FTP and TFTP provide the basic elements for file sharing. In an automation device, FTP or TFTP are often used to deliver firmware updates.

NTP (Network Time Protocol) (RFC 1305)

NTP (Network Time Protocol) is used to synchronize the time of a client device from a time server.

SMTP (Simple Mail Transfer Protocol) (RFC 0821)

SMTP (Simple Mail Transfer Protocol) is an e-mail transmission service. It is used to send e-mail between a sender and a recipient via an SMTP e-mail server.

SNMP (Simple Network Management Protocol) (RFCs 1155, 1156, and 1157)

SNMP (Simple Network Management Protocol) is an Internet protocol used to manage IP-based network devices. SNMP is used to:
- Monitor network components such as computer workstations, routers, switches, bridges, and end devices to view their status
- Obtain statistics about the network such as bandwidth utilization and detected network errors
- Change information in the device SNMP database such as when to report a high temperature condition

SNMP comprises a network manager (usually running on a computer) and agents (running on the network devices). Network management systems (NMS) are software applications used to manage SNMP managed devices.

QoS (Quality of Service) (RFC 2474)

QoS provides the ability to mark or “tag” packets of a specific type or origin so that in a congested network the switches will give higher priority to the most important packets.

RSTP (Rapid Spanning Tree Protocol)

RSTP has been implemented in Schneider Electric automation products to allow multi-port devices to be connected in ring configurations.
RSTP helps to prevent the formation of broadcast storms and monitors the state of the ring. Should a link in the ring become disconnected, the protocol routes packets in a different direction to help ensure continuity of service.

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Functions *(continued)*

Modbus standard communication protocol

Modbus, the industry communication standard since 1979, has been combined with Ethernet Modbus/TCP, the medium for the Internet revolution, to form Modbus/TCP, a completely open Ethernet protocol. The development of a connection to Modbus/TCP does not require any proprietary component, nor purchase of a license.
This protocol can easily be combined with any product supporting a standard TCP/IP communication stack. The specifications can be obtained free of charge from the following website: www.modbus.org.

Modbus/TCP, simple and open

The Modbus application layer is very simple and universally familiar with its 9 million installed connections. Thousands of manufacturers have already implemented this protocol. Many have already developed a Modbus/TCP connection and numerous products are currently available.
The simplicity of Modbus/TCP enables any field device, such as an I/O module, to communicate over Ethernet without the need for a powerful microprocessor or a lot of internal memory.

Modbus/TCP, high performance

Due to the simplicity of its protocol and the fast speed of 100 Mbps Ethernet, the performance of Modbus/TCP is excellent. This allows this type of network to be used in real-time applications such as I/O scanning.

Modbus/TCP function codes		dec	hex
Bit access	Read n input bits	02	02
	Read n output bits	01	01
	Read exception status	07	07
	Write 1 output bit	05	05
	Write n output bits	15	0F
	Read 1 input word	04	04
	Read n input words	03	03
	Write 1 output word	06	06
	Write n output words	16	10
	Read device ID	43/14	2B/0E

Examples of Modbus/TCP function codes for accessing data and diagnostics

Modbus/TCP, a standard

The application protocol is identical on Modbus serial link, Modbus Plus, or Modbus/TCP. This means that messages can be routed from one network to the other without converting protocol.
Since Modbus is implemented on top of the TCP/IP layer, users can also benefit from IP routing, enabling devices located anywhere in the world to communicate without worrying about the distance between them.
Schneider Electric offers a complete range of gateways for interconnecting a Modbus/TCP network to existing Modbus Plus or Modbus serial link networks.

The IANA organization (Internet Assigned Numbers Authority) has allocated the fixed port TCP 502 (well-known port) to the Modbus protocol. Thus Modbus has become an Internet standard.

Modbus and Modbus/TCP are recognized by the IEC/EN 61158 international standard as a fieldbus. They are also compliant with the Chinese national standard managed by ITEI.

Interfacing CANopen with Modbus/TCP

CiA DSP 309-2 provides standardized mapping of CANopen data for transport on Ethernet Modbus/TCP networks. The specification reserves Modbus function code 43/13 for this purpose. This function code is reserved exclusively for CANopen.

Modbus TCP/IP characteristics

Maximum size of data:
- Read: 125 words or registers
- Write: 100 words or registers

Modicon M580 automation platform
Industrial Ethernet services
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EtherNet/IP

Functions *(continued)*

EtherNet/IP standard communication protocol

EtherNet/IP is an industrial communications protocol based on the Common Industrial Protocol (CIP) which is owned and managed by ODVA, an international, independent standards organization (www.odva.org).

Standard, unmodified Ethernet

Schneider Electric added EtherNet/IP as a core network in 2007. EtherNet/IP is very similar to Modbus TCP in many aspects. In particular, it shares the same principles of standardization and interoperability. EtherNet/IP operates on the same equipment and infrastructure as Modbus TCP, and both protocols can operate simultaneously on the network at any time.

Advanced services and high performance

EtherNet/IP is built on an object-based model. Data in each EtherNet/IP device is grouped in objects, and each device may have different types of objects, depending on the purpose of the device.

EtherNet/IP objects

The Ethernet modules implement the standard set of objects prescribed by ODVA. The most common objects are listed below:

Communication	Identity Object (01hex)
	Message Router Object (02hex)
	Assembly Object (04hex)
	Connection Object (05hex)
	Connection Configuration Object (F3hex)
	Connection Manager Object (06hex)
	Modbus Object (44hex)
EtherNet/IP Network	QoS Object (48hex)
	Port Object (F4hex)
	TCP/IP Interface Object (F5hex)
	Ethernet Link Object (F6hex)
Diagnostics	EtherNet/IP Interface Diagnostic Object (350hex)
	EtherNet/IP IO Scanner Diagnostic Object (351hex)
	IO Connection Diagnostic Object (352hex)
	EtherNet/IP Explicit Connection Diagnostic Object (353hex)

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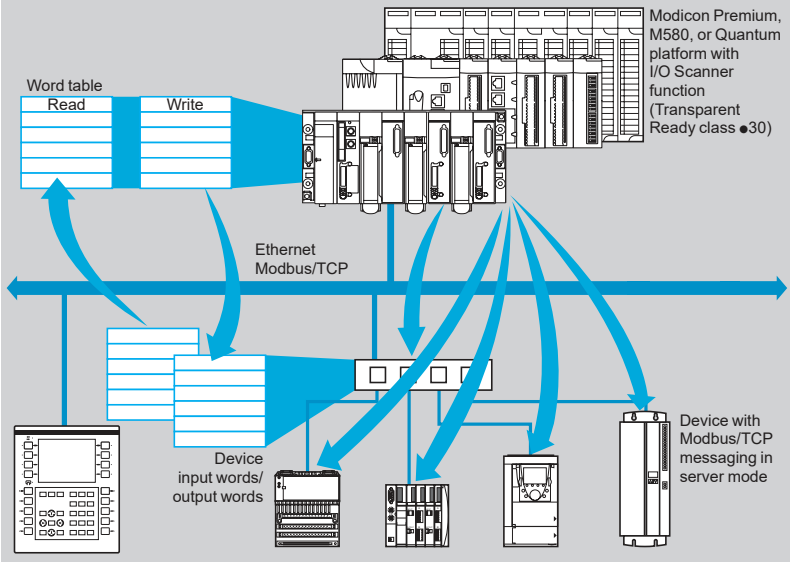
Modicon M580 automation platform

Industrial Ethernet services

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Functions *(continued)*

I/O Scanning service



The I/O Scanning service is used to manage the exchange of remote I/O states over the Ethernet network after simple configuration, without the need for any special programming.
I/O scanning is performed transparently by means of read/write requests according to the Modbus client/server protocol on the TCP/IP profile.
This principle of scanning via a standard protocol enables communication with any device supporting Modbus TCP messaging in server mode.
This service can be used to define:

- A %MW word zone reserved for reading inputs
- A %MW word zone reserved for writing outputs
- Refresh periods independent of the PLC scan

During operation, the module:

- Manages TCP/IP connections with each remote device
- Scans devices and copies the I/O to the configured %MW word zone
- Feeds back status words used to check that the service is working correctly from the PLC application
- Applies pre-configured fallback values if a communication error is detected

A range of hardware and software products is available enabling the I/O Scanning protocol to be implemented on any type of device that can be connected to the Ethernet network.

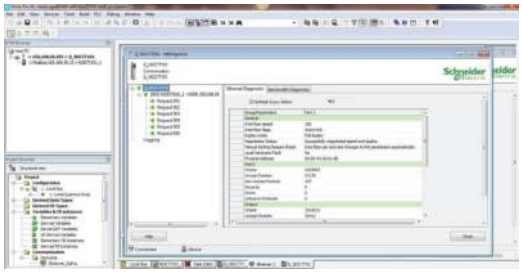
Characteristics

- Under EcoStruxure Control Expert (1) software, each station can exchange a maximum of:
  - 120 write words
  - 125 read words
- Maximum size in the PLC managing the service:
  - For **BME●58●●40** processors, 1 Kword %MW in inputs and 1 Kword %MW in outputs with the manager PLC limited to 64 stations
  - For **BME●58●●20** processors and the Ethernet communication module **BMENOC03●●**, 2 or 4 Kwords %MW in inputs and 2 or 4 Kwords %MW in outputs with the manager PLC limited to 128 stations

I/O Scanning service diagnostics

I/O Scanning service diagnostics can be performed in one of four ways:

- Via the application program from a specific PLC data zone
- From the setup software debug screen
- From the PLC system diagnostic function displayed by means of a Web browser on a PC station
- Using standard SNMP network management software



I/O Scanning service diagnostics

(1) Unity Pro software in earlier versions.

Modicon M580 automation platform
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FDR client device example (ATV630)

Functions *(continued)*

FDR (Fast Device Replacement) service

The FDR service uses standard address management technologies (BOOTP, DHCP) and the TFTP (Trivial File Transfer Protocol) file management service, with the aim of simplifying maintenance of Ethernet devices.

It is used to replace an existing device with a new device that will be detected, reconfigured, and automatically restarted by the system.

The main steps in replacement are:

1. The device to be replaced is identified.
2. Another similar device is taken from the maintenance store, preconfigured with the device name for the existing device, then reinstalled on the network. Depending on the device, addressing can be performed using rotary selector switches or can be given using the keypad integrated in the device (as for Altivar variable speed drives, for example).
3. The FDR server detects the new device, allocates it an IP address, and transfers the configuration parameters to it.
4. The replacement device checks that all these parameters are indeed compatible with its own characteristics and switches to operational mode.

The FDR server can be:

- A Modicon M580 Ethernet network module, **BMENOC03●●**
- A Modicon M580 processor with integrated Ethernet port, **BME●58●●●●**

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Modicon M580 automation platform

Industrial Ethernet services

Modicon M580 Web services

Embedded Web pages presentation

The M580 CPU includes a Hypertext Transfer Protocol Secure (HTTPS) server. The server transmits Web pages for the purpose of monitoring, diagnosing, and controlling remote access to the communication module. The server provides easy access to the CPU from standard Internet browsers.

The embedded Web server pages are used to display real-time diagnostic data for the M580 CPU.

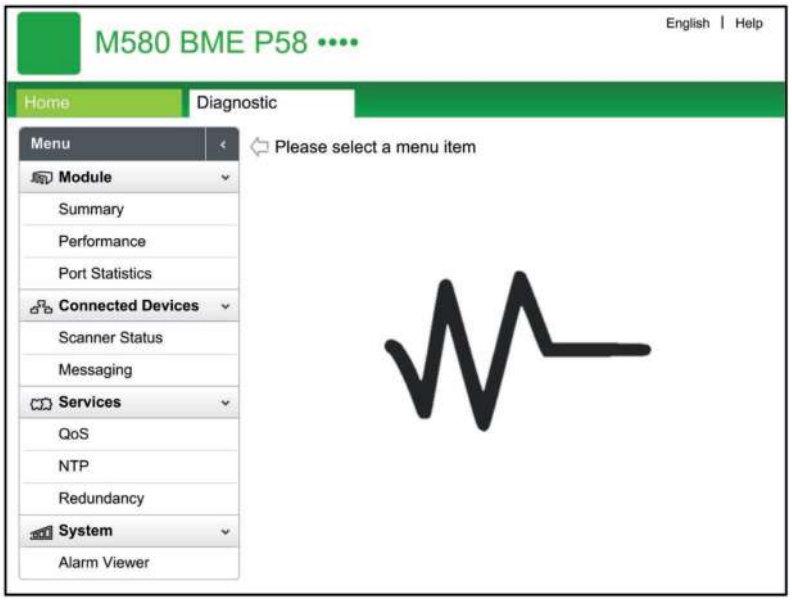
Requirements

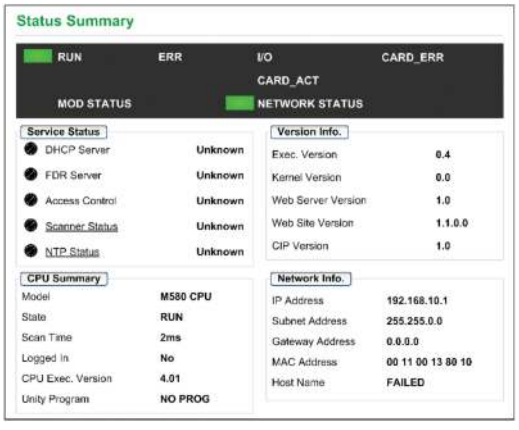
The embedded Web server in M580 CPUs displays data in standard HTML Web pages. The embedded Web pages can be accessed on a PC, iPad®, or Android® tablet with the following browsers:

- Internet Explorer® (V8 or later)
- Google Chrome® (V11 or later)
- Mozilla Firefox® (V4 or later)
- Safari® (V5.1.7 or later)

Diagnostic Web pages

The M580 CPU diagnostic Web pages provide information on Status Summary, Performance, Port Statistics, I/O Scanner, Messaging, QoS (quality of service), Network Time Service, Redundancy, and Alarm Viewer. All these pages are updated every 5 seconds to get the latest information.





Status Summary page

Status Summary page

The objects on this page provide status information.

Parameters	Description	
LEDs	The black field contains LED indicators (RUN, ERR, etc.)	
Service Status	Green	The available service is operational and running
	Red	An error is detected in an available service
	Black	The available service is not present or not configured
Version Info.	This field describes the software versions that are running on the CPU	
CPU Summary	This field describes the CPU hardware and the applications that are running on the CPU	
Network Info.	This field contains network and hardware address information and connectivity that corresponds to the CPU	

Modicon M580 automation platform

Industrial Ethernet services

Modicon M580 Web services



Performance page

Diagnostic Web pages *(continued)*

Performance page

The objects on this page provide information on performance statistics.

Field	Description
Error Statistics	This area contains the detected errors in the diagnostics data for the CPU (these counters can be reset to 0 with the Reset Counters button)
Error Rate	This percentage represents the total number of packets divided by the number of packets that are not associated with detected errors
Total Bandwidth Utilization	This value indicates the percentage of the available bandwidth that the CPU is using
Module I/O Utilization	This graph shows the total number of packets (per second) the CPU can handle at once *(1)*
Processor Utilization	This graph shows the number of Modbus/TCP or EtherNet/IP messages per second for the client or server *(1)*
System Bandwidth Monitor	These graphs show the percentage of bandwidth consumed by the Modbus messaging and I/O Scanning services *(1)*

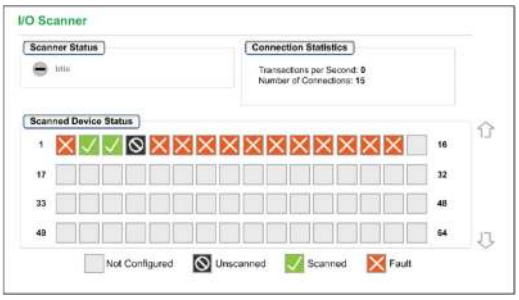


Port Statistics page

Port Statistics page

This page shows the statistics for each port on the CPU.
This information is associated with the configuration of the Ethernet ports and the configuration of the service/extended port.

The names of active ports are green. The names of inactive ports are gray.
The information is reset or expanded using these buttons:
- Reset Counters: Resets all dynamic counters to 0.
- Detail View: Expands the list of port statistics.



I/O Scanner page

I/O Scanner page

The objects on this page provide information on the scanner status and connection statistics.

Field	Description	
Scanner Status	Enabled	The I/O scanner is enabled
	Disabled	The I/O scanner is disabled
	Idle	The I/O scanner is enabled but not running
	Unknown	The I/O scanner returns unexpected values from the device
Connection Statistics	Transactions per second	
	Number of connections	
Scanned Device Status	Colors that appear in each block indicate these states for specific remote devices	
	Gray	There is an unconfigured device
	Black	The scanning of the specific device has been intentionally disabled
	Green	A device is being scanned successfully
	Red	A device that is being scanned is returning detected errors

(1) Move the mouse over the dynamic graphs to see the current numeric values.



Messaging page



QoS page



Network Time Service page

Diagnostic Web pages *(continued)*

Messaging page

This page shows current information for open TCP connections on port 502:

- Messaging Statistics: This field contains the total number of sent and received messages on port 502. These values are not reset when the port 502 connection is closed. Therefore, the values indicate the number of messages that have been sent or received since the module was started.
- Active Connections: This field shows the connections that are active when the Messaging page is refreshed.

QoS (quality of service) page

This page displays information about the QoS service. This service is configured in EcoStruxure Control Expert *(1)*. When QoS is enabled, the module adds a differentiated services code point (DSCP) tag to each Ethernet packet it transmits, thereby indicating the priority of that packet.

Network Time Service page

This page displays information about the NTP service. This service is configured in EcoStruxure Control Expert *(1)*. The Network Time Service synchronizes computer clocks over the Internet for the purposes of event recording (sequencing events), event synchronization (triggering simultaneous events), or alarm and I/O synchronization (time-stamping alarms).

Field	Description	
Service Status	Running	The NTP service is correctly configured and running
	Disabled	The NTP service is disabled
	Unknown	The NTP service status is unknown
Server Status	Green	The server is connected and running
	Red	A bad server connection is detected
	Gray	The server status is unknown
Server Type	Primary	A primary server polls a master time server for the current time
	Secondary	A secondary server requests the current time only from a primary server
DST Status	Running	DST (daylight saving time) is configured and running
	Disabled	DST (daylight saving time) is disabled
	Unknown	The DST status is unknown
Current Date	This is the current date in the selected time zone	
Current Time	This is the current time in the selected time zone	
Time Zone	This field shows the time zone in terms of plus or minus Universal Time Coordinated (UTC)	
NTP Service Statistics	These fields show the current values for service statistics	
	Number of Requests	This field shows the total number of requests sent to the NTP server
	Success Rate	This field shows the percentage of successful requests out of the total number of requests
	Number of Responses	This field shows the total number of responses received from the NTP server
	Last Error	This field contains the code of the last error that was detected during the transmission of an e-mail message to the network
	Number of Errors	This field contains the total number of e-mail messages that could not be sent to the network or that have been sent but not acknowledged by the server

(1) Unity Pro software in earlier versions.

Modicon M580 automation platform

Industrial Ethernet services

Modicon M580 Web services



Redundancy page

Diagnostic Web pages *(continued)*

Redundancy page

This page displays values from the RSTP configuration in EcoStruxure Control Expert *(1)*.

Parameters	Description	
Service Status	This is the status (enabled or disabled) of the RSTP bridge on the corresponding CPU	
Last Topology Change	These values represent the date and time that the last topology change was received for the corresponding bridge ID	
Redundancy Status	Green	The designated Ethernet port is learning or formatting information
	Yellow	The designated Ethernet port is discarding information
	Gray	RSTP is disabled for the designated Ethernet port
Router Bridge Statistics	Bridge ID	This unique bridge identifier is the concatenation of the bridge RSTP priority and the MAC address
	Bridge Priority	In EcoStruxure Control Expert *(1)*, configure the RSTP operating state of the Bridge ID



Alarm Viewer page

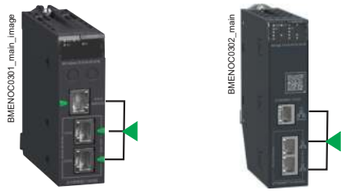
Alarm Viewer page

The Alarm Viewer page reports detected errors in the application. Information about alarm objects can be read, filtered, and sorted on this page. The type of information displayed by the Alarm Viewer is adjusted in the Filter Alarms box.

Field	Description	
Type	This column describes the alarm type	
Status	STOP	An alarm needs to be acknowledged
	ACK	An alarm has been acknowledged
	OK	An alarm does not require acknowledgment
Message	This column contains the text of the alarm message	
Occurrence	This column contains the date and time that the alarm occurred	
Acknowledged	This column reports the acknowledged status of the alarm	
Zone	This column contains the area or geographical zone from which the alarm comes (0: common area)	

(1) Unity Pro software in earlier versions.

Modicon M580 automation platform
Communication integrated ports and modules

Applications		**Ethernet communication**	**Ethernet communication**				**OPC UA communication**	**IEC 61850 communication**
Type of device		**Processors with integrated EtherNet/IP and Modbus/TCP**	**Ethernet modules**				**OPC UA module**	**IEC 61850 module**
								
Network protocols		**EtherNet/IP and Modbus/TCP**	**EtherNet/IP and Modbus/TCP**				**OPC UA**	**IEC 61850**
Structure	Physical interface	10BASE-T/100BASE-TX	10BASE-T/100BASE-TX	10/100/1000 BASE-TX	10BASE-T/100BASE-TX	10BASE-T/100BASE-TX/1 Gb	10/100/1000 BASE-TX	10BASE-T/100BASETX
	Type of connector	3x RJ45 connectors: 1 connector for service and 2 connectors for RSTP ring topology Ethernet backplane connection	3x RJ45 connectors: 1 for service and 2 for RSTP ring topology (devices) Ethernet backplane connection	3x RJ45 connectors: 1 for service and 2 for Control network (RSTP ring topology can be disabled) Ethernet backplane connection	3x RJ45 connectors: 1 for service and 2 for RSTP ring topology (devices) Ethernet backplane connection	3x RJ45 connectors: 1 for service and 2 for RSTP ring topology (control) Ethernet backplane connection	1x RJ45 connector (control port) Ethernet backplane connection	3x RJ45 connectors: 1 for service and 2 for RSTP ring topology (device/control) Ethernet backplane connection
	Access method	CSMA-CD						
	Data rate	10/100 Mbps	10/100 Mbps	10/100/1000 Mbps	10/100 Mbps	10/100 Mbps/1 Gbps	10/100 Mbps/1 Gbps	10/100 Mbps
Medium		Double shielded twisted pair copper cable, category CAT 5E						
Dimensions	W x H x D	32 x 131 x 86 mm/*1.25 x 5.15 x 3.38 in.*	32 x 100 x 86 mm/ *1.25 x 3.93 x 3.38 in.*	32 x 131 x 86 mm/ *1.25 x 5.15 x 3.38 in.*	32 x 100 x 86 mm/*1.25 x 3.93 x 3.38 in.*		32 x 131 x 86 mm/*1.25 x 5.15 x 3.38 in.*	32 x 100 x 86 mm/*1.25 x 3.93 x 3.38 in.*
Configuration	Maximum number of devices when module acts as Client/Scanner	Up to 125 DIO *(1)* / 31 RIO drops and 61 DIO	128 DIO (EtherNet/IP or Modbus/TCP)	128+16 DIO (EtherNet/IP or Modbus/TCP)	128 DIO (EtherNet/IP or Modbus/TCP)	112 DIO (EtherNet/IP or Modbus/TCP)	–	32 IED servers
	Maximum number of devices when module acts as Server/Adapter	3 EtherNet/IP adapter instances	16 EtherNet/IP adapter instances			12 EtherNet/IP adapter instances	10 OPC UA Clients	16 IEC 61850 clients
	Number of modules of the same type per station	1	Up to 4 Ethernet modules depending on processor level *(4)*	Up to 6 Ethernet modules depends on process level *(4)*	Up to 4 Ethernet modules depending on processor level *(4)*	Up to 2 Ethernet modules	Up to 2 OPC UA modules	Up to 4 Ethernet modules depending on processor level (1)
Web services	Standard services	Standard level PLC Web diagnostics Alarm Viewer	Standard level PLC Web diagnostics Alarm Viewer				Module diagnostics (OPC UA) Cybersecurity settings	
	Advanced services	Rack Viewer *(2)*	–	Rack Viewer, PLC Program Viewer, Alarm Viewer	Rack Viewer, PLC Program Viewer, Customizable dashboard (Trend Viewer), Data Editor access to PLC data and variables, Factory Cast Custom Web Pages		–	–
	Web page protocol	HTTPS (HTML5)	HTTPS (HTML5)		HTTPS (HTML5, JAVA *(3)*)		HTTPS (HTML5)	HTTPS (HTML5)
Communication services	Modbus TCP scanner (IO scanning)	Yes	Yes				No	No
	EtherNet/IP scanner (IO scanning)	Yes	Yes				No	No
	I/O scanning memory (data exchange with CPU)	–	8KB IN/8KB OUT	16KB IN/16KB OUT	8KB IN/8KB OUT	4KB IN/4KB OUT	–	–
	Modbus TCP client (messaging)	Yes	Yes				Yes	Yes
	EtherNet/IP client (messaging)	Yes	Yes				No	No
	EtherNet/IP adapter (local server)	Yes	Yes				No	No
	RIO scanner (EtherNet/IP scanner for X80 RIO drops)	No / Yes	No				No	No
	IP Forwarding	No	No			Yes (if enabled, no IPsec)	Yes	Yes (if enabled, no IPsec)
	QoS (Quality of Service)	Yes	Yes				No	Yes
	RSTP media redundancy	Yes	Yes				No	Yes
	NTP/SNTP time synchronization	Yes (client and server)	Yes (client), clock synchronization to CPU			Yes (client)	Yes (client and server)	Yes (client), clock synchronization to CPU
	FDR Service	Yes (server)	Yes (server)				Yes (client)	No
	SNMP network management	Yes (agent)	Yes (agent)				Yes (agent)	Yes (agent)
	Syslog	Yes (client)	Yes (client)				Yes (client)	Yes
	OPC UA Server	No	No				Yes	No
	IPsec	No	Yes	Yes (IKEv2)	Yes	Yes (if enabled, no IP forwarding)	Yes	Yes (if enabled, no IP forwarding)
	TLS	No	No				Yes (OPC UA)	No
	IEC 61850	No	No				No	MMS Client and Server GOOSE Publisher and Subscriber
	IPV6	No	No				Yes	No
Compatibility with processor		– / – / –	All Modicon M580 processors					
Reference		**BMEP58•020** / **BMEP58•040** / **BMEH58•040**	**BMENOC0301**	**BMENOC0302(H)**	**BMENOC0311**	**BMENOC0321**	**BMENUA0100**	**BMENOP0300**
Pages		2/11 / 2/11 / 2/12	4/17	7/5	4/17	4/17	4/18	4/23

(1) Depends on CPU level, BMEP581020: 61 DIO max
(2) Only for BM•584040/BM•585040/BM•586040 processors
(3) Only for Factory Cast custom Web pages
(4) See Modicon M580 processors selection guide page 2/2

Modicon M580 automation platform
Communication integrated ports and modules

Applications		**RTU communication**		**RTU communication**	
Type of device		**RTU modules**		**Advanced RTU module**	
					
Network protocols		**IEC 60870-5-104 (IEC 104), DNP3 NET (Subset level 3), Modbus/TCP**	**IEC 60870-5-101 (IEC 101), DNP3 Serial (Subset level 3), Serial link, external modem link**	**IEC 60870-5-104 (IEC 104), DNP3 NET (Subset level 3), Modbus/TCP**	**IEC 60870-5-101 (IEC 101), DNP3 Serial (Subset level 3)**
Structure	Physical interface	10BASE-T/100BASE-TX, PPPoE (Point-to-Point Protocol over Ethernet) for ADSL external modem link	Non-isolated RS-232/RS-485 (serial link), Non-isolated RS 232 (radio, PSTN, GSM, GPRS/3G external modem link)	100BASE-TX (backplane port)	Isolated RS-232/RS-485 (serial link)
	Type of connector	1x RJ45	1x RJ45	Backplane Ethernet connection and 2 Giga Ethernet control ports on the front	1x RJ45
	Access method	CSMA/CD	Server/Client	CSMA/CD	Server/Client
	Data rate	10/100 Mbps	0.3…38.4 Kbps (serial link)	100 Mbps	0.3...115.2 Kbps (serial link)
Medium		Double shielded twisted pair copper cable, category CAT 5E	Double shielded twisted pair copper cable, crossover serial cable (serial link), direct serial cable (external modem link)	Accessible via Ethernet backplane	Double shielded twisted pair copper cable, crossover serial cable (serial link)
Dimensions	W x H x D	32 x 100 x 86 mm/*1.25 x 3.93 x 3.38 in.*		32 x 131 x 86 mm/*1.25 x 5.15 x 3.38 in.*	
Configuration	Maximum number of devices when module acts as Client	64 (IEC 104) 32 (DNP3 NET)	32	64	32
	Maximum number of devices when module acts as Server	4 (1 main channel + 3 virtual channels)	1	4 (1 main channel + 3 virtual channels)	1
	Number of modules of the same type per station	Up to 8 **BMXNOR0200H** RTU modules depending on processor level *(1)*		Up to 4 **BMENOR2200H** Advanced RTU modules depending on processor level *(1)*	
Web services	Standard services	Rack Viewer Data Editor access to PLC data and variables		RTU module diagnostics Cybersecurity settings	
	Advanced services	FactoryCast Custom Web Pages		–	
	Web page protocol	HTTPS (JAVA)		HTTPS (HTML5)	
	Web page service	SOAP/XML		No	
Communication services	Modbus TCP Client (messaging)	Yes	Reading/writing discrete and analog I/O, counters	Yes	
	SNMP network management	Yes (agent)	–	Yes (agent)	
	NTP time synchronization	Yes (client), clock synchronization to CPU	–	Yes (client), clock synchronization to CPU	
	FDR Service	Yes (client)	–	Yes (client)	
	Syslog	No		Yes (client)	
	SMTP e-mail notification	Yes		No	
	TLS	–		Yes (DNP3 NET and IEC 104)	
RTU communi-cation services	Client or Server configuration	Yes (IEC 104/DNP3 NET)	Yes (IEC 101/DNP3)	Yes (IEC 101/IEC 104/DNP3 NET)	
	Time- and date-stamped data exchange	Interrogation via polling and exchanges on change of status (RBE), unsolicited messaging		Interrogation via polling and exchanges on change of status (RBE), unsolicited messaging	
	DNP3 Secure Authentication Version 2 and Version 5	No	–	Yes	
	IEC 60870-5-104 channel redundancy	No	–	Yes	
	Event routing	Yes	No	Yes	
	RTU time synchronization	Yes (IEC 104/DNP3 NET)	Yes (IEC 101/DNP3)	Yes (IEC 101/IEC 104/DNP3)	
	Management and buffering of time- and date-stamped events	Yes (IEC 104/DNP3 NET)	Yes (IEC 101/DNP3)	Yes (IEC 101/IEC 104/DNP3)	
	Automatic transfer of time- and date-stamped events to the Client/SCADA	Yes (IEC 104/DNP3 NET)	Yes (IEC 101/DNP3)	Yes (IEC 101/IEC 104/DNP3)	
	Event buffer size	100,000 events (65,535 events per client, 4 clients max.)		150,000 events (65,535 events per client, 4 clients max.) 40,000 events for DNP3 SAv5 events (10,000 events per client, 4 clients max.)	
Data logging service		Yes, on 128 MB SD memory card, in CSV files, access via FTP, or sent by e-mail		Yes, on 4 GB SD memory card, in CSV files, access via HTTPS	
Compatibility with processor		All Modicon M340 processors, Modicon M580 standalone processors only		All Modicon M580 processors	
Reference		**BMXNOR0200H**		**BMENOR2200H**	
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(1) See Modicon M580 processors selection guide page 2/2

Modicon M580 automation platform

Modicon M580 communication modules

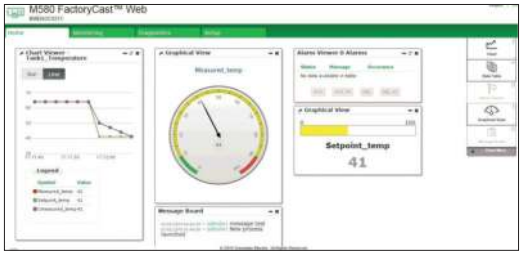
Modbus/TCP and EtherNet/IP network modules



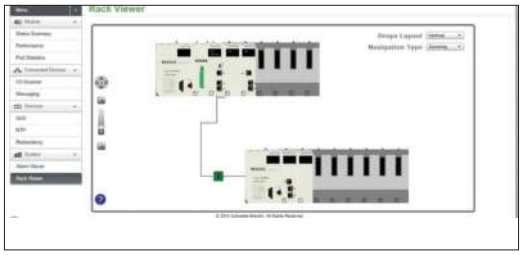
BMENOC0301



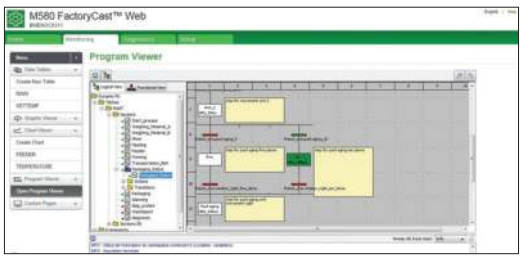
BMENOC0302



Customizable HTML5 Home page



Diagnose architecture from Web browser



Simple application maintenance from Web browser

Presentation

BMENOC03●● network modules act as an interface between the Modicon M580 PLC and other Ethernet network devices via the Modbus/TCP and EtherNet/IP communication protocols.

BMENOC03●● network modules are standard format and occupy a single slot in the rack of the Modicon M580 platform. They have to be installed in the main rack with Ethernet + X-bus backplane.

Functions

EtherNet/IP and Modbus/TCP network module

The **BMENOC0301** module offers the following functions:

- Modbus/TCP and EtherNet/IP protocols operating simultaneously
- Ring topologies on two Ethernet ports using RSTP (Rapid Spanning Tree Protocol)
- Priority of Ethernet packets using QoS (Quality of Service)
- Automatic module configuration recovery using FDR (Fast Device Replacement) service
- Embedded Web server for application monitoring and module diagnostics: this is an HTML5 Web server that can be read by any device (PC, tablet, smartphone) with the majority of operating systems (Android, iOS, Windows)
- Sharing data between PLCs, with/without VPN tunnel
- Network management using SNMP (Simple Network Management Protocol)
- Performance EtherNet/IP and Modbus/TCP network module

The **BMENOC0302** module includes all the functions of the **BMENOC0301** module, along with the following additional features:

- RSTP enable/disable
- Support for up to 6 modules in one rack
- IPSec (IKEv2) initiator and responder
- Rack Viewer/Program Viewer/Alarm Viewer
- SNMP v3 Agent
- NTP v4 Client

Ethernet FactoryCast module

The **BMENOC0311** FactoryCast module provides additional Web-based visualization of ePAC diagnostics and system data, such as:

- Custom Web pages: allow the user to define a personalized interface
- Rack Viewer: provides a graphical representation of the configured ePAC system including all modules and I/O status
- ePAC Program Viewer: provides a Web-based view of the EcoStruxure Control Expert *(1)* program code that animates logical states and variable values
- Customizable dashboard: allows a customized widget to be added to provide an optimum overview of the process data
- Trend Viewer: provides a graphical visualization of the variables
- Easy brand labeling: website logo and colors can be ajusted online

The customizable HTML5 Home page can display process values. It is compatible with the majority of operating systems on smartphones and tablets, such as Android, IOS, and Windows. By logging in from a common Web browser, it is easy to diagnose the architecture, and perform simple maintenance without EcoStruxure Control Expert *(1)* software.

Ethernet control router

The **BMENOC0321** Ethernet control router provides bridge transparency from the control network to the device network and connectivity with functions such as:

- Embedded IP forwarding: enables communication from the control network to PACs, PLCs, PCs, HMIs, etc.
- IPSec feature: applicable when the IP forwarding function is disabled
- Time synchronization: to be able to synchronize with external time servers and update the internal clock
- SMTP (Email): to send messages and alerts about the ePAC system
- Switch embedded in the Modicon M580 platform: provides a direct connection to the processor without any cable, and no separate power supply is required
- Fast Device Replacement service
- Multiple diagnostics: supports advanced Web pages to FactoryCast, MB Diagnostics, EIP Diagnostics

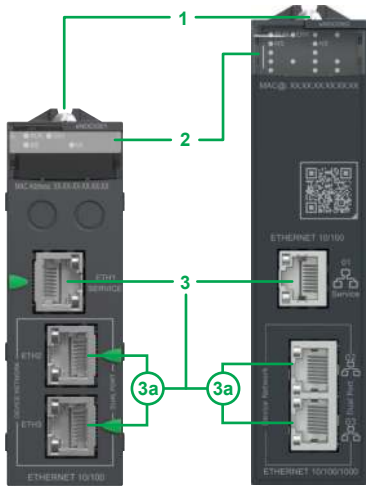
(1) Unity Pro software in earlier versions.

Processors: page 2/2
I/O architectures: page 6/2
Modules for severe environments: page 7/2

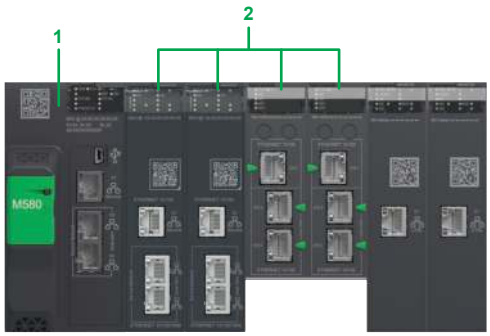
Modicon M580 automation platform

Modicon M580 communication modules

Modbus/TCP and EtherNet/IP network modules



BMENOC03●1 *BMENOC0302*



Example of BMEP58 and NOC module combination: BMEP586040 + BMENOC0302 + BMENOC0302 + BMENOC0301 + BMENOC0321 + BMENUA0100 + BMENUA0100



BMENOC0301



BMENOC0311



BMENOC0321



BMENOC0302

Description

The front panel of **BMENOC03●1/BMENOC0302** modules features:

1 Screw for locking the module in a slot in the rack

2 Display block with four LEDs:
- RUN LED (green): Operating status
- ERR LED (red): Error detected
- MS LED (green/red): Module status
- NS LED (green/red): Network connection status

BMENOC0321 modules have two additional LEDs:
- NS1 LED (green/red): Ethernet network status
- NS2 LED (green/red): Ethernet network status

3 Three RJ45 connectors for connection to the Ethernet network (the bottom two connectors **3a** support ring topologies (RSTP protocol))

Each RJ45 connector has two associated LEDs:
- LNK LED (yellow): Ethernet link established
- ACT LED (green): Transmission/reception activity

Combination of Ethernet modules and BMEP58 CPU

It is possible to combine Ethernet modules with the Modicon M580 CPU in order to increase its connectivity.
In this example, the four NOC EtherNet/IP and Modbus/TCP network modules are linked to the **BMEP58●0●0** CPU module:

1 **BMEP581020** CPU

2 **BMENOC03●●** EtherNet/IP and Modbus/TCP network module

References

Description	Data rate	Reference	Weight kg/*lb*
Modicon M580 EtherNet/IP and Modbus/TCP network module	10/100 Mbps	**BMENOC0301**	0.200/ *0.441*
Modicon M580 Ethernet FactoryCast module	10/100 Mbps	**BMENOC0311**	0.200/ *0.441*
Modicon M580 Ethernet Control router	10/100/1000 Mbps	**BMENOC0321**	0.200/ *0.441*
Modicon M580 performance EtherNet/IP and Modbus/TCP network module	10/100/1000 Mbps	**BMENOC0302**	0.393/ *0.866*

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Modicon M580 automation platform

Modicon M580 communication modules

OPC UA module



Front view

BMENUA0100



Rear view

Presentation

The **BMENUA0100** OPC UA module is an Ethernet communication module with an embedded OPC UA server for communication with OPC UA clients, including SCADA. It brings high-performance OPC UA capabilities and additional cybersecurity to Modicon M580 ePAC systems.

Combined with the OPC UA module, the Modicon M580 CPU also acquires OPC UA client capability allowing it to aggregate data coming from different OPC UA servers or to enable peer-to-peer communication between PLCs.

OPC UA (Open Platform Communications Unified Architecture) is a modern, secure, open, reliable standard for industrial communications. It defines a common infrastructure model to facilitate information exchange for industrial processes, including information context via meta-data, helping to ensure open interoperability, eliminate engineering repetition, simplify system configuration, and reduce maintenance overheads.

Description

1 LED array
2 Control port with Ethernet link and activity LEDs
3 Ethernet backplane port
4 X-bus backplane port
5 Cybersecurity mode rotary switch. The three switch positions are:
- Advanced
- Standard
- Reset

The **BMENUA0100** module can be installed in any X80 Ethernet backplane dual-port slot in the head rack of a Modicon M580 ePAC system.

Features

The OPC UA module is available in two designs:
- **BMENUA0100** for standard environments
- **BMENUA0100H** for severe environments *(1)*

The module includes the following features:
- Cybersecurity: Improved security by design features including encrypted firmware, network isolation, IP forwarding, IPsec integration, and full implementation of OPC UA cybersecurity features.
- Scalable performance: The module is designed to provide scalable performance from low bandwidth IIoT connectivity through to highly demanding operational SCADA connections with thousands of monitored variables without impacting Modicon M580 CPU scan rate.
- Simplified engineering: Integrated access to Modicon M580 ePAC data dictionary including simple or structured data types, online variable changes with no break in system communications and advanced, predefined diagnostic information.

OPC UA services

- Server Stack services (read/write, browse, call, publish, etc.)
- Server Stack Data Access Services
- Data Access Server Facet
- ComplexType 2017 Server Facet
- Core 2017 Server Facet
- Time-stamping at source
- Server Stack Security Services
- Server Stack Publish and Subscribe Services
- Server Stack Transport Services
- Client services: ReadList, WriteList, Browse, Subscriptions (monitored items)

References

Modicon M580 OPC UA module

Description	Reference	Weight kg/*lb*
OPC UA module *(1)*	BMENUA0100	0.384/ *0.847*

(1) For severe environments, see page 7/5.

Compatibility: page 1/18
Communication modules: page 4/12
Modules for severe environments: page 7/2

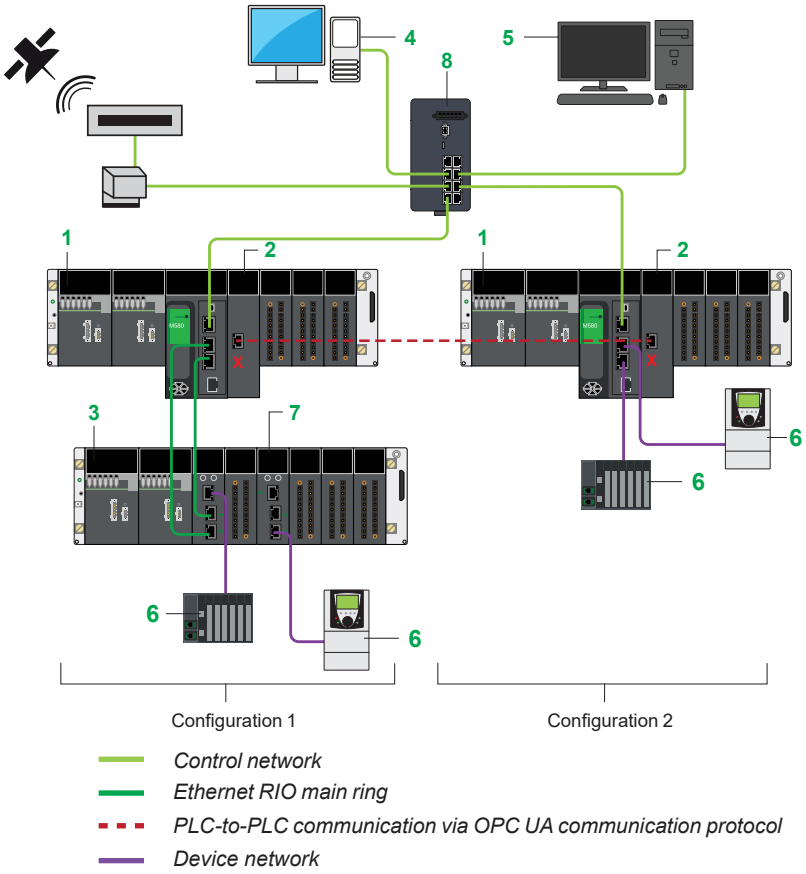
Modicon M580 automation platform

Modicon M580 communication modules

OPC UA module

Example architectures

Unified network with multiple Modicon M580 standalone PACs and single SCADA



1 Standalone PAC
2 BMENUA0100 with control port disabled
3 X80 Ethernet RIO drop
4 OPC UA client (SCADA system)
5 Engineering workstation with single Ethernet connection
6 Distributed equipment
7 BMENOS0300 switch
8 Modicon Switch

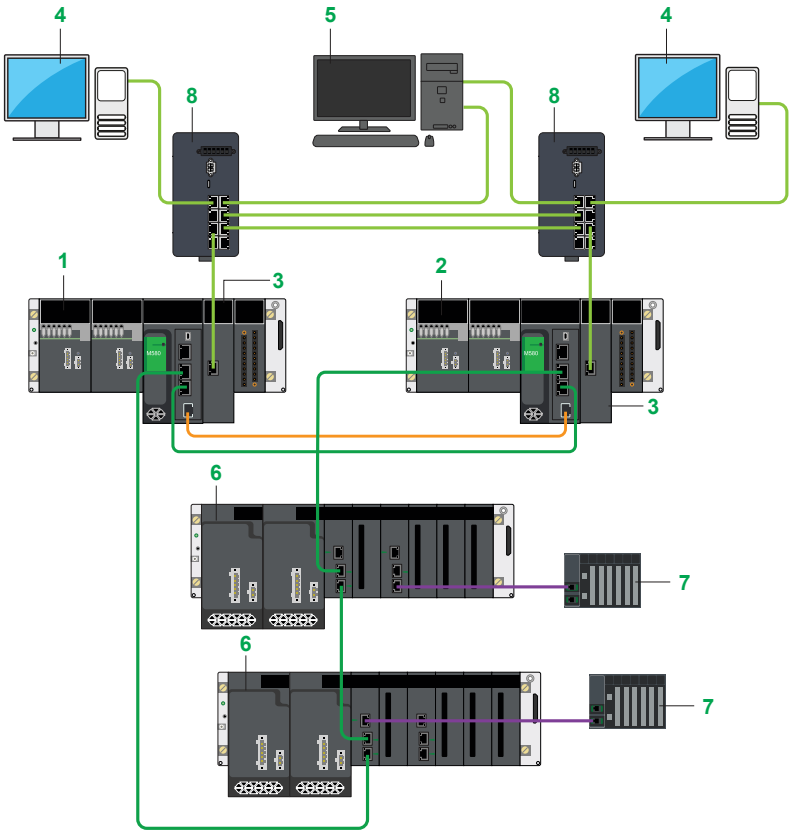
Modicon M580 automation platform

Modicon M580 communication modules

OPC UA module

Example architectures *(continued)*

Isolated control network with Modicon M580 redundant PACs



Control network
Ethernet RIO main ring
Hot Standby communication link
Device network

1 Primary redundant PAC
2 Standby redundant PAC
3 BMENUA0100 Ethernet communication module with embedded OPC UA server
4 OPC UA client (SCADA system)
5 Engineering workstation with dual Ethernet connections
6 X80 Ethernet RIO drop
7 Distributed equipment
8 Modicon Switch

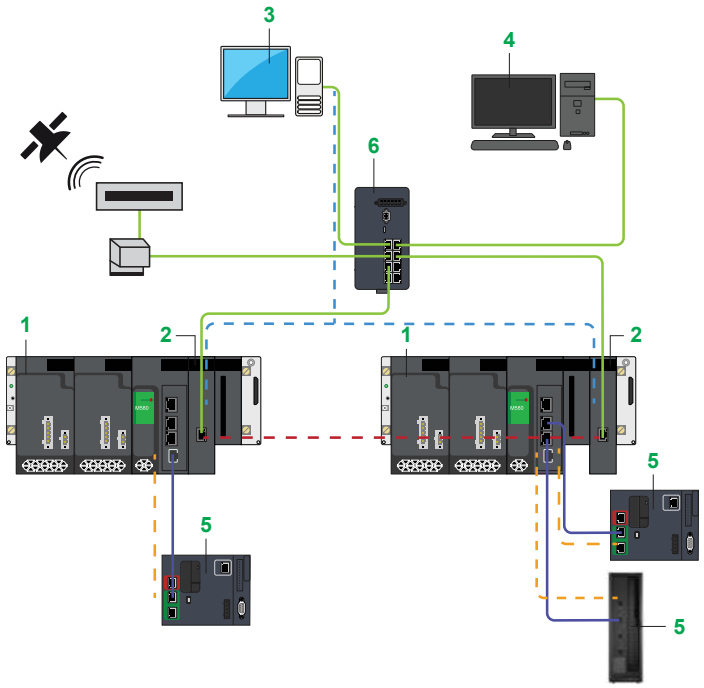
Modicon M580 automation platform

Modicon M580 communication modules

OPC UA module

Example architectures *(continued)*

Isolated control network with aggregation of data and PLC-to-PLC communication



Control network
Device network
PLC-to-PLC communication via OPC UA communication protocol
PLC-to-device communication via OPC UA communication protocol
SCADA-to-PLC communication via OPC UA communication protocol

1 Standalone PAC (OPC UA client via function blocks)
2 BMENUA0100 Ethernet communication module with embedded OPC UA server
3 OPC UA client (SCADA system)
4 Engineering workstation with single Ethernet connection
5 Distributed equipment (e.g. PLC, smart device)
6 Modicon Switch

Modicon M580 automation platform

Modicon M580 communication modules

IEC 61850 module

Presentation

IEC 61850 is the latest worldwide standard for electrical utilities. It covers information modeling, configuration language, and communication networks. Initially developed for communication in substations, implementation of the standard has advanced at a remarkable rate since its introduction, with huge numbers of IEC 61850 devices having been installed. Now considered to be the de facto standard for substation automation, it is encompassing an increasing number of new application areas, such as:

- Wind power (IEC 61400-25)
- Distributed energy resources (IEC 61850-7-420)
- Hydro power (IEC 61850-7-410)

The long-term active participation of Schneider Electric experts in IEC and UCA working groups has resulted in a state-of-the-art Schneider Electric IEC 61850 offer with full IEC 61850-8-1 functionality.
IEC 61850 with M580 helps reduce customer investment and operational costs by easily connecting their power device to the process systems.

The Modicon M580 IEC 61850 module helps to improve system reliability and security by:

- Getting the right data at the right time to be able to act proactively, thus increasing the reliability and availability of both the process and the power system
- Implementing robust M580 cybersecurity features to help ensure secure communication

Functionality

IEC 61850 MMS server, client, and GOOSE services can work in either Ed. 2.0 or Ed. 1.0 mode. Modicon M580 controllers support IEC 61850 standard engineering process and data objects. They also support the following data models:

- Substation automation systems (IEC 61850-7-4)
- Hydroelectric power plants (IEC 61850-7-410)
- Distributed energy resources (IEC 61850-7-420)

The **BMENOP0300** module from the Schneider Electric EcoStruxure platform is used to implement an engineering approach by enabling IEC 61850-compliant data exchange across industrial, energy, and power system applications. This offer helps our existing PLC customers from both process and energy applications to modernize smoothly and sustainably to the new IEC 61850 standard.

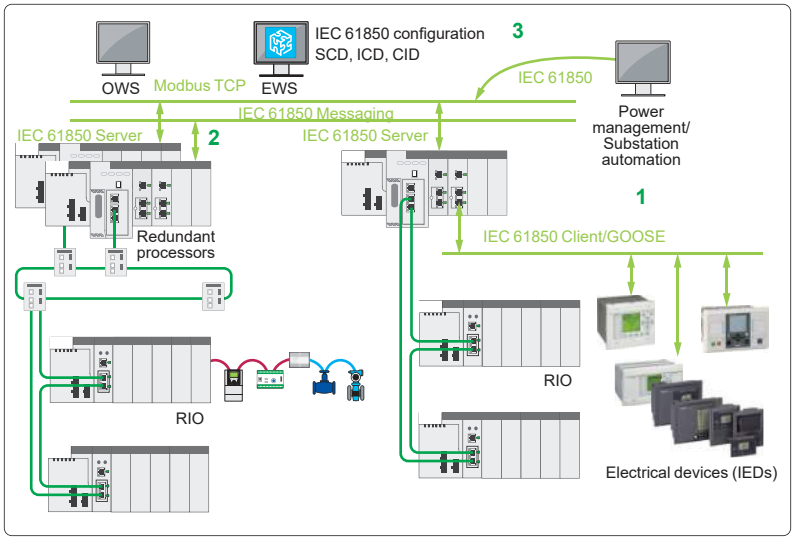
Application cases

The **BMENOP0300** module can provide different services under different roles, primarily in the following three areas:

1 Electrical device integration
   - IEC 61850 Client is used for communication with IEDs.
   - GOOSE is also possible.

2 IEC-61850 based process control
   - Process control objects are modeled with IEC61850 (hydro, DERs, etc.).
   - Server to SCADA and Client to IEDs is possible when needed.

3 Modicon M580 provides information to other systems
   - IEC 61850 Server is used.

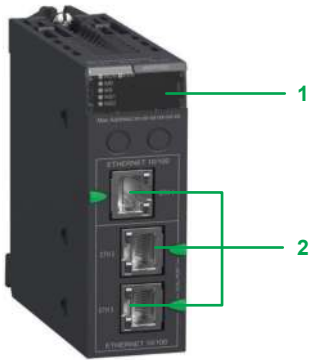


*Different services that **BMENOP0300** can provide*

Modicon M580 automation platform

Modicon M580 communication modules

IEC 61850 module



BMENOP0300

Description

The **BMENOP0300** IEC 61850 module is installed on the local Ethernet rack of a Modicon M580 system.

The six LEDs on the front panel **1** are used to diagnose operating conditions:
- RUN LED (green): Operating status
- ERR LED (red): Error detected
- MS LED (green/red): Module status
- NS LED (green/red): Network connection status
- NS1 LED (green/red): Ethernet network status
- NS2 LED (green/red): Ethernet network status

With three Ethernet ports **2** to link external intelligent electrical devices (IEDs), the module provides interfaces for IEC 61850 communication as well as device management software that utilizes the IEC 61850 standard *(1)*.

The maximum number of **BMENOP0300** modules that can be mounted on a local rack is determined by the M580 processor model:

Standalone processor model	**BMEP581020** **BMEP582020** **BMEP582040(S)**	**BMEP583020** **BMEP583040**	**BMEP584020** **BMEP584040(S)** **BMEP585040** **BMEP586040(S)**
Redundant processor model	**BMEH582040(S)**		**BMEH584040(S)** **BMEH586040(S)**
Maximum number	**2**	**3**	**4**

Main features

The main features of the **BMENOP0300** module are as follows:
- Compatible with the entire range of M580 CPUs, in both standalone and redundant configuration:
  - Ring topologies on two Ethernet ports using RSTP (Rapid Spanning Tree Protocol)
- Cybersecurity features:
  - ISA99 Achilles Level 2 certification
  - IPSec for IP-based communication
- IEC 61850 services:
  - MMS messaging server and client
  - GOOSE publisher and subscriber
- Network management using SNMP (Simple Network Management Protocol)
- Time synchronization: to be able to synchronize with external time servers and update the internal clock
- Modbus TCP support (limited, no I/O scanning)
- Dedicate IED configuration tool (IEDCT) for configuring IEC61850 data models and features

Capabilities

The capabilities *(2)* per module are:
- 16 logical devices
- MMS server: 16 concurrent connections, 64 report control block instances, 8 instances for one report control block, 68 data sets, 256 data attributes/data set, URCB and BRCB reports
- Control model: DOes, SBOes, DOns, SBOns
- MMS client: 32 concurrent connections
- GOOSE: 4 control blocks for GOOSE publish and 32 control blocks for GOOSE subscribe, up to 256 inputs/data set

References

Description	Usage	Reference	Weight kg/*lb*
Modicon M580 IEC 61850 communication module	IEC 61850 communication module used in M580 local rack Ethernet backplanes	**BMENOP0300** *(3)*	0.345/ *0.761*

(1) Requires EcoStruxure Control Expert or Unity Pro software V12.0 or later (see our website).
(2) Depends on the data model complexity. Maximum value has to be balanced with module performance behavior (loop latency, response time, etc.)
*(3) For the **BMENOP0300C** version with conformal coating, see page 7/5.*

Modicon M580 automation platform

Modicon M580 communication modules

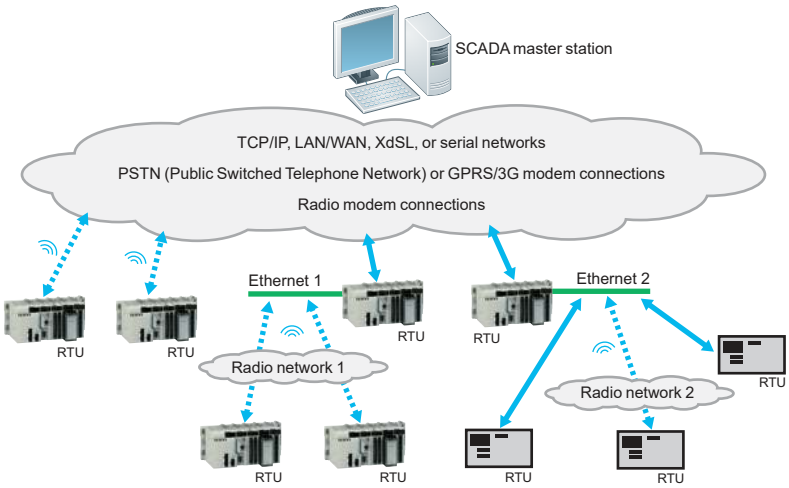
RTU communication

Presentation

RTU protocols and Telemetry systems provide a robust means of communication suitable for the process values, maintenance, and remote monitoring needs of infrastructures disseminated over a vast geographical area that may be difficult to access.

RTU systems are designed to meet the needs of the water industry, the oil and gas sector, and other infrastructures, where remote monitoring and telecontrol are essential to the effective management of sites and substations spread over a wide geographical area.

An RTU system consists of the following elements:
- A Telemetry Supervisor (SCADA) in a central control room
- A network infrastructure and a variety of suitable communication methods (LAN, WAN, modems, etc.)
- A large number of RTU substations geographically distributed throughout the field



Example of an RTU system architecture

RTU communication protocols

Currently, people working in the industrial Telemetry sectors use standard protocols for communication between control centers (SCADA) and RTU stations.

The most commonly used protocols are as follows:
- IEC 60870-5: IEC (International Electrotechnical Commission), in particular IEC 60870-5-101/104 (commonly known as IEC 101 or IEC 104)
- DNP3: Distributed Network Protocol version 3

DNP3 is the predominant protocol in North America, Australia, and South Africa whereas, in certain European countries, the IEC protocol is required by law. IEC is also commonly used in the Middle East.

The geographical distribution of these protocols is as follows:
- DNP3: North America, Australia, New Zealand, UK, Asia, South America, etc.
- IEC 60870-5: Europe, Middle East, Asia, South America, etc.

These protocols offer similar functions.
They are both particularly suited to “transient communications” (modem, radio) and data exchanges with limited bandwidth for the following reasons:
- They transfer data in a very robust manner between the SCADA system and the RTU devices.
- They are essentially “event-triggered” protocols (exchanges on changes of state, exchanges of time- and date-stamped events).

They offer the following transmission modes:
- Interrogation via polling
- Data exchanges on changes of state (RBE: report by exception)
- Unsolicited messaging (a slave station can start an exchange of data with the master station)

Both protocols offer native data management and time- and date-stamped events:
- Time synchronization between the master station and auxiliary stations via protocol functions
- Time- and date-stamping of data and events
- Automatic transfer of time- and date-stamped events between the RTU stations and SCADA (control room)

Modicon M580 automation platform

Modicon M580 communication modules

RTU modules

Main functions

The main RTU system functions are as follows:

- ■ Remote communications:
  - □ Between remote RTU sites (coordination, synchronization)
  - □ With the SCADA host system, controlling the central operator station (monitoring, alarm reports) and centralized databases (archiving of alarms or events)
  - □ With the on-call staff (alarm indication)
  - □ With the technical station (diagnostics, maintenance)
- ■ Data acquisition, processing, and memorization:
  - □ Process data sampling using standard or dedicated sensors, validation
  - □ Exchange of data with other devices within the station, including controllers and operator consoles
  - □ Use of discrete or analog I/O, serial links, fieldbuses, and LANs
  - □ Event detection, time- and date-stamping, prioritization, and logging as required by the application
- ■ Other functions:
  - □ IEC 61131-3 programmable control: forcing, access control, load sharing, servo control
  - □ Data logging
  - □ Alarm and report notification by e-mail/SMS
  - □ Web HMI: displaying the process, alarm handling, trend analysis, telecontrol
  - □ High reliability with hardened and ATEX ranges
- ■ Advanced RTU systems also feature (see page 4/28):
  - □ Cybersecurity functions
  - □ Simplified architecture
  - □ Integrating RTU DTM in Control Expert for easier configuration
  - □ Compliance with Modicon M580 Hot Standby
  - □ Certificates under Modicon M580 Safety (non-interfering Type 1)
  - □ Bulk configuration via Excel format

Two RTU communication modules are included in Schneider Electric offer with the following characterictics:

Features	BMENOR2200H	BMXNOR0200H
Platform support	Modicon M580(S)	Modicon M340, Modicon M580
Compliance with Modicon M580 Hot Standby	Yes	No
RTU protocol	DNP3, DNP3 NET, IEC60870-5-101, IEC60870-5-104	DNP3, DNP3 NET, IEC60870-5-101, EC60870-5-104
Ethernet protocol	SNMP V1/V3, SNTP, Modbus TCP, HTTPS	SNMP, SNTP, Modbus TCP, SMTP, FTP, HTTP
Firmware upgrade tool	Automation Device Maintenance	Unity Loader
Cybersecurity	Enhanced	Standard
Web diagnostics	Enhanced diagnostics	Standard diagnostics
Safety system support	Non-interfering Type 1	Not supported
Data logging	Yes	Yes
Serial port	Yes	Yes
IP address assignment	Static IP	DHCP, BootP, Static IP
SD card availability *(1)*	Optional	Mandatory
Event buffer size	150,000 + 40,000 *(2)*	100,000
Maximum input data	8,000 bytes	7,000 points total (including input/output)
Maximum output data	8,000 bytes	7,000 points (including input/output)
Data attribution	Unlocated *(3)*	Located/Unlocated
Strings exchange in DNP3	Supported	No
DNP3 SA key method	Pre-shared key	No
DNP3 secure statistics	Yes	No
TLS on RTU protocols *(4)*	Self-signed & CA	No

(1) The SD card is only used for the data logging feature.
(2) 40,000 event buffer used for DNP3 SAv5 security statistics events.
(3) When the user selects "On-Demand" mode for output type in DNP3/IEC 104 Server, the value will be generated as a located variable.
(4) TLS V1.2 for RTU protocols (DNP3/IEC 104)

Compatibility: page 1/18
Modules for severe environments: page 7/2

Modicon M580 automation platform

Modicon M580 communication modules

RTU module

Presentation

The **BMXNOR0200H** communication module integrates the RTU (remote terminal unit) functions and protocols in the Modicon M580 automation platform for industrial telemetry applications and other widely distributed infrastructures.

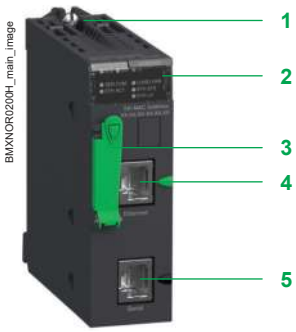
The **BMXNOR0200H** module can be used to connect an RTU Modicon M580 PLC directly to a telemetry supervisor or to other RTU stations, via the standard DPN3 protocols (subset level 3) or IEC 60870-5-101/104 with different connection methods: Ethernet TCP/IP, LAN, WAN, serial link, or modem connections (radio, PSTN, GSM, GPRS/3G, ADSL).

The **BMXNOR0200H** module is designed to operate in a harsh environment (conformal coating), in an extended temperature range (-25 to +70 °C/*-13 to +158 °F*).

Functions

The **BMXNOR0200H** module offers the following functions:

- Upstream RTU communication to the SCADA (server or slave mode)
- Downstream RTU communication to field devices (master mode)
- RTU protocols: Time synchronization, exchanges of time- and date-stamped data via polling (on change of state and unsolicited), management of time- and date-stamped events
- Application data logging with time- and date-stamping in the module flash memory card
- Event notifications via e-mail or SMS
- Embedded Web server for setting the RTU protocol parameters, diagnostics, and monitoring
- Communications on Ethernet port:
  - 10BASE-T/100BASE-TX physical interface
  - Modbus/TCP protocol (client and server)
  - Integrated RTU protocols for Ethernet communications: DNP3 IP (client or server) and IEC 60870-5-104 (over IP) (client or server)
  - Connection of ADSL external modem on the Ethernet port, via PPPoE (Point-to-Point Protocol over Ethernet)
  - Advanced Ethernet functions: NTP client, FTP client or server, HTTP server, SOAP/XML server, SNMP agent, SMTP agent
- Communications on serial port:
  - Isolated RS-232/RS-485 point-to-point serial links
  - Integrated RTU protocols for serial and modem communications: IEC 60870-5-101 (master or slave) and DNP3 serial (master or slave)
  - Connection of external modems (radio, PSTN, GSM, GPRS/3G) via PPP (Point-to-Point Protocol)



BMXNOR0200H

Description

The **BMXNOR0200H** module can be installed in either a standard or “ruggedized” configuration, equipped with a standard **BMXP34●●●●● /BMEP58●●●●** or “ruggedized” **BMXP34●●●●●H/BMEP58●●●●H** processor.

The front panel of the **BMXNOR0200H** module features:

1. A screw for locking the module in a slot in the rack
2. A display block with eight LEDs, four of which relate to the serial and Ethernet communication ports
3. A slot for a flash memory card (SD card) with protective cover
4. An RJ45 connector for connection to the Ethernet network
5. An RJ45 connector for connection of the serial link or an external modem

On the rear panel, two rotary switches for selecting the IP address assignment method for the module.

Compatibility:
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Modules for severe environments:
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Modicon M580 automation platform

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RTU module

BMXNOR0200H_main_image



BMXNOR0200H

References

Description	Communication port	Protocol	Reference	Weight kg/*lb*
Modicon M580 RTU communication module *(1)*	Ethernet 10BASE-100BASE-TX	■ Modbus/TCP (client or server) ■ DNP3 IP (client or server) ■ IEC 60870-5-104 (over IP) (client or server)	**BMXNOR0200H** *(2)*	0.205/ *0.452*
	Serial, External modems	■ Isolated RS232/RS485 point-to-point serial links ■ DNP3 serial (client or server) ■ IEC 60870-5-101 (client or server)		

Spare parts

Description	Usage	Supplied with module	Reference	Weight kg/*lb*
128 MB flash memory card supplied as standard with the module	Web pages, storage of data logging files (CSV)	**BMXNOR0200H**	**BMXRWS128MWF**	0.002/ *0.004*

(1) See ruggedized module characteristics, page 7/2.

(2) The Web Designer software is available on our website www.se.com. This software can be used to configure and download the embedded website and to configure advanced services: data logging, sending alarm notifications via SMS or e-mail. For further information, please consult our website.

4

Compatibility:
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Modicon 580 automation platform

Modicon M580 Communication modules

Advanced RTU module



BMENOR2200H, front and rear views

Presentation

The **BMENOR2200H** Advanced RTU module is a communication module fully based on the Schneider Electric Ethernet backbone to address advanced use cases and complex configurations. It can be used in Modicon M580 Hot-standby system to synchronize event data between modules in order to avoid event loss or event duplication after controller switchover.

Thus, **BMENOR2200H** Advanced RTU module reaches new levels of architecture connectivity and simplicity:

- Advanced level of cybersecurity with native implementation in RTU protocol (Secure authentication and confidential communication).
- Configuration, operating mode, and diagnostics are fully integrated inside EcoStruxure Control Expert. Cybersecurity settings are configured on embedded web page based on HTTPS.

The **BMENOR2200H** module is designed to operate in large infrastructures such as Water & Waste Water, pipelines, power generation plants, and transportation. It supports harsh environments (extended temperature range: -25 to +70 °C/*-13 to +158 °F*).

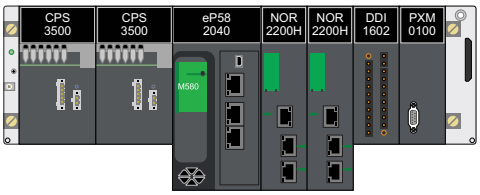
Functions

BMENOR2200H features the following key functions:

- DNP3 NET Sub-level 3/Serial SAv2/5 by pre-shared key, Server/Client
- System log for cybersecurity
- Time synchronized by CPU or RTU protocol
- Web page (HTTPS) for diagnostics and cybersecurity setting
- SNTP Client
- SNMP v1/v3 Agent
- RBAC Management
- IEC 60870-5-101/104, Server/Client
- Channel Redundancy for IEC104
- TLS on RTU Protocols
- Bulk configuration for RTU points
- Secure firmware download
- Sequence of Events (SOE)
- Modbus TCP Client/Server
- Data logging service (SD-card required)
- Other enhanced cybersecurity functions:
  - Enhanced password policy and login policy
  - System hardening, server services can be disabled/enabled
  - Rotary switch for selecting Advanced mode/Standard mode
  - Secure boot

Description

BMENOR2200H is installed on a **BMEXBP●●●●** Ethernet rack only (supports up to 4 Advanced RTU modules per CPU, including other Ethernet module, based on different CPU levels).



The front panel of the **BMENOR2200H** module presents:

1. A screw for locking the module in a slot in the rack
2. A display block with 9 LEDs (hardware diagnostic information: RUN, detected error, download firmware, serial data status, detected SD Card error, RTU connection status, Ethernet ports (front, backplane) status, cybersecurity status)
3. A slot for a Flash memory card (only for **BMXRMS004GPF** 4GB SD-card), with green protective cover
4. A RJ45 serial port supporting RS485 and RS232 *(1)*
5. 2 Giga Ethernet control ports

The back panel of the **BMENOR2200H** module features:

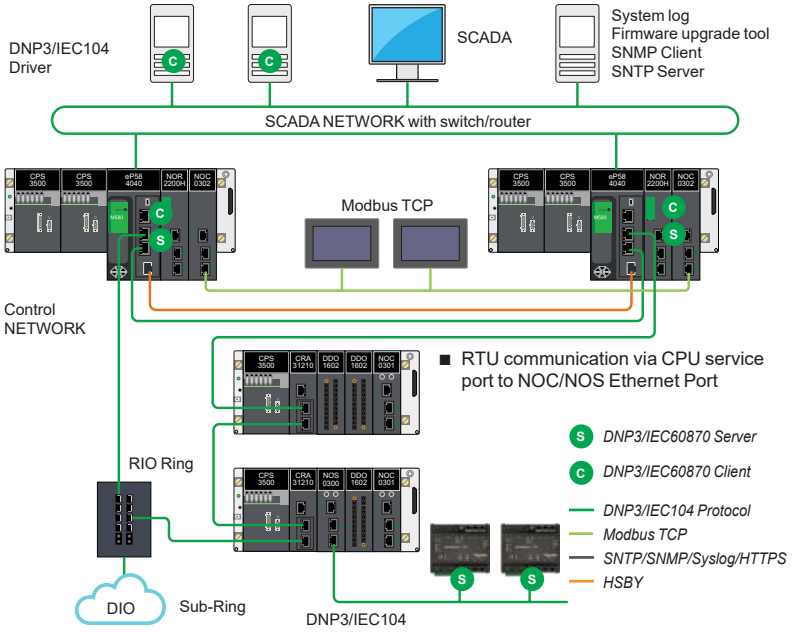
6. A rotary switch for cybersecurity (Advanced mode, Standard mode and Reset) (a dedicated screwdriver is shipped in the box from factory)
7. A dual port for X-bus and Ethernet communication

(1) Dust cover is provided.

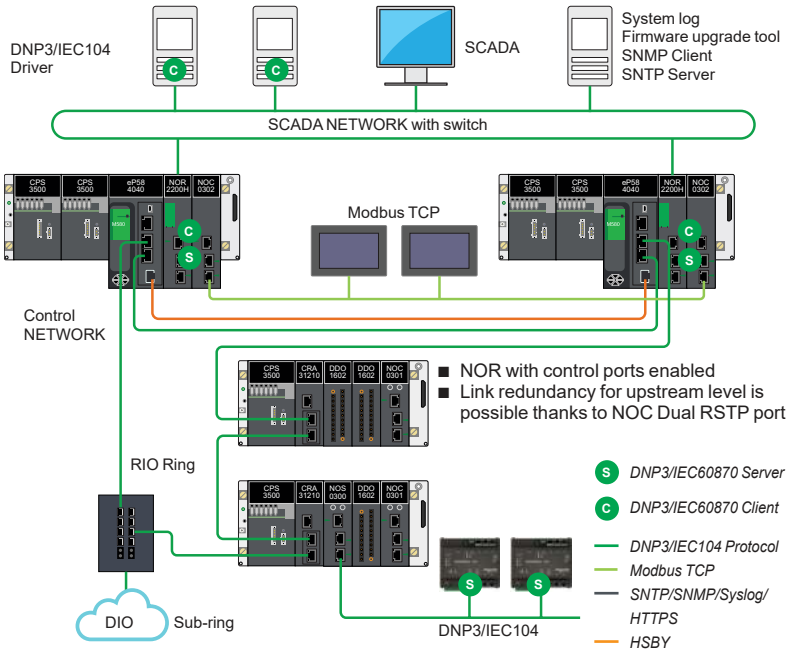
Modicon 580 automation platform
Modicon M580 Communication modules
Advanced RTU module

Architecture

Example of architecture: Unified network



Example of architecture: Isolated network



References

Description	Communication port	Protocol	Reference	Weight kg/ lb
Modicon M580 Advanced RTU module, Ethernet-based, 1 serial port, hardened *(1)*	Ethernet	DNP3 SAv2/SAv5, IEC 60870-5-101/104, Modbus TCP, SNMP, HTTPS, SNTP	BMENOR2200H	0.407/ *0.899*
SD flash memory card, 4 Go, for processor *(2)*			BMXRMS004GPF	0.002/ 0.004

(1) See ruggedized module characteristics, page 7/2.
(2) Only for data logging service

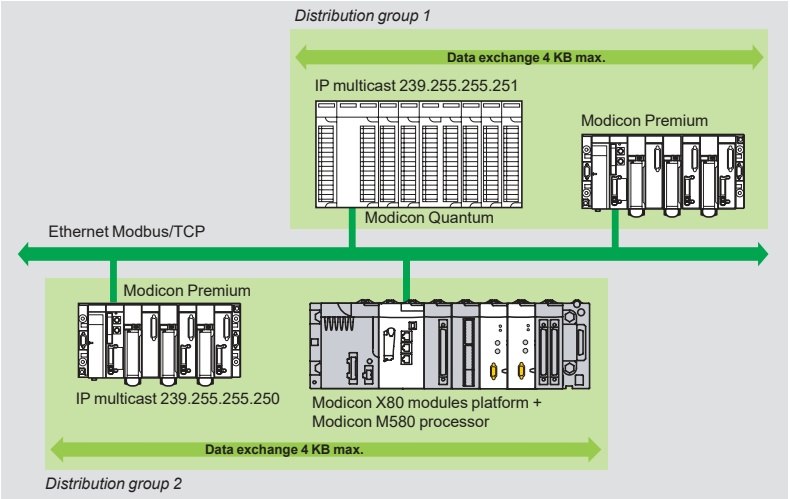
Modicon M580 automation platform

Modicon M580 communication modules

Ethernet Global Data module

Presentation

Global Data service



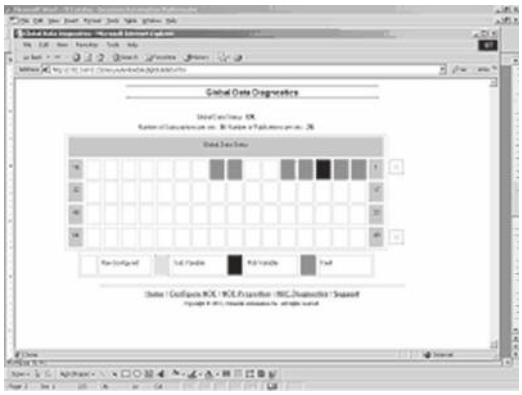
The Global Data service performs data exchanges in real time between stations belonging to the same distribution group. It is used to synchronize remote applications, or to share a common database between a number of distributed applications. Exchanges are based on a standard producer/consumer protocol, helping to ensure optimum performance with a minimum load on the network. This RTPS (Real Time Publisher Subscriber) protocol is promoted by Modbus-IDA (Interface for Distributed Automation), and is already a standard adopted by several manufacturers.

Characteristics

A maximum of 64 stations can participate in Global Data within a single distribution group. Each station can:

- Publish one 1,024-byte variable. The publication rate can be configured between 10 ms and 1,500 ms in increments of 10 ms.
- Subscribe to between 1 and 64 variables. The validity of each variable is controlled by health status bits linked to a refresh timeout configurable between 50 ms and 15 s. Access to an element of the variable is not possible. The total size of subscribed variables amounts to 4 K contiguous bytes.

To further optimize the performance of the Ethernet network, Global Data can be configured with the “multicast filtering” option which, together with switches in the ConneXium range, broadcasts data only to Ethernet ports where there is a Global Data service subscriber station. If these switches are not used, Global Data is sent in “multicast” mode to all switch ports.



Global Data diagnostics

Global Data service diagnostics

The diagnostic screens use a color code to show the Global Data status:

- Configured/not configured/detected fault
- Published/subscribed

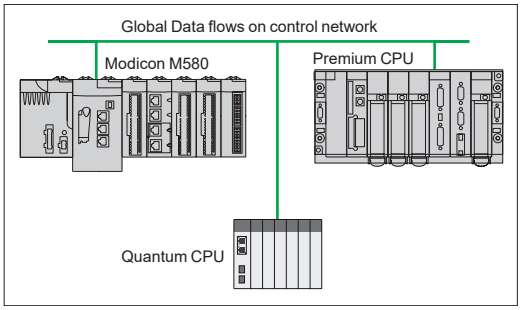
Global Data service diagnostics can be performed in one of four ways:

- Via the application program from a specific PLC data zone
- From the setup software debug screen
- From the PLC system diagnostic function displayed by means of a Web browser on a PC station
- Using standard SNMP manager software

Modicon M580 automation platform

Modicon M580 communication modules

Ethernet Global Data module



Example of architecture to implement BMXNGD0100



BMXNGD0100

Description

BMXNGD0100

The **BMXNGD0100** Ethernet Global Data module is specifically designed to modernize the large and complex Modicon installed base (mainly Premium and Quantum) by running the Global Data service more easily.

In addition to the Global Data service, the **BMXNGD0100** module also has the following embedded services, as it can also be used for inter-controller communication to provide solutions for complex processing and high-end applications:

- Ipconfig
- Modbus TCP explicit messaging (client and server)

Designed as a neat solution specifically for the Global Data service, some services, such as IO-Scanner, Web, FDR, and NTP, are not supported by the **BMXNGD0100** module. This module is only compatible with **BMEXBP●●●●** Ethernet racks in standalone architectures on the X80 platform, to keep the global data transferring internally only, isolated from the external world to help ensure a strict level of cybersecurity.

If these functions are required, please check with our Customer Care Center for alternative products that can fulfill these needs.

References

Description	Use	Reference	Weight kg/lb
Modicon M580 Ethernet Global Data module supplied with flash memory card (BMXRWSC016M)	Inter-controller communication service to transfer global data between each controller for complex multi-controller architectures	BMXNGD0100	0.200/ *0.440*
Flash memory card	Store global data for applications	BMXRWSC016M	0.002/ *0.004*

Contents

5 - Edge Module

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■ **Edge Compute Node**

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□ Module composition ..... *page 5/3*

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■ **Use cases** ..... *page 5/4*

Edge Module

Edge Compute Node

Type of device		Edge Module
		
Network protocols		Open platform
Fanless		YES
Structure	Physical interface	10/100/1000 BASE-TX
	Type of connector	1x RJ45 connector (control port) Ethernet backplane connection
	Transmission rate	10/100/1000 Mbps
CPU	Processor	ARM V7 32 bit dual core at 500 MHz
	Storage	8 GB eMMC (internal storage)
	Memory	1 GB ECC DDR3 RAM
Operating system		Linux
Software package		Container engine (Docker), Schneider Applications (OPC UA Server, Webserver, …)
Web page	Commissioning / Maintenance / Operation	YES
	Web page protocol	HTTPS (HTML5)
Conformal coating		Harsh environment
Power supply		Internal power supply via rack
Power consumption		<= 155 mA at 24 V DC
Dimensions	W x H x D	32 x 131 x 86 mm / 1.25 x 5.15 x 3.38 in.
Temperature	During operation	-25 to 70 °C
	During storage	-25 to 70 °C
Vibration resistance		9.8 m/s² (f = 9-150 Hz) conforming to IEC 61131-2
Configuration	Maximum number of OPC UA Clients connexion	2 OPC UA Clients
	Number of modules of the same type per station	Up to 2 OPC UA modules
Communication services	Modbus TCP client (messaging)	NO
	IP Forwarding	NO
	NTP/SNTP time synchronization	YES
	FDR Service	NO
	SNMP network management	YES (agent)
	OPC UA Server	YES (container only)
	IPsec	NO
	TLS	NO
	IPV6	NO
Standards and certifications		CE, cULus, RCM, UKCA
Mounting location		Backplane
Hot swapping fallback		YES
Product compatibility		Modicon X80, Modicon M580
Reference		**BMEECN0100H**
Pages		5/3

5

Modicon M580 automation platform

Modicon M580 Edge module

Edge Compute Node



BMEECN0100H

Presentation

The **BMEECN0100H** module integrates IT technologies to provide a simple and powerful open platform for applications. The module brings the IT concept inside the Modicon M580 system without requiring the installation of dedicated iPC hardware.

The module is based on three pillars:

- **Boost:** The module adds system features which are not available with the standard Modicon M580 processor, like complex calculations, third-party device with custom protocols, etc.
- **Platform**: Applications are deployed and managed by the ECN module through container virtualization technology, opening up a wide ecosystem of applications.
- **Reliability**: the Edge Compute Node platform benefits robustness of both Modicon M580 and Linux OS worlds.

Description

The **BMEECN0100H** module can be installed in any slot of a Modicon X80 Ethernet **BMEXBP●●●●** backplane, in the primary rack of a Modicon M580 ePAC system *(1)*.

The ECN module features:

1 LED array
2 Control port with Ethernet link and activity LEDs
3 Ethernet backplane port for Ethernet communication over the local main Ethernet rack and X-bus backplane port for 24 V ⎓ power and rack addressing

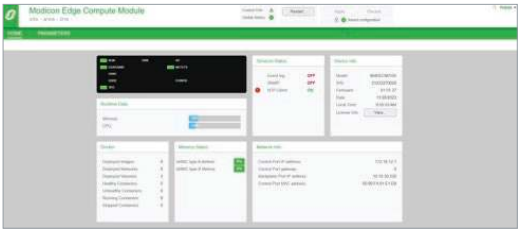
Features

- The ECN module is installed in the same rack (*1*) as the standalone Modicon M580 processor **BMEP58●●●●**
- The ECN platform is a non-interfering Type 1 module, compatible with Modicon M580 Safety processors **BMEP58●●●●S**
- 500Mhz dual-core ARM V7 32bit CPU
- Plug & play: The ECN platform is easy to install and ready to integrate and run applications - Webserver and Docker are integrated in the module.
- Hot-swappable: The **BMEECN0100H** module can be removed from its bus base while the Modicon M580 system is under power.
- EcoStruxure environment:
  - The ECN network IT is configured via EcoStruxure Control Expert v15.1 and later
  - The ECN module is updated via EcoStruxure Automation Device Maintenance V3.2.124.0 and later
- Software package: Docker V19.03.8
- Fanless, batteryless, its power is supplied internally via the rack
- Operating temperature range: -25 to +70 °C (supports severe environments conditions: please refer to 7/2)

Module composition

The Edge Compute Node module is delivered with:

- A pre-installed software package including Linux, Docker, OPC UA Server
- A web interface, to create, manage, and diagnose the module
- EcoStruxure tools (EcoStruxure Control Expert, EcoStruxure Automation Device Maintenance)



ECN web interface

Diagnostics

Edge Compute Node offers four types of diagnostics:

- Webserver diagnostic: an overview of the module is displayed on the homepage of the web interface as a first diagnostic
- Data diagnostic, using OPC UA server for a deep dive diagnostic on the ECN module and the CPU
- Network diagnostic: the SNMP communication protocol allows the user to manage and diagnose the network.
- Visual diagnostic: LED status array in the front of the module

References

Modicon M580 Edge module

Description	Reference	Weight kg/*lb*
Edge Compute Node for Modicon M580	**BMEECN0100H**	0.400/ *0.881*

(1) 2 ECN modules maximum in a Modicon M580 rack.
(2) Redundant processors BMEH●●●● do not support ECN.

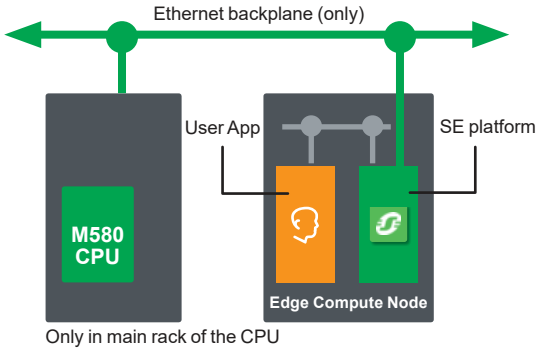
Modicon M580 automation platform

Modicon M580 Edge module

Edge Compute Node

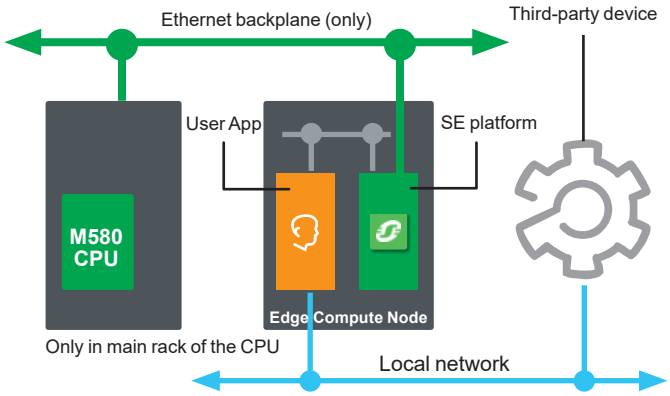
Use case no 1: complex calculations

Complex calculations are not easily programmed when following IEC 61131. With the Edge Compute Node module, a simple machine learning algorithm can be implemented using Python, or a Fast Fourier Transform (FFT) programmed in C++.



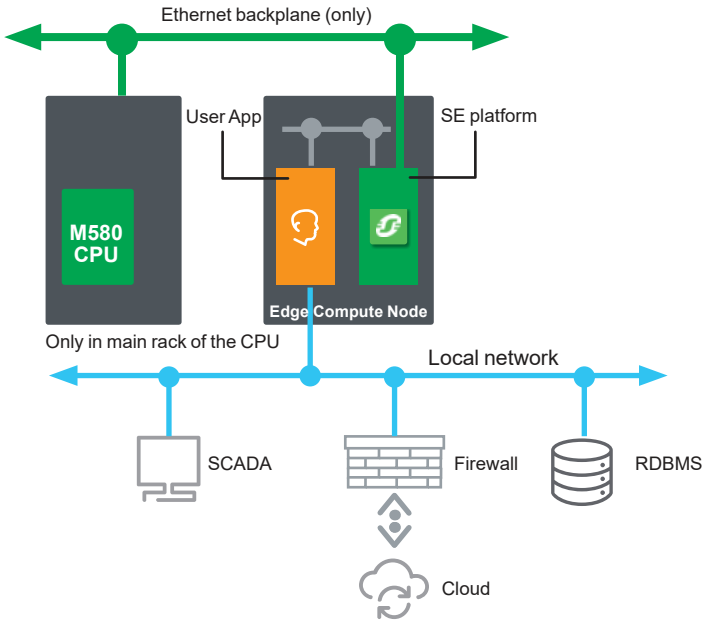
Use case no 2: third-party device integration

The Edge Compute Node module can act as a simple protocol gateway to integrate a third-party device with a non-standard protocol into a Modicon M580 environment.



Use case no 3: Integration within a management system

The Edge Compute Node module is used to connect the Modicon M580 to IT systems such as ERP, MES, databases and the cloud for advanced analytics and data analysis.



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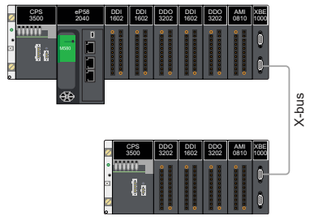
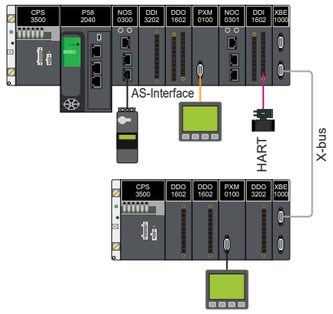
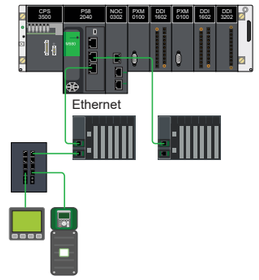
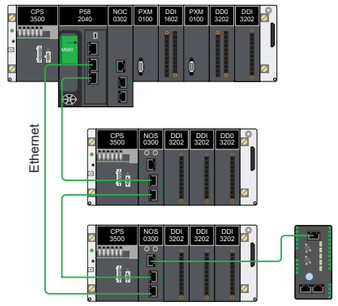
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Modicon M580 automation platform

Architectures

Standard I/O architectures

Modicon M580 architecture type *Note: These architectures can be combined with each other*	Architectures with local racks (main rack and expansion racks)		Architecture with local racks (main rack and expansion racks)	Architecture with racks in remote drops
	Hardwired	**Distributed peripherals over fieldbuses**	**Distributed peripherals and I/O over Ethernet**	**Remote over Ethernet**
	Compact topology with devices hardwired on local I/O	**Compact topology with devices distributed over fieldbuses**	**Distributed devices and I/O topology over Ethernet**	**Remote I/O + remote functions (including fieldbus master)**
	Local I/O architecture	**Integrated fieldbus architecture**	**Distributed I/O architecture**	**Remote I/O architecture**
				
Expansion rack (with X-bus rack expansion module)			Main local rack with up to 7 local expansion racks on X-bus (Modicon Premium or Modicon X80 racks)	Main local rack with up to 7 local expansion racks on X-bus (Modicon Premium or Modicon X80 racks), RIO drop with up to 1 remote expansion rack on X-bus (only Modicon X80 racks)
Backplane compatibility	BMEXBP●●00 Ethernet + X-bus backplanes		Compatible for main racks (local or remote)	
	BMXXBP●●00 X-bus backplanes PV02 (or later)		Mandatory for expansion racks (main or remote) Compatible with any rack provided that no Modicon X80 I/O Ethernet modules (such as weighing, HART, and **BMECRA31210** modules) are used in the racks	
Compatible CPU types			All standalone processors are compatible *(1)*	**BMEP58●●40** CPUs are required to manage RIO
CPU Ethernet ports	Service port		One Service port for HMI, EcoStruxure Control Expert *(2)*, control network, variable speed drive, etc.	
	Dual port		Dual ports are not used	Dual ports are used for distributed equipment (DIO scanner) / Dual ports are used for remote equipment (RIO scanner), BMECRA31210 Ethernet drop adapter is mandatory in RIO drop *(3)*
RIO drops			–	Maximum of 32 RIO drops can be supported in an M580 network
Communication	AS-Interface module	BMXEIA0100	Yes	Yes, in a local rack or RIO drop
	Serial link module	BMXNOM0200	Yes	Yes, in a local rack or RIO drop
	RTU modules	BMXNOR0200H	Yes	Yes, in local rack only
		BMENOR2200H	Yes	Yes, in local rack only
	IEC 61850 module	BMENOP0300	Yes	Yes, in local rack only
	OPC UA module	BMENUA0100	Yes	No
	Ethernet communication modules	BMENOC03●1	Yes	Yes, in local rack only
		BMENOC0302	Yes	Yes, in local rack only
	CANopen module	BMECXM0100	Yes	Yes, in a local rack or RIO drop
	PROFIBUS DP Master module	PMEPXM0100	Yes	
Expert functions	PTO (pulse train output) module	BMXMSP0200	Yes	Yes, in local rack only
	Other expert modules: counter, SSI encoder, etc.		Yes	Yes, in a local rack or RIO drop
Time-stamping	1 ms max. between modules in the same rack as the ERT time-stamping module	BMXERT1604T	Yes	Yes, in a local rack or RIO drop
	10 ms with CRA I/O drop adapter combined with discrete I/O modules in the RIO drop	BMECRA31210	–	Yes, in RIO drop only, system mode with OFS *(3)*
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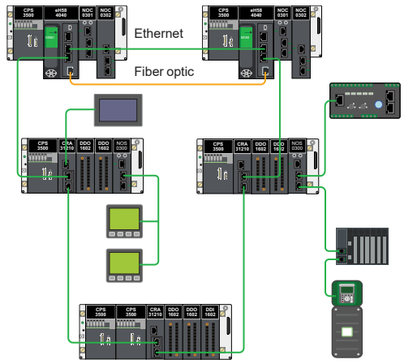
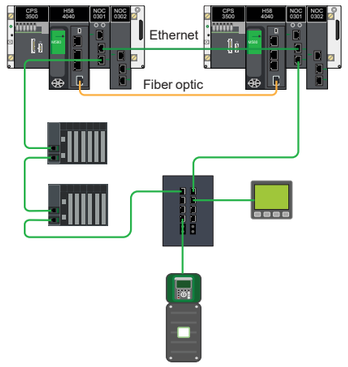
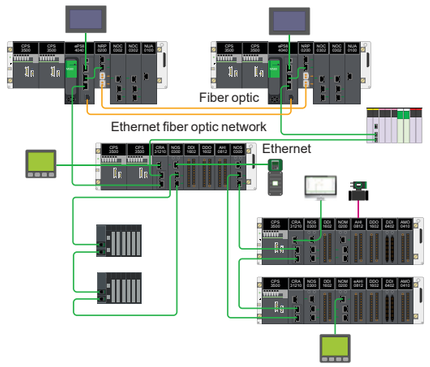
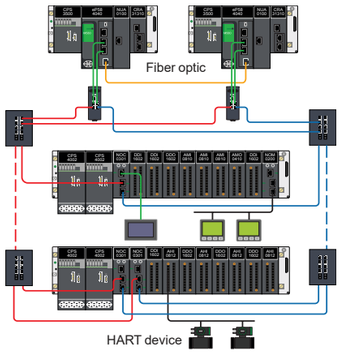
(1) ***BMEP58●●40*** *CPUs are not mandatory.*
(2) Unity Pro software in earlier versions.
(3) ***BMXCRA31210*** *modules are also compatible*

More technical information on www.se.com

Modicon M580 automation platform

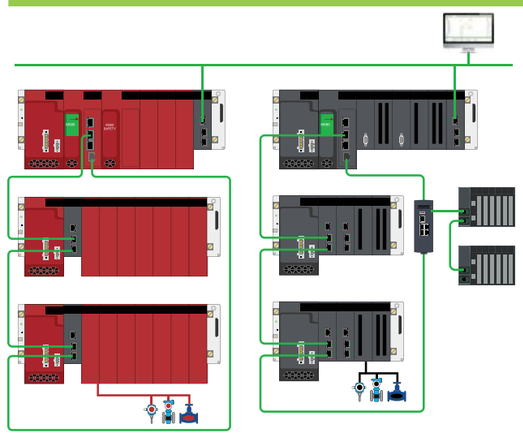
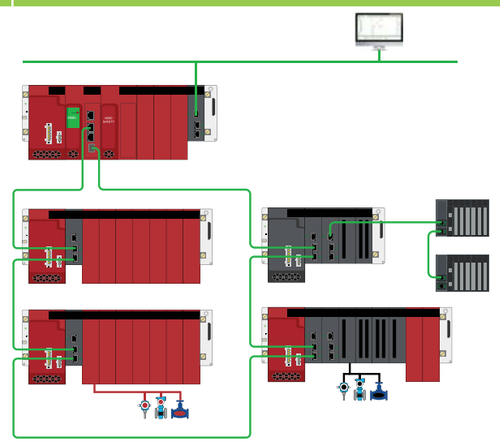
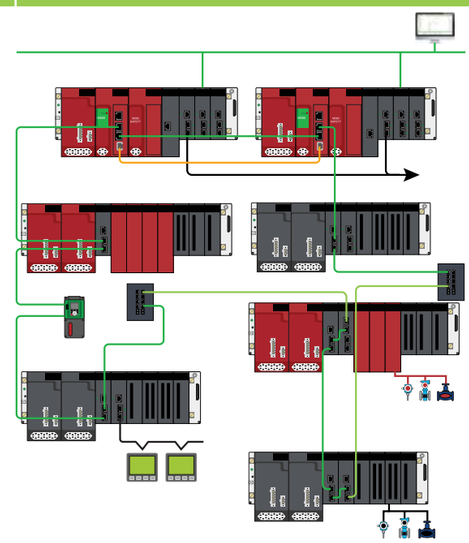
Architectures

High-availability I/O architectures

Modicon M580 architecture type			High-availability architectures for remote I/O (primary and redundant CPU)	High-availability architectures for distributed I/O (primary and redundant CPU)	High-availability architectures for hybrid I/O (primary and redundant CPU)	Very high-availability architectures
			Remote over Ethernet	Distributed over Ethernet	Distributed and remote over Ethernet	Remote over PRP LAN A and PRP LAN B
			Hot Standby topology with devices hardwired on remote I/O over Ethernet	Hot Standby topology with devices linked to distributed I/O over Ethernet	Hot Standby topology with devices available on distributed and remote I/O over Ethernet	Hot Standby topology with devices available on remote I/O over Ethernet
			Remote I/O architecture	Distributed I/O architecture	Mixed RIO/DIO architecture	Remote I/O architecture
						
Expanded rack (with X-bus rack expansion module)			No local I/O on high-availability architecture			
Backplane compatibility	BMEXBP●●00 Ethernet + X-bus backplanes		Compatible for main racks (remote only)			
	BMXXBP●●00 X-bus backplanes PV02 (or later)		Mandatory for expansion racks (main or remote) Compatible with any rack provided that no Modicon X80 I/O Ethernet modules (such as weighing, HART, and **BMECRA31210** modules) are used in the racks			
Compatible CPU types			All redundant processors are compatible			
CPU Ethernet ports	Service port		One Service port for HMI, EcoStruxure Control Expert *(1)*, control network, variable speed drive, etc.			
	Dual port		Dual ports are used for remote equipment	Dual ports are used for distributed equipment (DIO scanner) *(2)*	Dual ports are used for remote equipment (RIO scanner) *(3)*, **BMECRA31210** Ethernet drop adapter is mandatory in RIO drop *(4)*	Dual ports are used for remote equipment (RIO scanner) (3), one **BMECRA31310** Ethernet drop adapter is mandatory in RIO drop over PRP, two are supported
RIO drops			Maximum of 31 RIO drops can be supported in an M580 network	–	Maximum of 31 RIO drops can be supported in an M580 network	
Communication	AS-Interface module	BMXEIA0100	Yes		Yes, in a local rack or RIO drop	Yes
	Serial link module	BMXNOM0200	Yes		Yes, in a local rack or RIO drop	
	RTU module	BMENOR2200H	Yes, in local rack only			
	IEC 61850 module	BMENOP0300	Yes		Yes, in local rack only	
	OPC UA module	BMENUA0100	Yes, in local rack only			
	Ethernet communication modules	BMENOC03●1	Yes, in local rack only			
		BMENOC0302	Yes, in local rack only			No
	CANopen module	BMECXM0100	No			
	PROFIBUS DP Master module	PMEPXM0100	Yes, in local rack only			
Expert functions	PTO (pulse train output) module	BMXMSP0200	No			
	Other expert modules: counter, SSI encoder, etc.		Yes, in an RIO drop	No	Yes, in an RIO drop	
Time-stamping	1 ms max. between modules in the same rack as the ERT time-stamping module	BMXERT1604T	Yes, in an RIO drop	Yes	Yes, in an RIO drop	
	10 ms with CRA I/O drop adapter combined with discrete I/O modules in the RIO drop	BMECRA31210	Yes, in RIO drop only, system mode with OFS *(2)*	–	Yes, in RIO drop only, system mode with OFS *(2)*	
Pages			6/21			6/22

(1) Unity Pro software in earlier versions.
*(2) Distributed I/O can also be connected through the dual port of a **BMENOC03●●** module.*
(3) NRP fiber converter can be used in case of long distance network.
*(4) **BMXCRA31210** modules are also compatible.*

Modicon M580 automation platform
Architectures
Safety I/O architectures

Modicon M580 architecture type	Integrated Safety architecture	Common Safety architecture	High-availability Safety architectures (primary and redundant CPU)
	Local I/O	Safe and non-safe local I/O	Safe and non-safe remote I/O over Ethernet
	Remote I/O over Ethernet Non-safe distributed I/O	Safe and non-safe remote I/O over Ethernet Non-safe distributed I/O	Hot Standby topology with devices available on distributed and remote I/O over Ethernet
	Separation between Safe and non-Safe ePAC	Unique ePAC for Safe and non-Safe	Integrated or Common Safety
			

Expansion rack (with X-bus rack expansion module)			Main local rack with up to 7 local expansion racks on X-bus (Modicon X80 racks), RIO drop with up to 1 remote expansion rack on X-bus (only Modicon X80 racks)	No local I/O on high-availability architecture
Backplane compatibility	BMEXBP●●00 Ethernet + X-bus backplanes		Compatible for main racks (local or remote)	Compatible for main racks (remote only)
	BMXXBP●●00 X-bus backplanes PV02 (or later)		Mandatory for expansion racks (main or remote) Compatible with any rack provided that no Modicon X80 I/O Ethernet modules (such as weighing, HART, and **BMECRA31210** modules) are used in the racks	
Compatible CPU types			All Safety standalone processors are compatible	All Safety redundant processors are compatible
CPU Ethernet ports	Service port		One Service port for HMI, EcoStruxure Control Expert *(1)*, control network, variable speed drive, etc.	
	Dual port		Dual ports are used for remote equipment (RIO scanner), **BMECRA31210** Ethernet drop adapter is mandatory in RIO drop *(2)*	
RIO drops			A maximum of 31 RIO drops can be supported in an M580 network	
Communication	AS-Interface module	BMXEIA0100	Yes, in a local rack or RIO drop	
	Serial link module	BMXNOM0200	Yes, in a local rack or RIO drop	
	RTU module	BMENOR2200H	Yes, in local rack only	
	IEC 61850 module	BMENOP0300	Yes, in local rack only	
	OPC UA module	BMENUA0100	Yes, in local rack only	
	Ethernet communication modules	BMENOC03●1	Yes, in local rack only	
	CANopen module	BMECXM0100	No	
	PROFIBUS DP Master module	PMEPXM0100	Yes	Yes, in local rack only
Expert functions	PTO (pulse train output) module	BMXMSP0200	Yes, in local rack only	No
	Other expert modules: counter, SSI encoder, etc.		Yes, in a local rack or RIO drop	Yes, in RIO drop
Time-stamping	1 ms max. between modules in the same rack as the ERT time-stamping module	BMXERT1604T	Yes, in a local rack or RIO drop	Yes, in RIO drop
	10 ms with CRA I/O drop adapter combined with discrete I/O modules in the RIO drop	BMECRA31210	Yes, in the RIO drop only, system mode with OFS *(2)*	
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(1) Unity Pro software in earlier versions.
*(2) **BMXCRA31210** module is also compatible.*

Modicon M580 automation platform
Architectures

Presentation

The Modicon M580 automation platform offers an I/O architecture solution over local racks, fieldbuses, and Ethernet, connecting the Modicon M580 main rack to remote I/O (RIO) drops, installed on a Modicon X80 rack *(1)*, and distributed I/O (DIO) devices.

The Modicon M580 solution comprises:
- RIO drops on a Modicon X80 drop
- Ethernet DIO devices
- A choice of four Ethernet drop adapters (standard or high-performance) in each Modicon X80 RIO drop
- Two fiber optic repeaters, for single-mode or multimode optical fiber, on Modicon X80 RIO drop
- A choice of switches (Dual Ring Switch, managed switch, redundancy switch) from the Modicon Networking offer *(2)*, configurable by means of predefined configuration files for immediate setup

Different architectures are therefore possible, such as:
- Ethernet RIO architectures with or without Modicon managed switches *(2)*
- Architectures with separate or combined Ethernet RIO and Ethernet DIO devices on the same physical medium

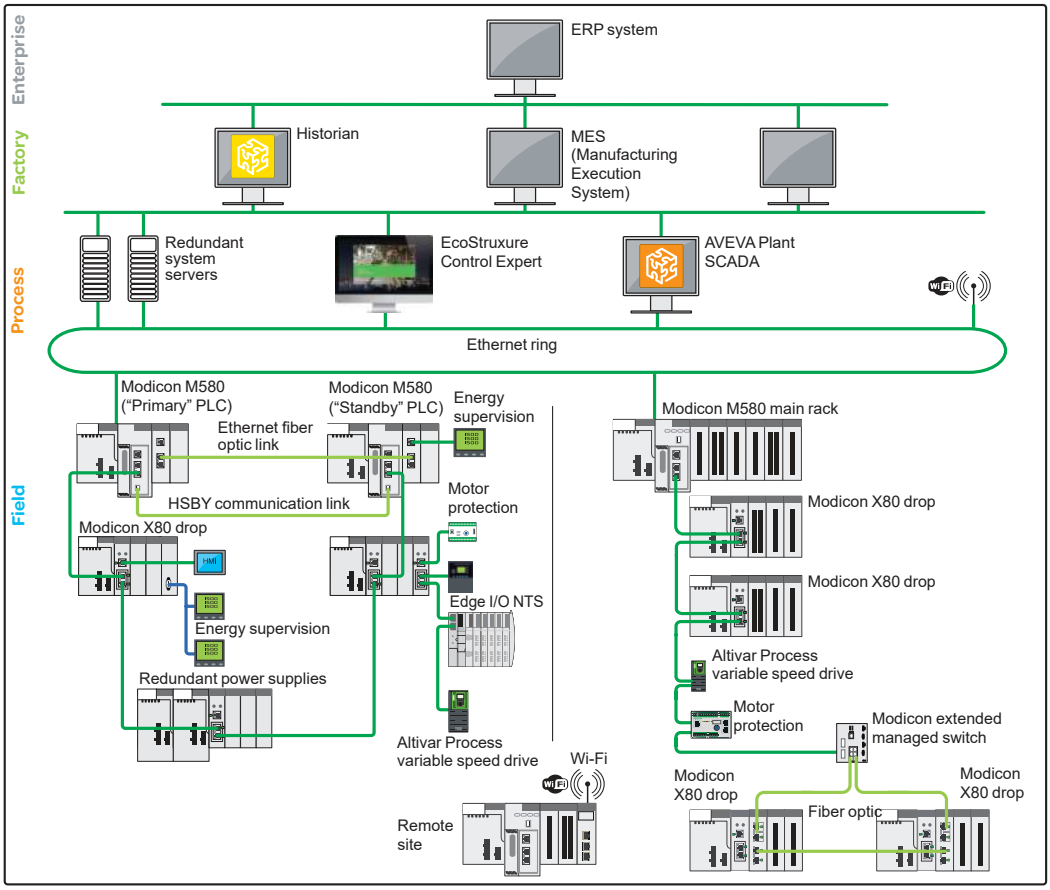
The following pages present four different types of architecture.

This solution also includes numerous options and functions as standard, providing:
- High process availability, with the option of connecting Ethernet RIO and Ethernet DIO in a daisy chain loop
- Deterministic data exchanges between the PLC and the Ethernet RIO
- Remote service, with a Service port available on the Modicon M580 CPU or Modicon X80 CRA Ethernet drop adapters

Note

- The validated and tested architectures are shown in the technical documentation available on our website.
- The use of switches other than those detailed in these architecture I/O pages (pages 6/8 to 6/15) is not supported *(2)*.

Even higher system availability is supported through PRP protocol, with duplicate communication networks and specific redundancy devices such as switches and **BMECRA31310** head adapter.



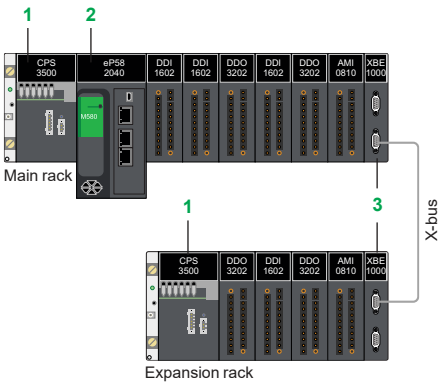
Typical architecture (3)

(1) The Modicon X80 range offers common I/O modules that can be used in Ethernet RIO drops connected in Modicon M580 automation platforms.
(2) Supported Modicon switches: **MCSESM083F23F1**, **MCSESM103F2CU1, MCSESM103F2CS1** *(see page 6/14).*
(3) This typical architecture representation is a conceptual network diagram and does not represent the actual wiring specifications.

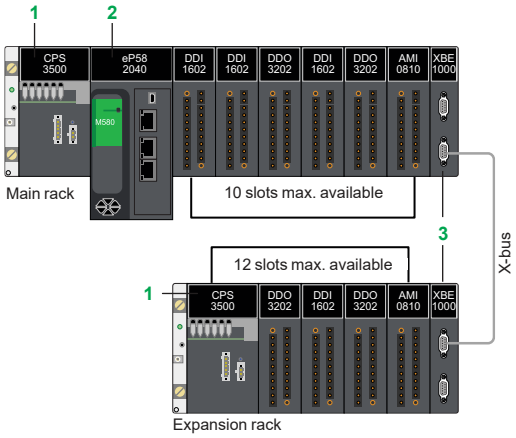
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Modicon M580 automation platform
Architectures
Local I/O architecture



Local I/O architecture: devices on local I/O



For rack accessory references, see chapter 2 of the Modicon X80 catalog



Use Modicon PLC Configurator for power consumption calculation

Presentation

Local I/O architecture is used for control systems that reside in the main control cabinet.

The Modicon M580 platform provides interrupt services for this type of application.

Up to 126 slots are possible for I/O modules in a configuration comprising a main rack and seven expansion racks, connected by **BMXXBE●00●** rack expansion modules.

Description

The Modicon M580 automation platform provides local I/O management for control systems that are wired to the main control cabinet.

Local I/O architecture can comprise a maximum of 10 I/O modules in the main rack, in addition to the CPU **2** and the power supply **1**.
These local I/O can be extended on an expansion rack by using a **BMXXBE●00●** rack expansion module **3**.

Ethernet slots are only available in the main rack because rack expansion cables only support X-bus.

The choice of appropriate rack depends on the required number of modules for the system. Main racks are available in the following formats:
- With X-Bus backplanes, 4, 6, 8, 12, and 16 slots
- With Ethernet backplanes, 4, 8, and 12 slots

As well as discrete and analog I/O modules, the following modules are available:

- Application-specific modules:
  - SSI encoder
  - Counter
  - Pulse train output
  - Weighing

Some application-specific modules (weighing, etc.) require the use of an Ethernet backplane.

If necessary, communication and network modules can be installed in the local rack. The majority of communication and network modules need to be in the local rack.

Local I/O architecture configuration rules

When configuring a local I/O architecture system, the following four parameters should be considered:
- Number of slots available in the eight local racks (main and expansion racks)
- Slots available for optional modules
- Power consumed by the installed modules
- Addressing words available for configuring the modules

Available slots and power consumption

The local I/O architecture can have a maximum of 126 available slots (with eight 16-slot racks) for I/O modules, application-specific modules, and communication modules.

These modules are powered from the power supply included in the rack.

For a valid configuration, simply add together the consumption (in mA) of the modules in the rack and check that the total current is less than that provided by the selected power supply.
This power consumption calculation can easily be performed using the online Modicon PLC Configurator or EcoStruxure Control Expert *(1)* software.

A protective cover **BMXXEM010** is also available to occupy unused slots.

Module addressing

With EcoStruxure Control Expert *(1)*, the I/O addressing is unlimited (physical limitation: 126 slots).

(1) Unity Pro software in earlier versions.

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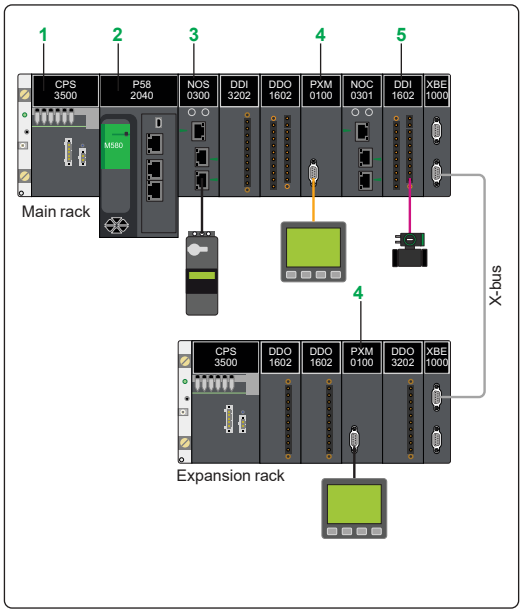
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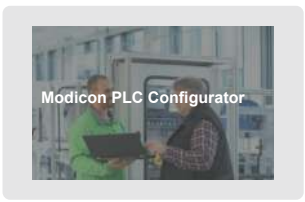
Modicon M580 automation platform

Architectures

Integrated fieldbus architecture



Integrated fieldbus architecture: devices distributed over fieldbuses



Use Modicon PLC Configurator for power consumption calculation

Presentation

The integrated fieldbus architecture is based on local I/O architecture with the possibility of adding fieldbuses such as AS-Interface, Modbus SL, HART, PROFIBUS, and CANopen.

This kind of architecture is used for control systems that are wired to the main control cabinet.

It consists of a mainly local topology with several peripherals distributed over fieldbuses.

The Modicon M580 automation platform provides interrupt services for this type of application.

Up to 126 slots are possible for I/O and communication modules in a configuration comprising a main rack and seven expansion racks, connected by **BMXXBE●00●** rack expansion modules.

Description

The Modicon M580 automation platform provides local I/O management for control systems that are wired to the main control cabinet.

The integrated fieldbus architecture can comprise a maximum of 10 I/O and communication modules in the main **BMEXBP●●00** rack, in addition to the CPU module **2** and the power supply module **1**. These local I/O and communication modules can be extended on expansion racks by using a **BMXXBE●00●** rack expansion module.

The choice of appropriate racks depends on the required number of modules for the system. Main racks are available in the following formats:
- With X-Bus backplanes, 4, 6, 8, 12, and 16 slots
- With Ethernet backplanes, 4, 8, and 12 slots

If necessary, communication and network modules can be installed in the main rack. The majority of communication and network modules need to be in the main rack.

As well as discrete and analog I/O modules, the following modules are available:

- Communication modules:
  - Serial link **3**
  - AS-Interface **4**
  - HART **5**
  - PROFIBUS DP
  - CANopen

Some communication modules (Modbus/TCP and EtherNet/IP network module, HART analog I/O modules, etc.) require the use of an Ethernet backplane.

Integrated fieldbus architecture configuration rules

When configuring an integrated fieldbus architecture system, the following four parameters should be considered:
- Number of slots available in the eight local racks
- Slots available for optional modules
- Power consumed by the installed modules
- Addressing words available for configuring the modules

Available slots and power consumption

The integrated fieldbus architecture can have a maximum of 126 available slots (with eight 16-slot racks) for I/O modules, application-specific modules, and communication modules.

These modules are powered from the power supply included in the rack.

For a valid configuration, simply add together the consumption (in mA) of the modules in the rack and check that the total current is less than that provided by the selected power supply.

This power consumption calculation can easily be performed using the online Modicon PLC Configurator or EcoStruxure Control Expert software.

A protective cover **BMXXEM010** is also available to occupy unused slots.

Module addressing

With EcoStruxure Control Expert *(1)*, the I/O addressing is unlimited (physical limitation: 126 slots).

(1) Unity Pro software in earlier versions.

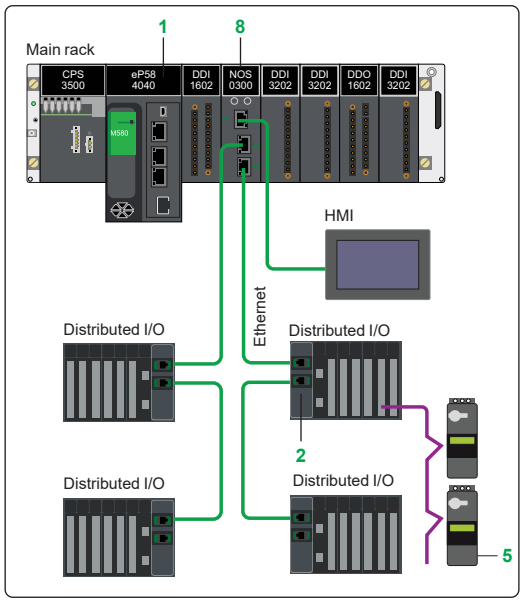
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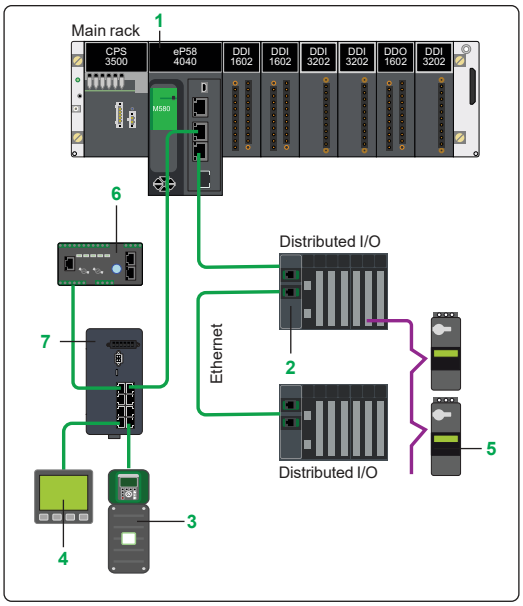
Modicon M580 automation platform

Architectures

Distributed I/O architecture



Distributed I/O architecture: devices distributed over Ethernet with BMENOS0300



Distributed I/O architecture: devices distributed over Ethernet with Modicon switch

Presentation

The distributed I/O architecture consists of I/O and devices distributed over Ethernet (DIO).

The Ethernet DIO devices can be connected to Ethernet ports of the **BMEP58●0●0** CPU **1** or a Modicon DRS (dual ring switch).

The available Ethernet DIO devices are:
- Modicon distributed I/O **2**
- Altivar Process variable speed drive **3**
- Energy supervision **4** and HMI
- Tesys U **5** connected via CANopen to a Modicon Edge I/O NTS and Tesys T/ Tesys Island **6** motor protection, etc.

Modbus serial link devices can be integrated in the distributed I/O architecture via the **BMXNOM0200** serial link module.

High availability and expanded integration capacity

The distributed I/O architecture can use the embedded switching module or the external switches to expand the integration capacity.

The **BMENOS0300** Ethernet switch module **8** can be installed on a local or remote **BMEXBP●●●●** Ethernet main rack in the Modicon M580 platform. The external Modicon switch **7** *(1)* can be loaded with 15 predefined configurations to simplify their implementation.

The use of these switches provides enhanced capacity for integrating the following devices:
- DIO sub-rings
- DIO clouds

The advantages of this architecture are:
- High availability of the Ethernet DIO devices

Maximum distance between each Modicon managed switch:
- 100 m/*328 ft* with copper medium
- 2 km/*1.25 mi* with multimode optical fiber medium
- 16 km/*9.94 mi* with single-mode optical fiber medium

(1) Supported Modicon switches: **MCSESM083F23F1**, **MCSESM103F2CU1**, *and* **MCSESM103F2CS1**.

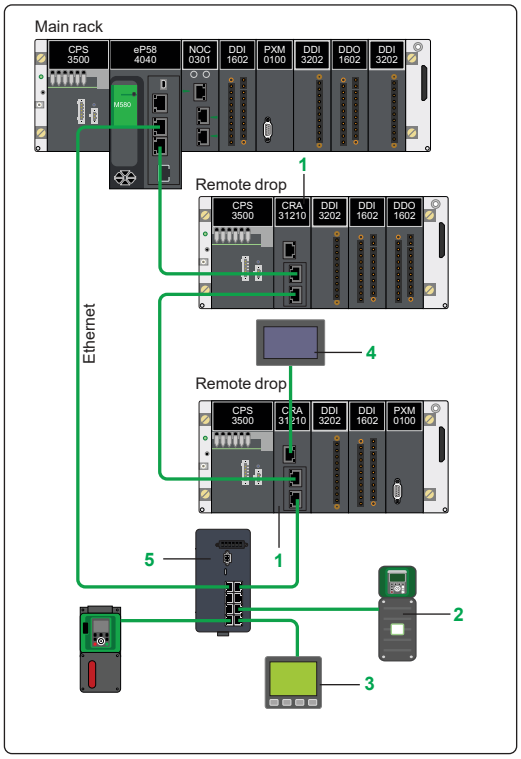
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Architectures

Remote I/O architecture



Remote I/O architecture: devices on remote I/O



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Presentation

The remote I/O architecture consists of remote I/O and remote functions (including fieldbus masters). This type of architecture is fully compatible with the references in the Modicon M580 automation platform and Modicon X80 module platform offers.

A maximum of 8, 16, or 31 RIO drops **1** made of Modicon X80 I/O modules can be supported in a remote I/O architecture system, depending on the CPU level.

It is possible to include DIO devices in a remote I/O architecture via the Service port of the CPU or the **BMECRA31210** drop adapter **1**, via a **BMENOS0300** network option switch, or via a Modicon switch **5**.

Some available Ethernet DIO devices:
- Altivar Process variable speed drive **2**
- Energy supervision **3** and HMI **4**
- Tesys T motor protection, etc.

Rack Viewer function

The Rack Viewer function provides access to Ethernet RIO data via a Web browser.

Predefined configurations for Modicon managed switches

The use of Modicon managed switches specifically for Modicon M580 architectures is simplified using 15 predefined configuration files.

Standard remote I/O architecture

This is composed of a daisy chain loop consisting of a Modicon M580 main rack and several Modicon X80 I/O drops containing an Ethernet drop adapter:
- **BMECRA31210** Modicon X80 remote I/O performance adapter, with Service port
- **BMXCRA31210** Modicon X80 remote I/O drop adapter, with Service port
- **BMXCRA31200** Modicon X80 remote I/O drop adapter, without Service port

Long distance remote I/O architecture

Similar to the standard remote I/O architecture, this variant comprises one or more remotely located Modicon X80 I/O drops connected via integrated NRP fiber converter modules.

There are two types of NRP fiber converter modules:
- **BMXNRP0200**: multimode fiber converter module (remote location up to 2 km/*1.25 mi*)
- **BMXNRP0201**: single-mode fiber converter module (remote location up to 16 km/*9.94 mi*)

The NRP repeaters are linked to CRA drop adapters by means of Ethernet Interlink cables.

High availability and expanded integration capacity

The remote I/O architecture can use the embedded switching module or the external switches to expand the integration capacity.

The **BMENOS0300** Ethernet switch module can be installed on a local or remote **BMEXBP●●●●** Ethernet main rack in the Modicon M580 platform. The external Modicon DRSs *(1)* can be loaded with 20 predefined configurations to simplify their implementation.

The use of these switches provides enhanced capacity for integrating the following devices:
- RIO sub-rings
- Fiber optic media for long distance remote location, etc.
- DIO integration in remote I/O architectures

The advantages of this architecture are:
- Reduced wiring costs
- Deterministic data exchanges between the PLC and the EIO devices
- Secondary rings can be linked to the main ring by two DRSs, which improve availability

Maximum distance between each Modicon managed switch:
- 100 m/*328 ft* with copper (twisted pair) medium
- 2 km/*1.25 mi* with multimode optical fiber medium
- 16 km/*9.94 mi* with single-mode optical fiber medium

(1) Supported Modicon switches: **MCSESM083F23F1**, **MCSESM103F2CU1**, *and* **MCSESM103F2CS1**.

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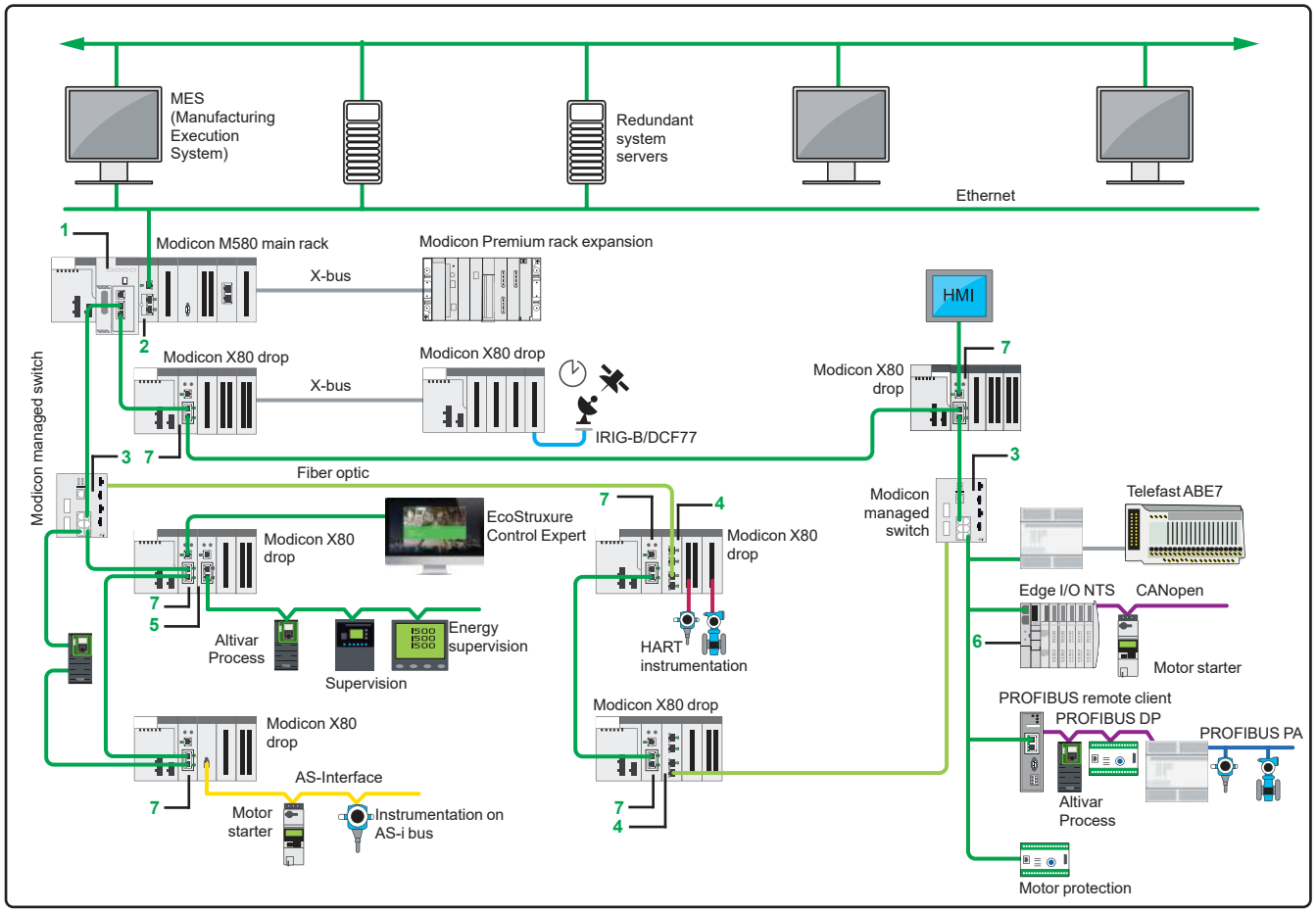
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Example of a complex standard architecture

The complex architecture below illustrates the extensive possibilities of the Modicon M580 offer:

- A choice between nine **BMEP58●0●0** CPUs **1**
- Easy integration of the I/O network with supervisors in the control network, due to the **BMENOC03●●** Ethernet module **2**
- Optimized wiring with RIO and DIO control via a single medium: the DIO are controlled via the CPU
- High availability of secondary rings with Modicon managed switches **3**
- Long distance optimized by the fiber optic converter **4** installed directly in the Modicon X80 rack
- Simplified integration of devices via a serial link **5** (for example, power meter, variable speed drive, motor starters, protection relays, etc.); FTD/DTM technology makes it possible to configure and debug devices transparently via the Ethernet network, from any supervisor
- Great flexibility due to integration of DIO devices **6** or other diagnostic/configuration tools on any drop Service port or on the DIO port of a managed switch
- Easy integration of Modicon X80 I/O drops on Ethernet with **BMECRA31210** drop adapters **7**



Example of a complex architecture

6

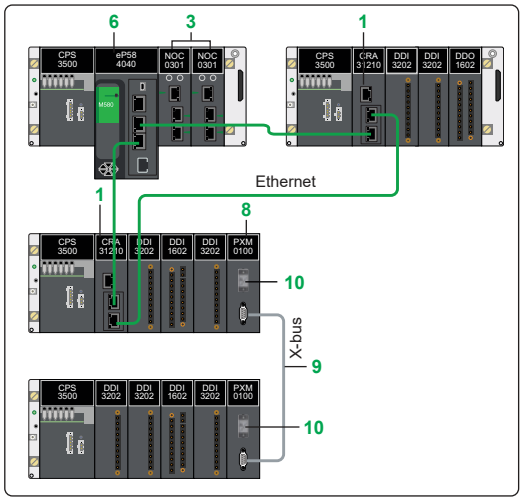
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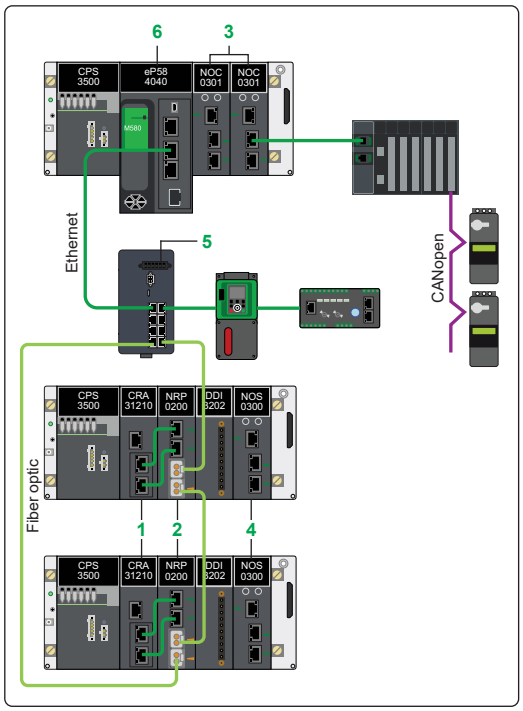
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Local I/O architecture + remote I/O architecture



Distributed I/O architecture + remote I/O architecture (with BMENOS Modicon X80 Ethernet switch module)

References *(1)*

Ethernet head and drop adapters *(2)*

Description	Service port	Item *(3)*	Reference	Weight kg/*lb*
Modicon X80 EIO drop adapter Provide 1 module per Modicon X80 EIO drop	–	1	BMXCRA31200	0.200/ *0.441*
	1	1	BMXCRA31210 *(4)*	0.234/ *0.516*
	1	1	BMECRA31210 *(4)*	0.234/ *0.516*

Modicon X80 Ethernet RIO fiber converter modules *(2)*

Description	Optical fiber	Item *(3)*	Reference	Weight kg/*lb*
Modicon X80 Ethernet converter modules	Multimode	2	BMXNRP0200	0.203/ *0.448*
	Single-mode	2	BMXNRP0201	0.203/ *0.448*

EIA/TIA 568 shielded twisted pair cables for CE market

Description	Connectors	Type	Length m/*ft*	Reference	Weight kg/*lb*
Straight-through copper cables CE compatible	2x RJ45 connectors for connection to terminal equipment (DTE)	Standard	2/*6.56*	490NTW00002	–
			5/*16.40*	490NTW00005	–
			12/*39.37*	490NTW00012	–
		Rugged	1/*3.28*	TCSECE3M3M1S4	–
			2/*6.56*	TCSECE3M3M2S4	–
			3/*9.84*	TCSECE3M3M3S4	–
			5/*16.40*	TCSECE3M3M5S4	–
			10/*32.81*	TCSECE3M3M10S4	–

EIA/TIA 568 shielded twisted pair cables for UL market

Description	Connectors	Type	Length m/*ft*	Reference	Weight kg/*lb*
Straight-through copper cables UL compatible	2x RJ45 connectors for connection to terminal equipment (DTE)	Standard	2/6.56	490NTW00002U	–
			5/*16.40*	490NTW00005U	–
			12/*39.37*	490NTW00012U	–
		Rugged	1/*3.28*	TCSECU3M3M1S4	–
			2/*6.56*	TCSECU3M3M2S4	–
			3/*9.84*	TCSECU3M3M3S4	–
			5/*16.40*	TCSECU3M3M5S4	–

Ethernet communication modules *(2)*

Description	Item *(3)*	Reference	Weight kg/*lb*
Modicon X80 EtherNet/IP, Modbus/TCP network module	3	BMENOC0301	0.200/ *0.441*
Modicon X80 FactoryCast network module	3	BMENOC0311	0.200/ *0.441*
Modicon X80 embedded router network module	3	BMENOC0321	0.200/ *0.441*
Modicon M580 performance EtherNet/IP and Modbus/TCP network module	3	BMENOC0302	0.393/ *0.866*

Ethernet switch

Description	Service port	Device network port (Ethernet)	Item *(3)*	Reference	Weight kg/*lb*
Modicon X80 Ethernet switch module	1	2	4	BMENOS0300	–

(1) For additional characteristics, see our website.
(2) Requires EcoStruxure Control Expert or Unity Pro Extra Large software ≥ V8.0 (see page 6/16).
*(3) For items **5** to **9**, see page 6/15.*

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References (continued) (1)

Dedicated Modicon managed switches (4)

Copper port	Multimode fiber optic port	Single-mode fiber optic port	Item (2)	Reference (3)	Weight kg/lb
RJ45 shielded connectors	Duplex SC connectors				
8 x 10/100 BASE-TX ports	–	–	–	MCSESM083F23F1	0.420/ 0.925
8 x 10/100 BASE-TX ports	2 x 10/100 BASE-FX ports	–	5	MCSESM103F2CU1	0.500/ 1.102
	–	2 x 10/100 BASE-FX ports	5	MCSESM103F2CS1	0.500/ 1.102

Modicon M580 processors (2)

I/O capacity	Device ports	Service port	Item (2)	Reference	Weight kg/lb
1,024 discrete I/O **256 analog I/O** **36 application-specific channels** 4 MB integrated (memory program)	2 DIO	1	6	BMEP581020	–
2,048 discrete I/O **512 analog I/O** **72 application-specific channels** 8 MB integrated (memory program)	2 DIO	1	6	BMEP582020	–
	2 RIO	1	6	BMEP582040	–
3,072 discrete I/O **768 analog I/O** **108 application-specific channels** 12 MB integrated (memory program)	2 DIO	1	6	BMEP583020	–
	2 RIO	1	6	BMEP583040	–
4,096 discrete I/O **1,024 analog I/O** **144 application-specific channels** 16 MB integrated (memory program)	2 DIO	1	6	BMEP584020	–
	2 RIO	1	6	BMEP584040	–

Rack expansion for Modicon X80 drop

Description	Item (2)	Reference	Weight kg/lb
Modicon X80 rack expansion module Standard module for mounting in each rack (XBE slot) allowing the interconnection of two racks max.	8	BMXXBE1000	0.178/ 0.392
Modicon X80 rack expansion kit Complete kit for 2-rack configuration comprising: - Two BMXXBE1000 rack expansion modules - One BMXXBC008K extension cordset, length 0.8 m/2.63 ft - One TSXTLYEX line terminator (pack of 2)	 8 9 10	BMXXBE2005	0.700/ 1.543

Cordsets and accessories

Description	Type of connector	Length m/ft	Item (2)	Reference	Weight kg/lb
X-bus preformed extension cordsets with two 9-pin SUB-D connectors	Elbowed	0.8/2.63	9	BMXXBC008K	0.165/ 0.364
		1.5/4.92	9	BMXXBC015K	0.250/ 0.551
		3/9.84	9	BMXXBC030K	0.420/ 0.926
		5/16.4	9	BMXXBC050K	0.650/ 1.433
		12/39	9	BMXXBC120K	1.440/ 3.175

Description	Use	Item (2)	Reference	Weight kg/lb
Line terminator 2x 9-way SUB-D connectors marked A/ and /B **(Sold in lots of 2)**	Required on the two BM●XBP●●●0 modules located at either end of the daisy chain 2	10	TSXTLYEX	0.050/ 0.110

(1) For additional characteristics, see our website.
(2) For items 1 to 4, see page 6/14.
(3) Conformal coating and extended temperature version for harsh environments. In this case, add the letter "H" to the end of the reference.
(4) Modicon managed switches validated for Modicon M580 architectures.

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Requirements for a Modicon M580 Ethernet I/O architecture (1)

The table below gives the minimum hardware and software requirements for setting up a Modicon M580 I/O architecture.

Description of the hardware or software required	Reference	Version	Item (2)
Unity Pro Extra Large software	UNISPUEF•CD80	≥ 8.0	–
Modicon X80 remote I/O drop adapter	BMECRA31210	≥ 2.0	1
	BMXCRA31200	≥ 2.0	1
	BMXCRA31210	≥ 2.0	1
Modicon X80 fiber converter modules	BMXNRP0200	–	2
	BMXNRP0201	–	2
Modicon managed switches	MCSESM083F23F1	Firmware ≥ 6.0	4
	MCSESM103F2CU1	Firmware ≥ 6.0	4
	MCSESM103F2CS1	Firmware ≥ 6.0	4
M580 CPUs	BMEP581020	Firmware ≥ 1.0	5
	BMEP582020	Firmware ≥ 1.0	5
	BMEP582040	Firmware ≥ 1.0	5
	BMEP583020	Firmware ≥ 1.0	5
	BMEP583040	Firmware ≥ 1.0	5
	BMEP584020	Firmware ≥ 1.0	5
	BMEP584040	Firmware ≥ 1.0	5
	BMEP585040	Firmware ≥ 1.0	5
	BMEP586040	Firmware ≥ 1.0	5

(1) For additional characteristics, see our website.

*(2) For items **1** to **4**, see page 6/14 and for items **5**, see page 6/15.*

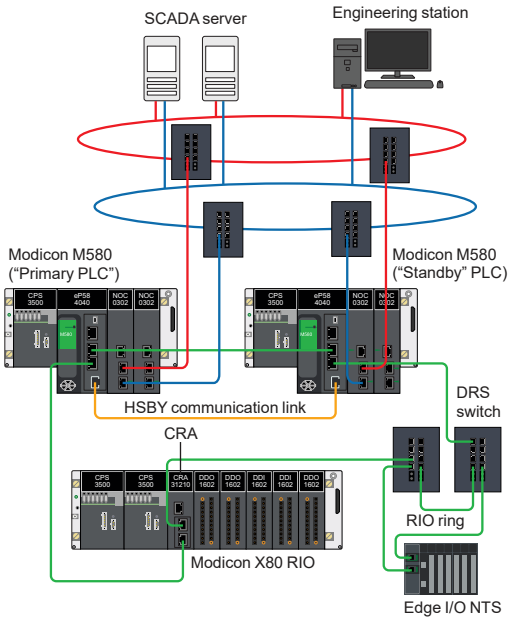
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High-availability system based on mixed DIO/RIO architectures

Types of high-availability architecture

The EcoStruxure Modicon PAC high-availability system is used for more demanding applications in terms of the availability of their control/command system where no interruption of the process can be tolerated.

By minimizing process downtime, the high-availability system with EcoStruxure Control Expert *(2)* software increases productivity.

High-availability system based on Ethernet DIO architecture

In a Hot Standby topology based on Ethernet DIO architecture, devices are linked to distributed I/O over Ethernet. This high-availability system requires one Modicon M580 Ethernet module **BMENOC03●1,** or if less than 61 DIO, one Modicon X80 **BMENOS0300** in each Primary and Standby PLC using distributed devices. The changeover from Primary to Standby processor might not be bumpless depending on the type of DIO used.

Please contact our Customer Care Center for more information.

High-availability system based on Ethernet RIO architecture

In a Hot Standby topology based on an Ethernet RIO architecture, devices are hardwired on remote I/O over Ethernet. This high-availability system is used for sensitive processes that require an I/O control takeover time within the region of the PLC scan time.

As the Ethernet RIO drops are synchronized with the PLC CPU scan time, the CPU changeover is carried out smoothly at the outputs, i.e. it is bumpless.

Due to the built-in Ethernet technology of Modicon M580 controllers, the remote I/O architecture is simple to realize. There is no need to insert an Ethernet head adapter module in both the Primary PLC and the Standby PLC. The capacity of Modicon X80 I/O drops depends on the CRA Ethernet drop adapter used.

A maximum of 31 RIO drops can be supported in a high-availability remote I/O architecture. Automatic switching of the IP address of these modules helps to ensure transparent addressing to SCADA, even in the event of a CPU changeover.

High-availability system based on mixed DIO/RIO architectures

In a Hot Standby topology based on mixed DIO/RIO architectures, RIO and distributed equipment are integrated on the same physical network. This system features an optimized wiring with RIO and DIO control via a single medium: the DIO are controlled via the CPU.

Very high-availability system based on PRP protocol

With PRP protocol implementation, Modicon M580 high-availability system gains even more redundancy capabilities as PRP protocol allows duplicate communication between the redundant PLCs and remote I/Os through PRP-LAN A and PRP-LAN B dual networks.

Components of a high-availability system *(1)*

A high-availability (HSBY) system is based on global redundancy of control equipment and network. In case of a shortcoming happening on one control equipment or network, the alternative equipment or network takes over in order to avoid process downtime.

Modicon range offer comprises a large choice of devices and modules specifically designed for redundancy purposes:

- Modicon M580 redundant processors
- Modicon M580 Ethernet Network modules
- Modicon X80 redundant power supplies
- Modicon X80 backplanes dedicated to redundant power supplies
- Modicon X80 I/O expansion modules
- Modicon switches



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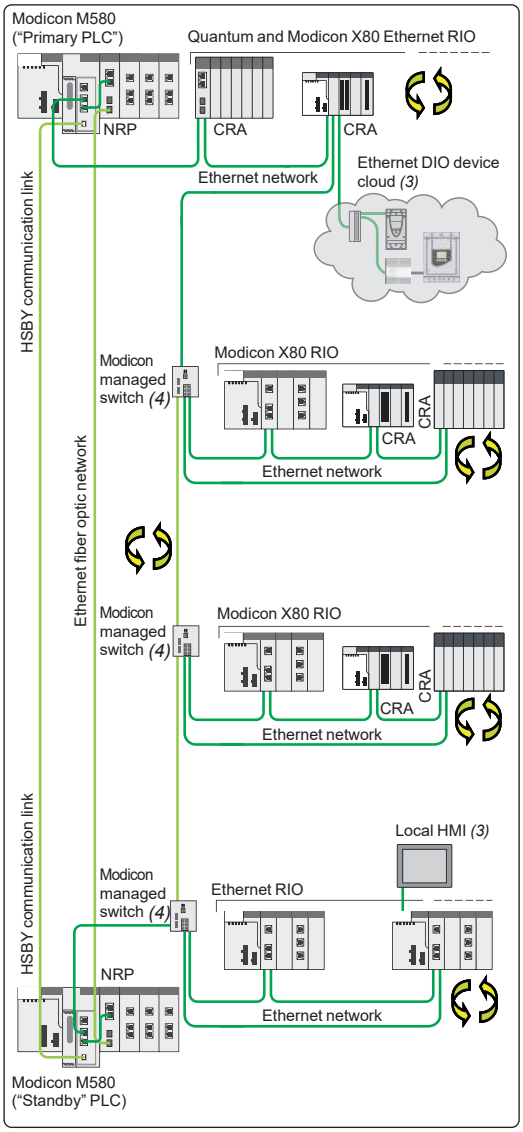
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(1) Requires EcoStruxure Control Expert or Unity Pro Extra Large software ≥ V11.0.

Modicon M580 automation platform

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Modicon M580 Hot Standby Ethernet I/O architecture, long distance

Components of a high-availability system *(continued)*

Modicon M580 redundant processors

At the heart of a high-availability architecture are two PLC racks ("Primary" and "Standby") with identical hardware configurations, based on **BMEH58●●40** redundant CPUs connected via a high-speed (1 Gbps) communication link. The volume of data exchanged between the Primary and Standby PLCs can reach 4 MB depending on the CPU.

- The Primary PLC executes the application program and controls the I/O located in the X80 drops (redundant processors do not support local I/O).
- The Standby PLC remains in the background.

In the event of a detected error affecting the Primary PLC, the Standby system switches over automatically, changing over execution of the application program and control of the I/O to the Standby PLC with an up-to-date data context. Once the changeover is complete, the Standby PLC becomes the Primary PLC while the former Primary PLC is being cleared from the detected error: when clearance is done, the PLC reconnects to the standby system and acts as the Standby PLC. The changeover is performed smoothly at the outputs and is completely transparent to the process.

In addition to the HSBY communication link, Primary and Standby PLCS may also be connected to each other by an Ethernet link providing a redundant path, thus constituting a main ring that enhances PLC availability.

See page 2/8 for more details about redundant processors.

Modicon X80 redundant power supplies and compatible backplanes

For high-availability applications, two **BMXCPS●●02** redundant power supplies can be used on the same rack to help ensure continuity of the power supply. They are supported by a 6-slot **BMEXBP0602** backplane and a 10-slot **BMEXBP1002** backplane equipped with dual slots marked CPS1 and CPS2. The power supply is initially set as Primary on the CPS1 slot and Standby on the CPS2 slot. When power stops being supplied in accordance with the expected rate, they switch roles so that power can be continuously delivered.

See the Modicon X80 catalog for more details.

Redundant network equipment

Redundant CPUs feature a specific slot on the front panel for an SFP socket supporting the HSBY communication link between them. Depending on the distance between the Primary and Standby PLC, SFP transceivers can be connected via copper or fiber optic cable, the latter requiring a fiber optic converter module installed on the rack (NRP fiber optic converter).

Modicon M580 communication modules

A high-availability architecture may require the use of one or several Modicon M580 communication modules:

- **BMENOC0301, BMENOC0302** or **BMENOC0311** Ethernet communication module:
  - to connect the Primary and Standby PLCs to each other and create the Ethernet link
  - to connect an Ethernet network to the Ethernet backplane of the local rack
  - to attach a DIO ring to the main ring (up to 128 distributed devices)
  - to scan distributed equipment
- **BMENOC0321** Ethernet communication module (on local rack):
  - to create a redundant control network link between the two PLCs
  - to create transparency between the device network and the control network
- **BMENOP0300** communication module for supporting IEC 61850 communication
- **BMENOR2200H** communication module (in Primary and Standby racks) for supporting IEC 60870-5-101/104 or DNP communication
- **BMENUA0100** communication module to implement OPC UA communication protocol for:
  - Primary PLC-to-Standby PLC communication
  - SCADA-to-PLC communication
  - PLC-to-device communication

Modicon M580 automation platform

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Components of a high-availability system *(continued)*

Modicon X80 communication modules

A high-availability architecture may require the use of one or several Modicon X80 communication modules:

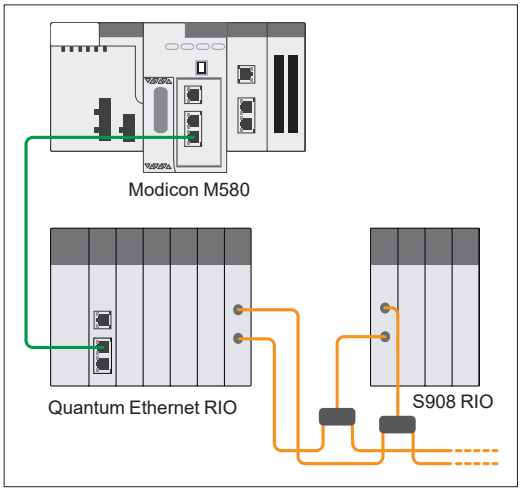
- ■ **BMENOS0300** network option switch:
  - □ to connect the Primary and Standby PLCs to each other and create the redundant Ethernet link
  - □ to connect an Ethernet network to the Ethernet backplane of the local rack
  - □ to attach a DIO ring to the main ring (up to 64 distributed devices)
- ■ **BMXNRP0201** fiber converter module:
  - □ to connect the Primary and Standby PLCs to each other and create the redundant Ethernet link through fiber optic cabling (for long-distance system)
- ■ **BMXNOE0100** module for Ethernet Modbus TCP (requires **BMXPRA0100** adapter)

Modicon X80 I/O expansion modules

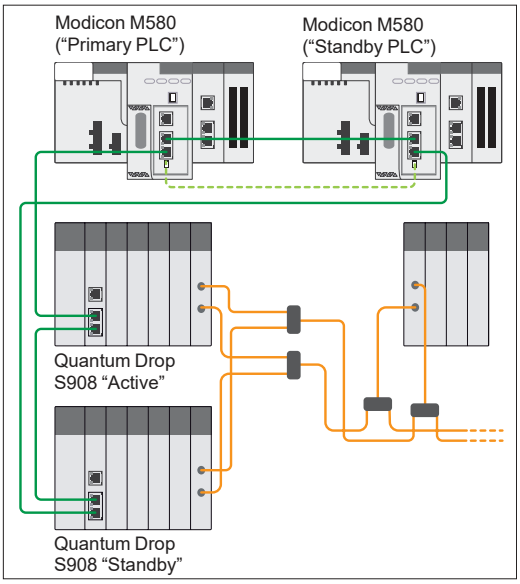
In a high availability system, the **BM●CRA31210** I/O expansion module is used for:

- ■ connecting distributed devices (via the Service port) to a Modicon X80 RIO drop
- ■ forwarding messages to the CPUs, including Modbus messages received by the **BMXNOM0200** module
- ■ time-stamping at source of any discrete I/O signal located in the drop with a resolution of 10 ms (NTP protocol); for a faster time-stamping performance (1 ms), the **BMXERT1604T** module may be used either in an RIO drop or in a local rack equipped with a **BM●CRA31210** module (see time-stamping performance comparison table below)

In addition to performing these tasks, Modicon X80 RIO Drop redundant communication adapter **BMECRA31310** is used when the system is based on a PRP network in a very high availability system. See example page 6/21.



Standalone architecture example



High availability architecture example

Topologies

Compatible with standalone architecture

Like the Quantum Ethernet drop adapter, **140CRA31200**, the Quantum S908 RIO adapter, **140CRA31908**, supports the same Quantum I/O and catalog as the Quantum Unity system. In addition, use of the **140CRA31908** adapter removes the need for a Quantum processor in the local rack, which is the principle behind the first step of modernizing the Quantum system.

Modernization of an S908-based architecture without rewiring the coaxial bus and I/O cabling involves four simple steps. By removing the Quantum processor from the local rack, and inserting a **140CRA31908** adapter instead, the S908 bus I/O is then ready for connection to the M580 platform. In terms of software conversion, applications can be easily migrated using advanced converter tools.

The Quantum Ethernet scanners (140NOE●●●●●/140NOC●●●●●) are replaced by the embedded scanner services in the M580 processor, or extra BMENOC scanners integrated in the M580 platform.

Compatible with high availability architecture

In high-availability architectures, redundancy is achieved by replacing the 2 Quantum HotStandby processors with 2 Quantum S908 RIO adapters on the local rack, and then connecting the adapters to the M580 high-availability processor.

Similar to the concept of “Primary” and “Standby” PLCs, each CRA will have either the role of Active S908 master or Standby.

The “Active CRA” controls the S908 bus master, and is scanned by M580 processor. S908 outputs can be applied and mapped in the “Primary PLC”.
The “Standby CRA” is in listen-only mode on the S908 bus, and is scanned implicitly by the M580 processor, but S908 I/O states are not visible from the application.

The Standby CRA will assume control automatically without any user programming whenever one of the following events appears:

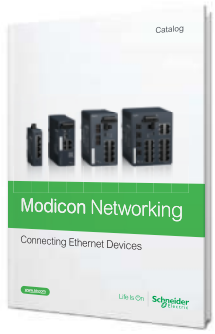
- ■ CRA no longer seen by CPU (both Ethernet cables broken)
- ■ Drop power supply error detected
- ■ CRA31908 hardware error detected
- ■ CRP hardware error detected
- ■ S908 bus no longer seen by active CRP (both S908 coaxial cables broken)

The system is independent from the M580 redundancy states.

Modicon M580 automation platform

Architectures

High-availability architectures



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Modicon Switches

- Modicon extended managed switches **MCSESM●●●●●●●1** are used to isolate dual networks from each other and to expand the system including Modicon X80 RIO drops, secondary rings, Ethernet DIO device cloud, or distributed equipment, while keeping the redundant network available, thanks to the switch management capabilities and multiple connection ports.
- Modicon Redundancy switches **MCSESR●●●●●●●●** connect Modicon M580 CPUs RIO network (RSTP) to Redundant RIO network (PRP)

Refer to the Modicon Networking catalog for more details.

Time-stamping performance

Performance	Event source module	Value
Between two identical source modules in the same rack	**BMXERT1604T**	1.6 < resolution < 3.3 ms
	BM●CRA31210	10 ms
Between two different inputs in the same source module	**BMXERT1604T**	1 ms
	BM●CRA31210	1 scan
Maximum number of events scanned	**BMXERT1604T**	400 events *(1)*
	BM●CRA31210	2,048 events *(1)*
Maximum number of I/O and memory available	**BMXERT1604T**	16 discrete inputs on module
		512 events in internal buffer
	BM●CRA31210	256 discrete I/O configured
		4,000 events in internal buffer
Maximum number of source modules in an Ethernet remote drop	**BM●CRA31210**	1 per drop
	BMXERT●●●●	9 per drop
Maximum number of event sources controlled	**BMXERT●●●●**	500 sources per second *(1)*

(1) This maximum value is not an absolute value. It depends on the overall system dynamics (total number of scanned items and number of events generated by the system).

Modicon M580 automation platform

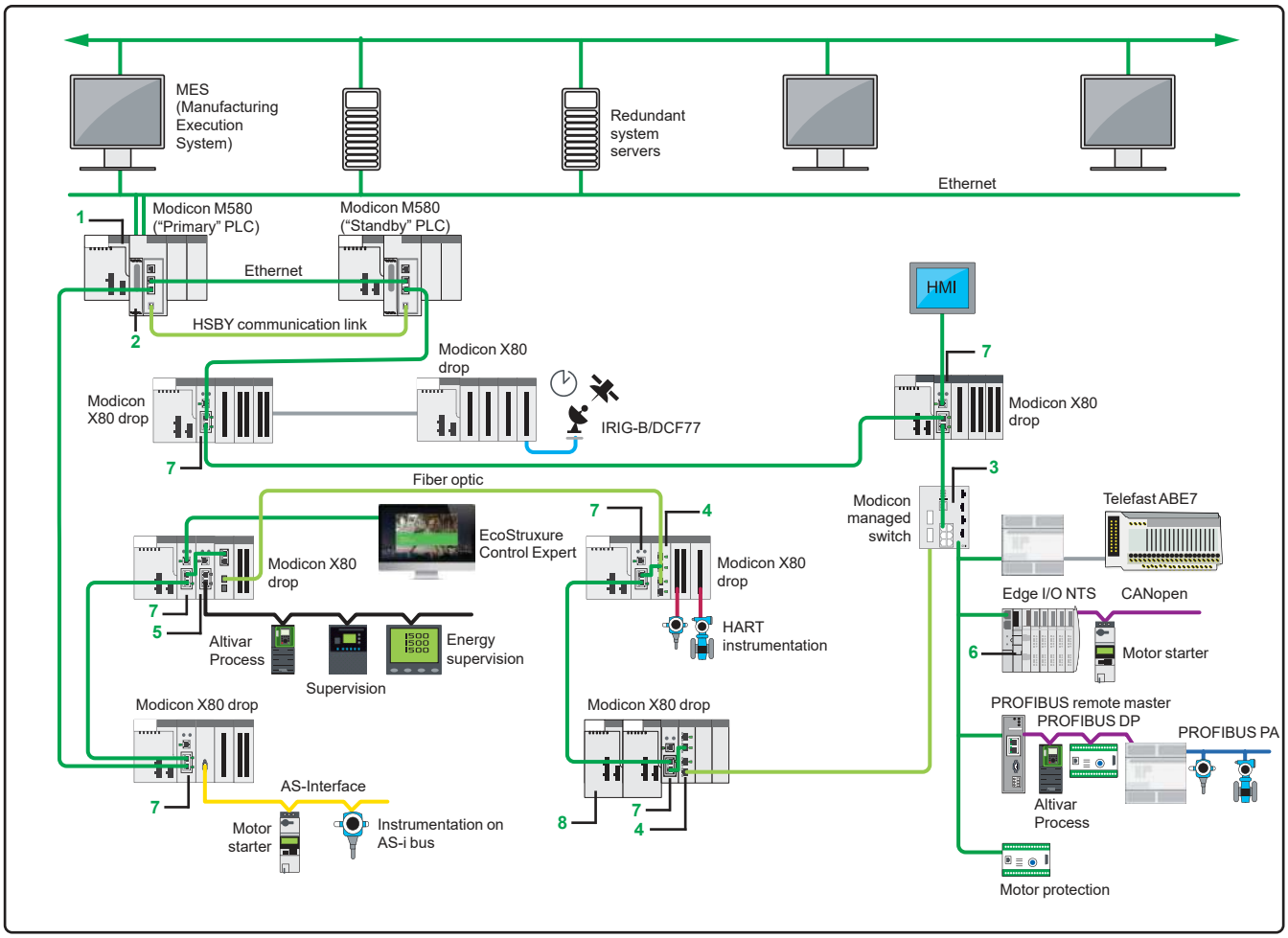
Architectures

High-availability architectures

Example of a complex high-availability architecture

The complex architecture below illustrates the extensive possibilities of the Modicon M580 offer in terms of mixed RIO and DIO networks:

- A choice between three **BMEH58●040** Modicon M580 redundant CPUs 1
- Easy integration of the I/O network with supervisors in the control network, due to the **BMENOC03●●** Ethernet module 2
- Optimized wiring with RIO and DIO control via a single medium: the DIO are controlled via the CPU
- High availability of secondary rings with Modicon extended managed switches 3
- Long distance optimized by the fiber optic converter 4 installed directly in the Modicon X80 rack
- Simplified integration of devices via a serial link 5 (for example, power meter, variable speed drive, motor starters, protection relays, etc.); FTD/DTM technology makes it possible to configure and debug devices transparently via the Ethernet network, from any supervisor
- Great flexibility due to integration of DIO devices 6 or other diagnostic/configuration tools on any drop Service port or on the DIO port of a managed switch
- Easy integration of Modicon X80 I/O drops on Ethernet with **BMECRA31210** drop adapters 7
- The redundant power supplies are compatible with both single power supply racks for standard applications, and the dual power supply racks are compatible with high-availability applications 8



Example of a complex high-availability architecture

6

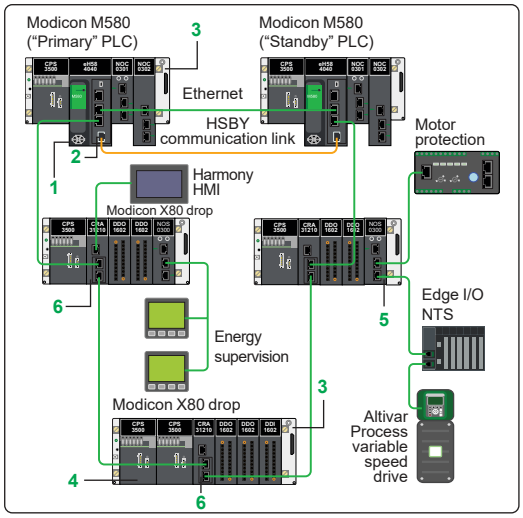
Processors:
page 2/2

Modicon M580 modules for severe environments:
page 7/2

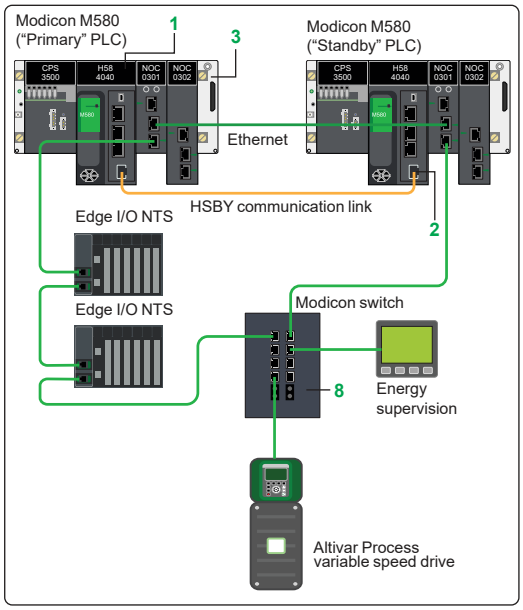
Modicon M580 automation platform

Architectures

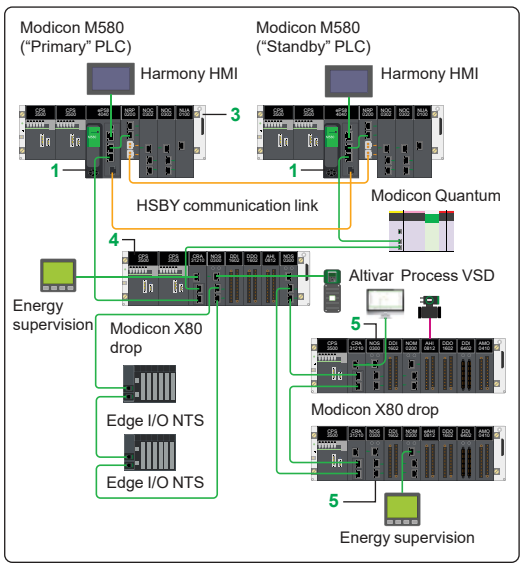
High and very high-availability architectures



Remote I/O architecture



Distributed I/O architecture



Mixed remote and distributed I/O architecture

References *(1)*

Modicon M580 redundant processors *(2)*

Memory capacity	Device ports	Service port	Item *(3)*	Reference	Weight kg/*lb*
8 MB integrated (memory program)	2 RIO	1	1	BMEH582040	0.849/ *1.872*
16 MB integrated (memory program)	2 RIO	1	1	BMEH584040	0.849/ *1.872*
64 MB integrated (memory program)	2 RIO	1	1	BMEH586040	0.849/ *1.872*

Modicon M580 redundant processor kits

Description	Composition	Item *(3)*	Reference	Weight kg/*lb*
M580 redundant processor kit	- 2 Modicon M580 **BMEH582020** redundant processors - 2 RJ45 SFP sockets **490NAC0100**	1	BMEH582040K	–
	- 2 Modicon M580 **BMEH584020** redundant processors - 2 RJ45 SFP sockets **490NAC010**	1	BMEH584040K	–

Accessories

Description	Use	Cable medium	Item *(3)*	Reference	Weight kg/*lb*
HSBY link SFP socket (one reference for one socket)	To be inserted in pair in 2 **BMEH58●●40** redundant processors for short distance	RJ45 copper	2	490NAC0100	–
	To be inserted in pair in 2 **BMEH58●●40** redundant processors for long distance	Single-mode fiber	2	490NAC0201	–

Ethernet + X-bus dual power supply racks

Description	Type of module to be inserted	Connectors Ether-net	Connectors X-bus	Power consump-tion	Item *(3)*	Reference	Weight kg/*lb*
6-slot Ethernet + X-bus dual power supply backplane	**BMXCPS4002●** redundant power supply, **BMEP58/BMEH58** processor, I/O modules, communication modules, and application-specific modules (counter, motion control, and serial)	4	6	3.9 W	3	BMEXBP0602	1.377/ *3.036*
10-slot Ethernet + X-bus dual power supply backplane		8	10	3.9 W	3	BMEXBP1002	1.377/ *3.036*

Redundancy power supplies

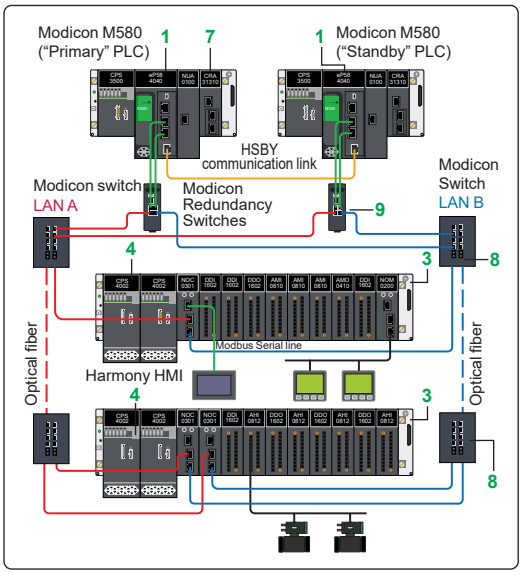
Line supply	Available power 3.3 V ⎓ *(3)*	Available power 24 V ⎓ *(3)*	Total	Nominal current 24 V ⎓ rack	Item *(3)*	Reference	Weight kg/*lb*
100...240 V ∼	18 W	40 W	40 W	1.67 A	4	BMXCPS4002	0.360/ *0.794*
100...240 V ∼	18 W	40 W	40 W	1.67 A	4	BMXCPS4002H	0.360/ *0.794*

(1) For additional characteristics, see our website.
(2) For additional characteristics, refer to our redundant processors selection guide page 2/4.
(3) *For items **5** to **9**, see page 6/23.*

Modicon M580 automation platform

Architectures

High and very high-availability architectures



High-availability redundant architecture



BMECRA31310



MCSESR043F2LM0



DIA6ED2131203EN



DIA6ED2140903EN

References

Ethernet switch module *(1)*

Description	Device ports	Service port	Item *(3)*	Reference	Weight kg/*lb*
Ethernet switch module	2 for Ethernet/IP device network	1	5	BMENOS0300	–

I/O expansion modules *(1)*

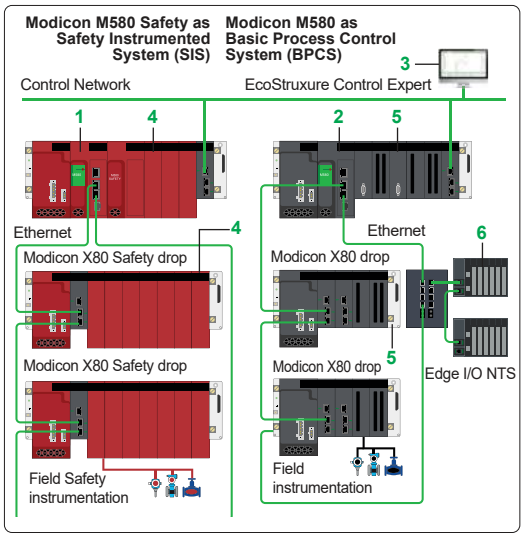
Description	Device ports	Service port	Item *(3)*	Reference	Weight kg/*lb*
RIO drop adapter	2 for Ethernet RIO network (RSTP)	1	6	BMECRA31210	0.22/ *0.496*
RIO drop redundant communication adapter	2 ports: - 1 for Ethernet Redundant RIO Network (PRP Lan A) - 1 for Ethernet Redundant RIO Network (PRP Lan B)	1	7	BMECRA31310	*0.39/ 0.873*

Modicon Switch *(2)*

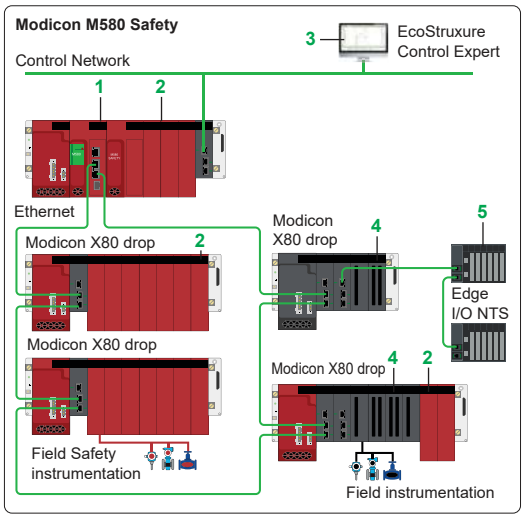
Description	Device ports	Item *(3)*	Reference	Weight kg/*lb*
Modicon Extended Managed Switch	8 ports for copper	8	MCSESM083F23F1	0.42/ *0.925*
	8 ports for copper 2 ports for fiber optic (MM)	8	MCSESM103F2CU1	0.50/ *1.102*
	8 ports for copper 2 ports for fiber optic (SM)	8	MCSESM103F2CS1	0.50/ *1.102*
Modicon Redundancy Switch *(2)*	4 ports for copper	9	MCSESR043F23F0	0.290/ *0.639*
	2 ports for copper 2 ports for fiber optic	9	MCSESR043F2LM0	0.290/ *0.639*

(1) For additional characteristics, see the Modicon X80 catalog.
(2) For additional characteristics, see the Modicon Networking catalog.
(3) *For items **1** to **4**, see page 6/22.*

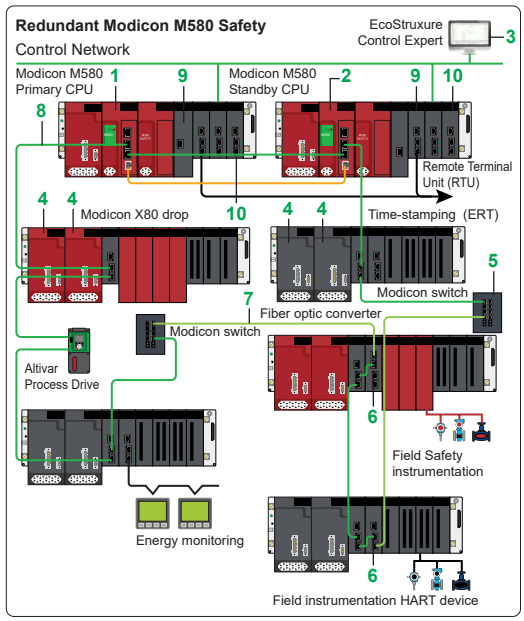
Modicon M580 automation platform
Safety architectures



Integrated Safety architecture



Common Safety architecture



High-availability Safety architecture

Types of Modicon M580 Safety architecture

Integrated Safety architecture

This architecture is based on a Modicon M580 Safety PAC **1** monitoring Safety Instrumented Functions with Modicon X80 Safety I/O **4** and a Modicon M580 PAC **2** operating the process with Modicon X80 **5** and Edge IO NTS **6**. Both PACs are engineered with EcoStruxure Control Expert **3**.

The Modicon M580 Safety PAC inherits all the Modicon M580 characteristics in terms of features, performance, and architecture.

This integrated solution is most useful for medium to large architectures, or if a physical separation is required between the Basic Process Control System (BPCS) and the Safety Integrity System (SIS).

Common Safety architecture

This architecture is based on a single Modicon M580 Safety PAC **1** monitoring Safety Instrumented Functions with Modicon X80 Safety I/O **2** and operating the process with Modicon X80 **4** and Edge IO NTS **5**.

The same PAC is managing both Process and Safety. Logics are separated but integrated in the same EcoStruxure Control Expert application **3**.

This Common Safety solution in most useful for small to medium architecture. In this case the Basic Process Control System and the Safety Integrity System are integrated in the same hardware but independent from each other. The non-safety related Modicon X80 I/O modules as the DIO islands are classified as non-interfering with Safety.

High-availability Safety architecture

The Modicon M580 Safety PAC can be used in standard or high-availability architectures using standalone or redundant controllers respectively (Hot Standby system).

The high-availability architecture provides the same Safety level (SIL3) as the single architecture and provides features for critical processes to configure with EcoStruxure Control Expert **3**.

To increase availability, the Modicon PAC allows the following to be used in a simple way:

- Redundant processors, named “Primary CPU” **1** and “Standby CPU” **2**
- Redundant power supplies **4**
- Ethernet ring network topology **8**

The ring can be made of copper **8** and optical fiber links **7** using Modicon switches **5** and Modicon X80 fiber optic converters **6**.

Primary and Standby CPU racks do not support Modicon X80 I/O, only communication modules as for example **9** with Remote Terminal Unit (**BMENOR2200H**) and **10** with the control network (**BMENOC03●1**).
Other types of communication module may be used for OPC UA (**BMENUA0100**), IEC 61850 (**BMENOP0300**), and PROFIBUS DP (**PMEPXM0100**) communication.

Modicon M580 automation platform

Safety architectures

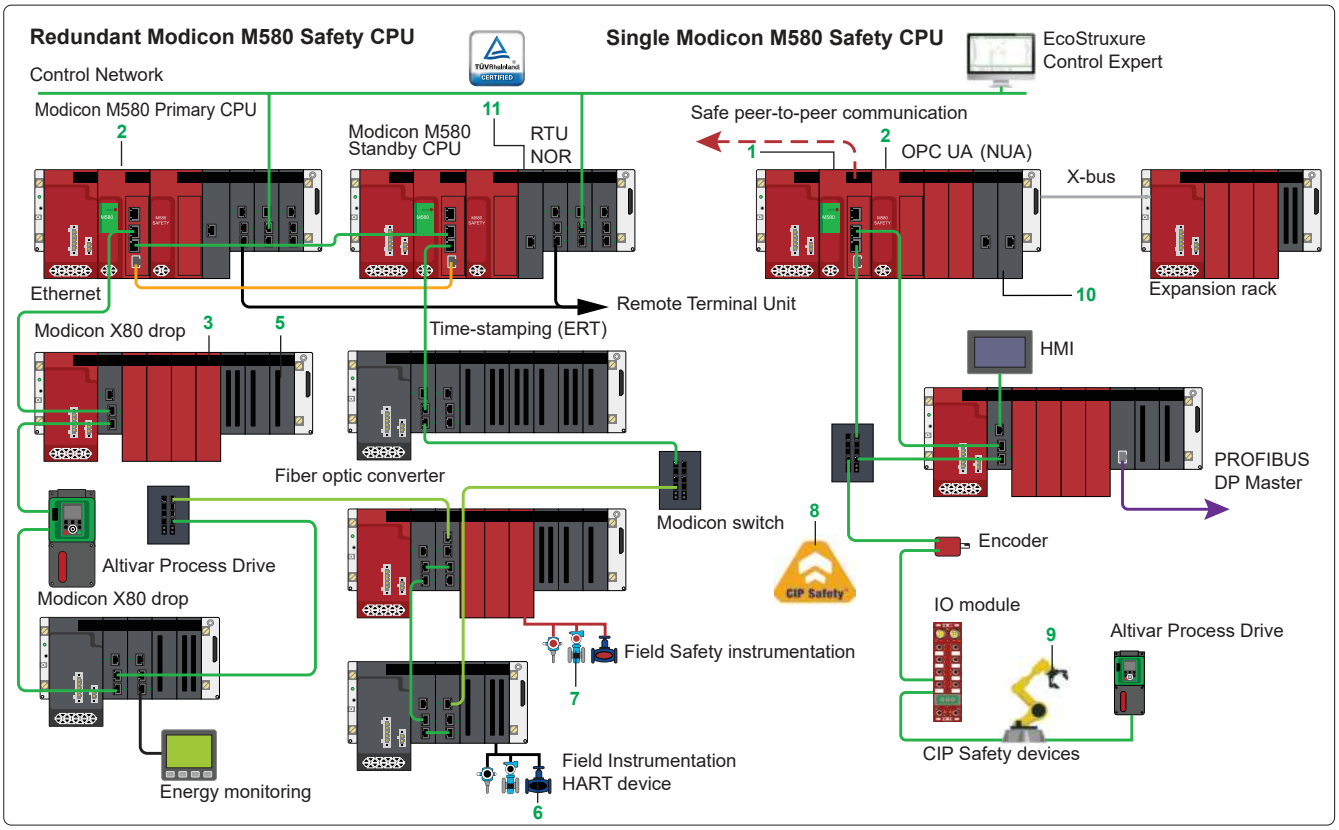
Example of a complex Safety architecture

Example of a complex Safety architecture

The Safety architecture below illustrates the extensive possibilities of the Modicon M580 offer:

- A choice between **BMEP58●040S** Modicon M580 Safety standalone CPU **1** and **BMEH58●040S** Modicon M580 Safety redundant CPU **2**.
- The possibility to integrate Modicon M580 and Modicon M580 Safety PAC in the same architecture with a physical separation between the control and the Safety part of the system.
- The possibility to use Common Safety mixing process control and Safety in the same PAC with a logical separation. The Safety CPU can manage the process part of the application using standard, non-Safety-related Modicon X80 I/O **5** connected to non-Safety-related Safety instrumentation **6** and the Safety part of the application using Safety I/O **3** connected to Safety instrumentation **7**.
- The standalone CPU can use third-party Safety devices **9** over CIP Safety **8**.
- The possibility to connect to the control network via high-performance and secure OPC UA **10** communications
- The possibility to connect to a Remote Terminal Unit **11**

A Modicon M580 Safety architecture inherits all Modicon M580 features in terms of architecture and performance. Hence, all previous architecture descriptions can apply to the Safety CPU with the restriction about usage of non-interfering Modicon X80 IO modules. The simple rule is that Modicon X80 non-interfering Type 1 modules can be located as required but non-interfering Type 2 modules can only be in non-Safety-related racks (without any Safety modules in). The complete and official list of non-interfering modules is in the TÜV Certificate Revision List (Certificate 01/205/5610/01/19). Please consult the TÜV website for more details.



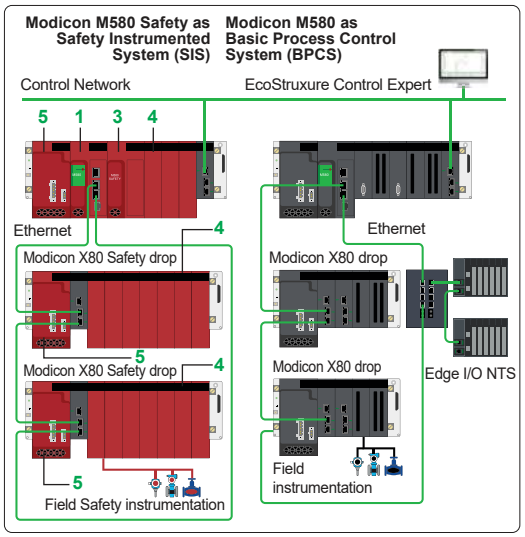
Complex Safety architecture

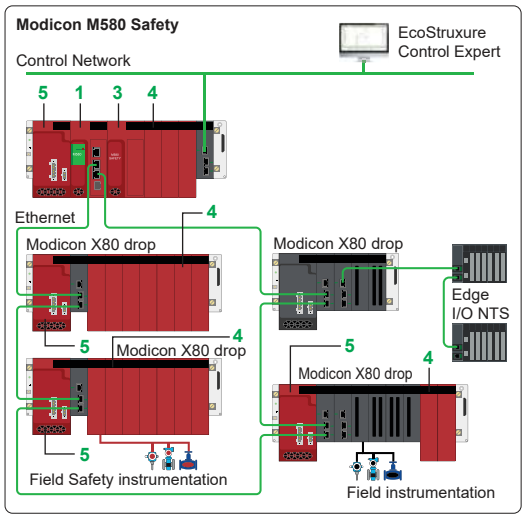
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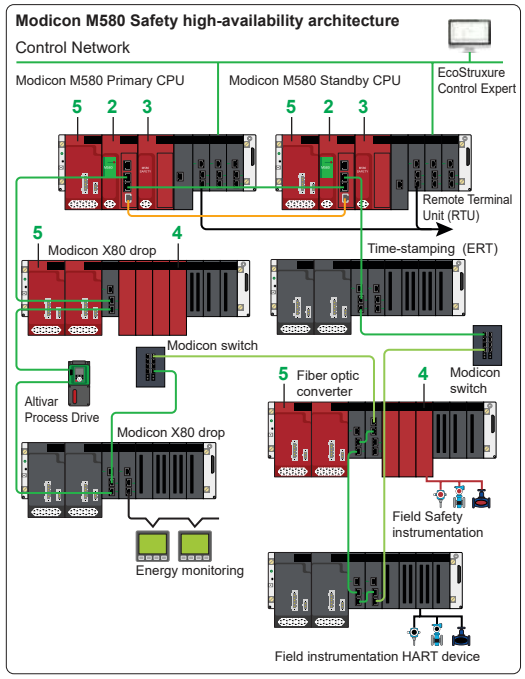
Modicon M580 automation platform

Safety architectures

Example of a complex Safety architecture







References *(1)*

Modicon M580 Safety standalone processors

Memory capacity	Maximum number of networks	Device ports	Service port	Item *(2)*	Reference	Weight kg/*lb*
2/8 MB integrated (Safety/non-Safety memory program)	2 Ethernet networks	2 RIO/DIO	1	1	BMEP582040S	0.849/ *1.872*
4/16 MB integrated (Safety/non-Safety memory program)	4 Ethernet networks	2 RIO/DIO	1	1	BMEP584040S	0.849/ *1.872*
16/64 MB integrated (Safety/non-Safety memory program)	4 Ethernet networks	2 RIO/DIO	1	1	BMEP586040S	0.849/ *1.872*

Modicon M580 Safety redundant processors

Memory capacity	Maximum number of networks	Device ports	Service port	Item *(2)*	Reference	Weight kg/*lb*
8 MB integrated (memory program)	2 Ethernet networks	2 RIO/DIO	1	2	BMEH582040S	0.849/ *1.872*
16 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	2	BMEH584040S	0.849/ *1.872*
64 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	2	BMEH586040S	0.849/ *1.872*

Modicon M580 Safety mandatory coprocessor

Reference	Item *(2)*	Weight kg/*lb*
BMEP58CPROS3	3	0.849/ *1.872*

(1) For additional characteristics, see our website.
(2) For items 4 to 5, see page 6/27.

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Processors:
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Modicon M580 modules for severe environments:
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Modicon M580 automation platform

Safety architectures

Example of a complex Safety architecture



BMXCPS4002S power supply

References *(continued) (1)*

Safety input and output modules *(3)*

Description	Type of current	Input voltage	IEC/EN 61131-2 conformity	Number of channels (common)	Item *(2)*	Reference	Weight kg/*lb*
Safety discrete input module	DC	24 V (logic positive)	Type 3	16 non-isolated inputs (1 x 16)	4	BMXSDI1602	0.115/ *0.254*
Safety discrete output module	DC	24 V (logic positive)	Yes	8 non-isolated outputs (1 x 8)	4	BMXSDO0802	0,12/ *0,264*
Safety analog input module	Current	-		4 isolated inputs	4	BMXSAI0410	0.143/ *0.315*
Safety relay output module	AC/DC relay	24 Vdc/ 24..230 Vac	Yes	4 isolated outputs (1 x 4)	4	BMXSRA0405	0.145/ *0.320*

Safety and redundant power supplies

Line supply	Available power			Nominal current	Item *(2)*	Reference	Weight kg/*lb*
	3.3 V ⎓ *(2)*	24 V ⎓ *(2)*	Total	24 V ⎓ rack			
100...240 V ~	18 W	40 W	40 W	1.67 A	5	BMXCPS4002S	0.510/ *1.124*
20...48 V ⎓	18 W	40 W	40 W	1.67 A	5	BMXCPS4022S	0.810/ *1.786*
100...150 V ⎓	18 W	40 W	40 W	1.67 A	5	BMXCPS3522S	0.610/ *1.345*

(1) For additional characteristics, see our website.
(2) For items 1 to 3, see page 6/26.
(3) Connection via 20-way caged, screw clamp, or spring-type removable terminal block.

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Processors:
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- Treatment for severe environments ..... page 7/2
  - Harsh chemical environments ..... page 7/2
  - Extreme climate environments ..... page 7/2
- Specific characteristics for Safety modules ..... page 7/3
- Modicon M580 offer composition for severe environments ..... page 7/4

Dedicated parts for severe environments

- **Modicon M580 processors for severe environments**
- References ..... page 7/4
- **Modicon M580 communication modules for severe environments**
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- Modicon M580 OPC UA communication module ..... page 7/5
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- Modicon M580 Performance communication module ..... page 7/5

Modicon M580 automation platform
Treatment for severe environments

Presentation

Protective treatment for Modicon M580 automation platform

The Modicon M580 automation platform complies with “TC” treatment requirements (treatment for all climates). It is designed as standard to operate in temperatures ranging from 0 to +60 °C/*32 to 140 °F*.
For installations in industrial environments corresponding to “TH” (treatment for hot and humid environments), devices must be housed in enclosures providing at least IP54 protection as specified by standard IEC/EN 60529, or an equivalent level of protection according to NEMA 250.

The Modicon M580 automation platform offers **IP20 protection** *(1)*. It can therefore be installed without an enclosure in reserved access areas that do not exceed **pollution level 2** (control room with no conductive dust). **Pollution level 2** does not take account of harsher environments, such as those where the air is polluted with conductive dust, fumes, corrosive or radioactive particles, vapors or salts, molds, insects, etc. All the Safety hardware in-rack modules colored red (processor, coprocessor, modules) are conformal coated for use in severe environments.

Treatment for severe environments

If the Modicon M580 automation platform has to be used in more severe environments or is required to start and operate in an extended temperature range, from **-25 to +70 °C/*-13 to +158 °F*** *(only H or T version)*, the “***ruggedized***” offer features industrially hardened processor and power supply modules, X-bus and Ethernet I/O modules, and racks that have a protective coating on their circuit boards.

***Note**: Capable of **starting** within an extended temperature range (from **-25 to +70 °C/-13 to +158 °F**, a single-rack configuration is also able to **operate at extremely low temperatures** (as low as **-40 °C/-40 °F**) if placed in an appropriate enclosure. Please contact our Customer Care Center.*

The coated/harsh offer provides the Safety CPU/coprocessor and Safety I/O modules with “AVR 80” coating on their electronic cards.This treatment increases the isolation capability of the circuit boards and their resistance to:
- Condensation
- Dusty atmospheres (conducting foreign particles)
- Chemical corrosion, in particular during use in sulfurous atmospheres (oil refinery, purification plant, etc.) or atmospheres containing halogens (chlorine, etc.) or chemical vapors

This protection, combined with appropriate installation and maintenance, enables Modicon M580 automation platform products to be used in the following environments:

Harsh chemical environments (products with suffix ‘H’ and ‘C’)

The use of contact grease protection on connectors and removal terminal blocks is mandatory to meet these requirements.
The lubricant protection seals electrical contacts from oxygen, moisture, aggressive gasses, and other hostile elements.

- **IEC/EN 60721-3-3 class 3C1, 3C2, 3C3, 3C4:**
  - 7 days; 25 °C/*77 °F* relative humidity 75%
  - Concentrations (ppb): H_2S: 9,900/SO_2: 4,800/Cl_2: 200
- **ISA S71.04 classes G1, G2, G3, Gx:**
  - 14 days; 25 °C/*77 °F* relative humidity 75%
  - Concentrations (ppb): H_2S: 60/SO_2: 350/Cl_2: 1,450/NO_2: 12
- **IEC/EN 60068-2-52 salt mist, Kb test severity level 2:**
  - 3x 24-hour cycles
  - 5% NaCl
  - 40 °C/*104 °F* relative humidity 93%

Extreme climate environments (products with suffix ‘H’ and ‘T’)

- Temperatures ranging from -25 to +70 °C/*-13 to +158 °F*
- Relative humidity levels up to 93%
- Altitudes from 0 to 5,000 m/*0 to 16,404 ft*

***Note**: Some products with the suffix 'C' also operate in an extended temperature range (from **-25 to +60 °C/-13 to +140 °F**). Please contact our Customer Care Center.*

*(1) Each slot in a **BM●XBP●●00** rack is equipped as standard with a protective cover that should only be removed when inserting a module. If any covers are subsequently misplaced, replacements can be ordered under reference **BMXXEM010** (sold in lots of 5).*

Compatibility table:
page 1/18

Communication modules:
page 4/12



Protective gel BMXGEL0025

Presentation *(continued)*

Specific characteristics for Safety modules

All Safety modules are coated and only exist with this surface treatment. There is no T, C, or H extension in the product references. Safety modules are compatible with:
- a temperature range from -25...+60 °C/*-13...+140 °F*
- corrosive environments using common H components

A protective gel is needed to cover all electrical connections on Modicon M580 products used in corrosive environments.

This gel comes in a 25 g tube and can be ordered separately under the reference **BMXGEL0025**.

Modicon M580 offer composition for severe environments

To order ruggedized or conformal coated processors and modules, see the reference tables from page 7/4 to page 7/5:
- References of available ruggedized products include the suffix "**H**"
- References of available conformal coated products include the suffix "**C**"

The majority of operating and electrical characteristics of ruggedized modules are identical to those of their equivalent standard versions. However, some characteristics are subject to either derating or limitation. Please consult our website.

In this chapter, note that only Modicon M580 products are described.
- For Modicon X80 or Modicon M340 products, please refer to the corresponding catalog:



DIA6ED2131203EN



DIA6ED2110104EN

- For additional accessories, please refer to:
  - Standard accessories for standalone processors, page 2/11
  - Standard accessories for redundant processors, page 2/12

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Modicon M580 automation platform

Dedicated parts for severe environments

Modicon M580 processors for severe environments



BMEP58●●●●H

Modicon M580 processors for severe environments

M580 standalone processors for severe environments

I/O capacity	Maximum number of networks	Device ports	Service port	Reference	Weight kg/lb
1,024 discrete I/O, 256 analog I/O 36 application-specific channels 4 MB integrated (memory program)	2 Ethernet networks	2 DIO	1	BMEP581020H	–
2,048 discrete I/O, 512 analog I/O 72 application-specific channels 8 MB integrated (memory program)	2 Ethernet networks	2 DIO	1	BMEP582020H	–
		2 RIO/DIO	1	BMEP582040H	–

Modicon M580 standalone processors with conformal coating

I/O capacity	Maximum number of networks	Device ports	Service port	Reference	Weight kg/lb
5,120 discrete I/O, 1,280 analog I/O 180 application-specific channels 24 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEP585040C	–
6,144 discrete I/O, 1,536 analog I/O 216 application-specific channels 64 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEP586040C	–

Modicon M580 redundant processors with conformal coating

I/O capacity	Maximum number of networks	Device ports	Service port	Reference	Weight kg/lb
8 MB integrated (memory program)	2 Ethernet networks	2 RIO/DIO	1	BMEH582040C	–
16 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEH584040C	–
64 MB integrated (memory program)	4 Ethernet networks	2 RIO/DIO	1	BMEH586040C	–

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Compatibility table: page 1/18
Processors: page 2/11
Communication modules: page 4/12

Modicon M580 automation platform

Dedicated parts for severe environments

Modicon M580 communication modules for severe environments



BMENOC0321C



BMENOC0302H

Communication

Modicon M580 Ethernet communication modules with conformal coating

Description	Service port	Device network port (Ethernet)	Reference	Weight kg/*lb*
EtherNet/IP, Modbus/TCP network module	1	2	BMENOC0301C	0.345/ *0.761*
FactoryCast network module	1	2	BMENOC0311C	0.345/ *0.761*
EtherNet control router	1	2	BMENOC0321C	0.345/ *0.761*
EtherNet/IP and Modbus/TCP network module	1	2	BMENOC0302H	0.394/ *0.868*



BMENUA0100H

Modicon M580 OPC UA communication module for severe environments

Description	Reference	Weight kg/*lb*
OPC UA module for severe environments	BMENUA0100H	0.384/ *0.847*



BMENOP0300C

Modicon M580 IEC 61850 communication module with conformal coating

Description	Protocols	Physical layer	Reference	Weight kg/*lb*
IEC 61850 communication module	IEC 61850 standard	10BASE-T/ 100BASE-TX	BMENOP0300C	0.345/ *0.761*



BMXNOR0200H



BMENOR2200H

Modicon M580 RTU communication modules for severe environments

Description	Protocols	Physical layer	Reference	Weight kg/*lb*
RTU communication module	Modbus TCP, IEC 60870-5-104, or DNP3 NET (client or server)	1x Ethernet port 10BASE-T/ 100BASE-TX	BMXNOR0200H	0.205/ *0.452*
	IEC 60870-5-101 or DNP3 serial (client or server)	1x non-isolated RS-232/RS-485 serial link port		
Advanced RTU communication module	DNP3 SAv2/SAv5 or IEC60870-5-104 (Client or Server), Modbus TCP, SNMP, HTTPS, SNTP (client or server)	1x Ethernet port 100BASE-TX *(1)*, 2x front Ethernet ports 1000BASE-TX	BMENOR2200H	0.407/ *0.899*
	IEC 60870-5-101 or DNP3 serial (client or server)	1x isolated RS-232/RS-485 serial link port		

(1) On backplane port.

Compatibility table: page 1/18
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Communication modules: page 4/12

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8

Modicon M580 automation platform

Standards, certifications, and environment conditions

Standards and certifications

Per region

The Modicon M580 automation and Modicon M580 Safety platforms have been developed to comply with the principal national and international standards concerning electronic equipment for industrial automation systems. Up-to-date information on which certifications have been obtained is available on our website: consult commercial references directly.

- Compliance with European Directives for CE marking:
  - WEEE: 2012/19/EU
  - Low voltage: 2014/35/EU
  - Electromagnetic compatibility: 2014/30/EU
  - Machinery: 2006/42/EC (check EU DoC on our website)
  - ATEX: 2014/34/EU (check EU DoC on our website)
- Requirements specific to programmable controllers (functional characteristics, immunity, resistance, functional safety, etc.):
  - IEC/EN 61131-2
  - IEC/EN/UL/CSA 61010-2-201
- Country-specific passport:
  - RCM
  - EAC
  - UKCA

For other country certifications, please refer to the technical appendix page 8/10.

Modicon M580 PACs are considered as open equipment and are designed for use in industrial environments, in pollution degree 2, overvoltage category II (IEC 60664-1), and in low-voltage installations, where the main power branch is protected on both wires by devices such as fuses or circuit breakers limiting the current to 15 A for North America and 16 A for the rest of the world.

Per application

Power generation

- IEC/EN 61000-6-5 for Type 1 and Type 2 interfaces
- IEC/EN 61850-3 for location G

Marine

Marine requirements of the major international organizations are unified in IACS (International Association of Classification Societies) E10 rules: BV, DNV, ABS, LR, RINA (refer to page 8/11).

Railway

- EN 50155/IEC 60571: Railway applications - Rolling stock - Electronic equipment
- EN 45545-2: Railway applications - Fire protection on railway vehicles - Part 2 : requirements for fire behavior of materials and components
- EN 50121-3-2/IEC 62236-3-2: Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus
- EN 50121-4/IEC 62236-4: Railway applications - Electromagnetic compatibility - Part 4: Emission and immunity of the signalling and telecommunications apparatus
- EN 50121-5/IEC 62236-5: Railway applications - Electromagnetic compatibility - Part 5: Emission and immunity of fixed power supply installations and apparatus
- EN 50124-1/IEC 62947-1: Railway - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment
- EN 50125-1/IEC 62498-1: Railway - Environmental conditions for equipment - Part 1 : Rolling stock and on-board equipment
- EN 50125-3/IEC 62498-3: Railway - Environmental conditions for equipment - Part 3: Equipment for signaling and telecommunications

Hazardous areas

- For USA and Canada: Hazardous location class I, division 2, groups A, B, C, and D
- For European Union: ATEX for atmosphere Zone 2 (gas) and Zone 22 (dust)
- For United Kingdom: UKEX for atmosphere Zone 2 (gas) and Zone 22 (dust)
- For other countries: IECEx for atmosphere Zone 2 (gas) and/or Zone 22 (dust)

Modicon M580 automation platform

Standards, certifications, and environment conditions

Standards and certifications *(continued)*

Functional safety

All Modicon X80 Safety modules are certified by TÜV Rheinland.

The certificate reviews the following standards:

■ **Generic safety**

□ IEC/EN 61508: Functional safety of electrical/electronic/programmable electronic safety-related systems
- IEC/EN 61508-1 - Part 1: General requirements
- IEC/EN 61508-2 - Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems
- IEC/EN 61508-3 - Part 3: Software requirements

■ **Safety for Process**

□ IEC/EN 61511: Functional safety - Safety instrumented systems for the process industry sector
- IEC/EN 61511-1 - Part 1: Framework, definitions, system, hardware and software requirements
- IEC/EN 61511-2 - Part 2: Guidelines for the application of IEC 61511-1
- IEC/EN 61511-3 - Part 3: Guidance for the determination of the required safety integrity levels

■ **Safety for Machine**

□ IEC/EN 62061: Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems

□ ISO/EN 13849-1: Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design

□ ISO/EN 13849-2: Safety-related parts of control systems - Part 2: Validation

■ **Safety for Railway**

□ EN 50126/IEC 62278: Railway Applications - The Specification and demonstration of reliability, availability, maintainability and safety (RAMS)

□ EN 50128/IEC 62279: Railway Applications - Communication, signaling and processing systems. Software for railway control and protection systems

□ EN 50129/IEC 62425: Railway applications - Communication, signaling and processing systems - Safety-related electronic systems for signaling

Fire & Gas

■ EN 54.2: Fire detection and fire alarms systems - Part 2: Control and indicating equipment

■ EN 50156-1: Electrical equipment for furnaces and ancillary equipment - Part 1: Requirements for application design and installation

■ EN 50130-4: Immunity requirements components of fire, intruder, holdup, CCTV, access control and social alarms systems

■ EN 298: Automatic burner control systems for burners and appliances burning gaseous or liquid fuels

■ NFPA 85: Boiler and Combustion Systems Hazards Code

■ NFPA 86: Standard for Ovens and Furnaces

■ NFPA 72: National Fire Alarm and Signaling Code

Modicon M580 automation platform

Standards, certifications, and environment conditions

Environmental characteristics

Service conditions and recommendations relating to the environment

			Modicon M580 automation platform	Modicon M580 Safety platform	Modicon M580 modules for severe environments
Temperature	Operation	**°C/°F**	0...60/*32...140*	-25...+60/*-13...+140*	-25...+70/*-13...+158*
	Storage	**°C/°F**	-40...+85/*-40...+185*	-40...+85/*-40...+185*	-40...+85/*-40...+185*
Relative humidity (without condensation)	Cyclical humidity	**%**	+5 ... +95 up to 55 °C/*131 °F*	+5...+95 up to 55 °C/*131 °F*	+5 ... +95 up to 55 °C/*131 °F*
	Continuous humidity *(1)*	**%**	+5 ... +93 up to 55 °C/*131 °F*	+5...+93 up to 60 °C/*140 °F*	+5 ... +93 up to 60 °C/*140 °F*
Altitude	Operation	**m/ft**	0…2,000/*0...6,562* (full specification: temperature and isolation) 2,000...5,000/*6,562...16,404* (temperature derating: approx. 1 °C/400 m *(33.8 °F/1,312 ft)*, isolation 150 V/1,000 m/*3,281 ft* For accurate temperature derating calculation, refer to IEC 61131-2 Ed4.0 Annex A		

			Modicon X80 power supplies				
Supply voltage			**BMXCPS2010**	**BMXCPS3020 BMXCPS3020H**	**BMXCPS3540T BMXCPS3522 BMXCPS3522S**	**BMXCPS2000**	**BMXCPS3500 BMXCPS3500H BMXCPS4002 BMXCPS4002S BMXCPS4002H BMXCPS4022S**
	Nominal voltage	**V**	24 ⎓	24...48 ⎓	125 ⎓	100...240 ∿	100...240 ∿
	Limit voltages	**V**	18...31.2 ⎓	18...62.4 ⎓	100…150 ⎓	85...264 ∿	85...264 ∿
	Nominal frequencies	**Hz**	–	–	–	50/60	50/60
	Limit frequencies	**Hz**	–	–	–	47/63	47/63

Protective treatment of the Modicon M580 automation platform

The Modicon M580 and Modicon M580 Safety platforms meet the requirements of “TC” treatment (treatment for all climates).

For installations in industrial production workshops or environments corresponding to “TH” treatment (treatment for hot and humid environments), Modicon M580 automation platform must be embedded in enclosures with minimum IP54 protection.

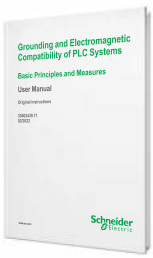
The Modicon M580 and Modicon M580 Safety platforms offer **protection to IP20 level** and **protection against access to terminals** (enclosed equipment) *(2)*. They can therefore be installed without an enclosure in reserved-access areas that do not exceed **pollution level 2** (control room with no dust-producing machine or activity). Pollution level 2 does not take account of more severe environmental conditions: air pollution by dust, smoke, corrosive or radioactive particles, vapors or salts, molds, insects, etc.

Installation restrictions and recommendations

Please note that in order to fulfill the international certification conditions:

- Devices must be installed, wired, and maintained in accordance with the instructions provided in the manual “Grounding and Electromagnetic Compatibility of PLC Systems”.
- Installation restrictions are provided in the “Modicon M580, M340, X80 I/O Platforms, Standards and Certifications“ and “Modicon M580 Safety, Standards and Certifications” manuals.

Download the manuals for further details:



33002439KO1000



EIO0000002726



EIO0000002750

(1) The modules have been tested for a period of 96 hours.
(2) In cases where a slot is not occupied by a module, a BMXXEM010 protective cover must be installed (see “Modicon X80” catalog).
(CE): Tests required by European directives (CE) and based on IEC/EN 61131-2 standards.

Modicon M580 automation plaftorm

Standards, certifications, and environment conditions

Environment tests

The table below (pages 8/5 to 8/9) provides test values for Industry; for Power generation, Merchant navy, and Railway application related tests, please refer to “Modicon M580, M340, and X80 platforms, Standards and Certifications - Installation & User guide” (see page 8/4).

Name of test	Standards	Levels
Immunity to LF interference (CE) *(1)*		
Voltage and frequency variations	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-11**	0.85...1.10 Un - 0.94...1.04 Fn; 4 steps t = 30 min
Direct voltage variations	**IEC/EN 61131-2; IEC 61000-4-29**	0.85...1.2 Un + ripple: 5% peak; 2 steps t = 30 min
Third harmonic	**IEC/EN 61131-2**	H3 (10% Un), 0°/180°; 2 steps t = 5 min
Voltage interruptions	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-11; IEC 61000-4-29** For functional safety (DS criteria): **IEC 61000-6-7; IEC 61326-3-1**	Power supply immunity: ■ 1 ms for ⎓ PS1/10 ms for ∿ PS2 (20 ms DS criteria), 85% Un ■ Check operating mode for longer interruptions ■ Up to 5 s, 85% Un
	IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-11	For ∿ PS2: ■ 20% Un, t0: ½ period ■ 40% Un, cycle 10/12 ■ 70% Un, cycle: 25/30 ■ 0% Un, cycle 250/300
Voltage shut-down and start-up	**IEC/EN 61131-2**	■ Un…0…Un; t = Un/60 s ■ Umin…0…Umin; t = Umin/5 s ■ Umin…0.9 Udl…Umin; t = Umin/60 s
Magnetic field	**IEC/EN 61131-2; IEC 61000-4-8** For functional safety (DS criteria): **IEC 61000-6-7; IEC 61326-3-1**	Power frequency: 50/60 Hz, 100 A/m continuous ...1,000 A/m; t = 3 s; 3 axes
	IEC 61000-4-10	Oscillatory: 100 kHz...1 MHz, 100 A/m; t = 9 s; 3 axes
Conducted common mode disturbances range 0 Hz …150 kHz	**IEC 61000-4-16** For functional safety (DS criteria): **IEC 61000-6-7; IEC 61326-3-1**	For remote systems: ■ 50/60 Hz and ⎓, 300 V, t = 1s ■ 50/60 Hz and ⎓, 30 V, t = 1 min ■ 5 Hz…150 kHz, sweep 3 V…30 V ■ For AC: 10 V ■ For DC: 10 V cont. or 100 V, t = 1 s

Where:
- PS1 applies to PLC supplied by battery, PS2 applies to PLC energized from ∿ or ⎓ supplies
- Un: nominal voltage, Fn: nominal frequency, Udl: detection level when powered

(1) Devices must be installed, wired, and maintained in accordance with the instructions provided in the manual “Grounding and Electromagnetic Compatibility of PLC Systems” (see page 8/4).

(2) These tests are performed without an enclosure, with devices fixed on a metal grid and wired as per the recommendations in the manual “Grounding and Electromagnetic Compatibility of PLC systems” (see page 8/4).

(CE)*: Tests required by European CE directives and based on IEC/EN 61131-2.*

Modicon M580 automation platform

Standards, certifications, and environment conditions

Environment tests *(continued)*

Name of test	Standards	Levels
Immunity to HF interference (CE) *(1)*		
Electrostatic discharges	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-2** For functional safety (DS criteria): **IEC 61000-6-7; IEC 61326-3-1**	6 kV contact; 8 kV air; 6 kV indirect contact
Radiated radio frequency electromagnetic field	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-3** For functional safety (DS criteria): **IEC 61000-6-7; IEC 61326-3-1**	80 MHz…1 GHz: 10/15 V/m (20 V/m DS criteria); 3 V/m, 1.4 GHz...2 GHz: 3V/m (10 V/m DS criteria) 2 GHz...6 GHz: 3V/m Sinus amplitude modulated 80%,1 kHz + internal clock frequencies
Electrical fast transient bursts	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-4** For functional safety (DS criteria): **IEC 61000-6-7; IEC 61326-3-1**	For ∿ or ⎓ main supplies: ■ 2 kV in common mode/2 kV in wire mode (4 kV DS criteria with external protection) For ∿ or ⎓ auxiliary supplies, ∿ unshielded I/O: ■ 2 kV in common mode For analog, ⎓ unshielded I/O, communication and shielded lines: ■ 1 kV in common mode (3 kV DS criteria)
Surge	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-5** For functional safety (DS criteria): **IEC 61000-6-7; IEC 61326-3-1**	For ∿/⎓ main and auxiliary supplies, ∿ unshielded I/O: ■ 2 kV in common mode/1 kV in differential mode (4 kV DS criteria with external protection) For analog, ⎓ unshielded I/O: ■ 1 kV in common mode For communication and shielded lines: ■ 1 kV in common mode (3 kV DS criteria)
Conducted disturbances induced by radiated electromagnetic fields	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-6** For functional safety (DS criteria): **IEC 61000-6-7; IEC 61326-3-1**	10 V; 0.15 MHz...80 MHz (20 V DS criteria) Sinus amplitude 80%, 1 kHz + spot frequencies
Damped oscillatory wave	**IEC/EN 61131-2; IEC 61000-4-18**	For ∿/⎓ main supplies and ∿ auxiliary supplies, ∿ unshielded I/O: ■ 2.5 kV in common mode/1 kV in differential mode For ⎓ auxiliary supplies, analog, ⎓ unshielded I/O: ■ 1 kV in common mode/0.5 kV in differential mode For communication and shielded lines: ■ 0.5 kV in common mode

(1) Devices must be installed, wired, and maintained in accordance with the instructions provided in the manual "Grounding and Electromagnetic Compatibility of PLC Systems" (see page 8/4).

(2) These tests are performed without an enclosure, with devices fixed on a metal grid and wired as per the recommendations in the manual "Grounding and Electromagnetic Compatibility of PLC systems" (see page 8/4).

(CE)*: Tests required by European CE directives and based on IEC/EN 61131-2.*

Environment tests *(continued)*

Name of test	Standards	Levels
Electromagnetic emissions (CE) *(1)*		
Conducted emissions	**IEC/EN 61131-2; IEC/EN 61000-6-4; CISPR 11 & 22, Class A, Group 1**	150 kHz … 500 kHz: quasi-peak 79 dB (µV/m); average 66 dB (µV/m) 500 kHz … 30 MHz: quasi-peak 73 dB (µV/m); average 60 dB (µV/m)
Radiated emissions	**IEC/EN 61131-2; IEC/EN 61000-6-4; CISPR 11 & 22, Class A, Group 1**	30 MHz ... 230 MHz: quasi-peak 40 dB (µV/m) (at 10 m/*33 ft*) 230 MHz ... 1 GHz: quasi-peak 47 dB (µV/m) (at 10 m/*33 ft*) 1 GHz ... 3 GHz: quasi-peak 76 dB (µV/m) (at 3 m/*9.84 ft*) 3 GHz ... 6 GHz: quasi-peak 80 dB (µV/m) (at 3 m/*9.84 ft*)
Name of test	**Standards**	**Levels**
Immunity to climatic variations *(1)* (power on)		
Dry heat	**IEC 60068-2-2 (Bb & Bd)**	60 °C/*140 °F*, t = 16 hrs [for ruggedized range: 70 °C/*158 °F*, t = 16 hrs] *(2)*
Cold	**IEC 60068-2-1 (Ab & Ad)**	0 °C…- 25 °C/*32 °F...-13 °F*, t = 16 hrs + power on at 0 °C/*32 °F* [for ruggedized range: power on at -25 °C/*-13 °F*] *(2)*
Damp heat, steady state (continuous humidity)	**IEC 60068-2-78 (Cab)**	55 °C/*131 °F*, 93% relative humidity, t = 96 hrs [for ruggedized range: 60 °C/*140 °F*] *(2)*
Damp heat, cyclic (cyclical humidity)	**IEC 60068-2-30 (Db)**	55 °C…25 °C/*131 °F...77 °F*, 93…95% relative humidity, 2 cycles t = 12 hrs +12 hrs
Change of temperature	**IEC 60068-2-14 (Nb)**	0 °C … 60 °C/*32 °F...140 °F*, 5 cycles t = 6 hrs + 6 hrs [for ruggedized range: - 25 °C…70 °C/*-13 °F...158 °F*] *(2)*
Name of test	**Standards**	**Levels**
Withstand to climatic variations *(1)* (power off)		
Dry heat	**IEC/EN 61131-2; IEC 60068-2-2 (Bb & Bd)**	85 °C/*185 °F*, t = 96 hrs
Cold	**IEC/EN 61131-2; IEC 60068-2-1 (Ab & Ad)**	-40 °C/*-40 °F*, t = 96 hrs
Damp heat, cyclic (cyclical humidity)	**IEC/EN 61131-2; IEC 60068-2-30 (Db)**	55 °C…25 °C/*77 °F...131 °F*, 93…95% relative humidity, 2 cycles t = 12 hrs + 12 hrs
Change of temperature (thermal shocks)	**IEC/EN 61131-2; IEC 60068-2-14 (Na)**	-40 °C...85 °C/*-40 °F...185 °F*, 5 cycles t = 3 hrs + 3 hrs

(1) Devices must be installed, wired, and maintained in accordance with the instructions provided in the manual "Grounding and Electromagnetic Compatibility of PLC Systems" (see page 8/4).
(2) Refer also to the section "Treatment for severe environments".

(CE): *Tests required by European CE directives and based on IEC/EN 61131-2 standards.*

Environment tests *(continued)*

Name of test	Standards	Levels
Immunity to mechanical constraints *(1)* (power on)		
Sinusoidal vibrations	**IEC/EN 61131-2;** **IEC 60068-2-6** (Fc)	Basic IEC/EN 61131-2: 5...150 Hz, ± 3.5 mm/*0.14 in.* amplitude (5…8.4 Hz), 1 g (8.4…150 Hz) Specific profile: 5...150 Hz, ± 10.4 mm/*0.41 in.* amplitude (5…8.4 Hz), 3 g (8.4…150 Hz) For basic and specific: endurance: 10 sweep cycles for each axis
	IEC 60870-2-2; **IEC 60068-2-6** (Class Cm)	2...500 Hz, 7 mm/*0.28 in.* amplitude (2…9 Hz), 2 g (9…200 Hz), 1.5 g (200…500 Hz) endurance: 10 sweep cycles for each axis
	IEC 60068-2-6	Seismic analysis: 3... 35 Hz, 22.5 mm/*0.89 in.* amplitude (3…8.1 Hz), 6 g (8.1…35 Hz)
Shock	**IEC/EN 61131-2;** **IEC 60068-2-27** (Ea)	30 g, 11 ms; 3 shocks/direction/axis *(2)* For Modicon M580 Safety: 15 g, 11 ms; 3 shocks/direction/axis 25 g, 6 ms; 100 bumps/direction/axis (bumps) *(3)*
Free fall during operation	**IEC/EN 61131-2;** **IEC 60068-2-32** (Ed Method 1)	1 m/*3.28 ft*, 2 falls
Name of test	**Standards**	**Levels**
Withstand to mechanical constraints (power off)		
Random free fall with packaging	**IEC/EN 61131-2;** **IEC 60068-2-32** (Method 1)	1 m/*3.28 ft*, 5 falls
Flat free fall	**IEC/EN 61131-2;** **IEC 60068-2-32** (Ed Method 1)	10 cm/*0.33 ft*, 2 falls
Controlled free fall	**IEC/EN 61131-2;** **IEC 60068-2-31** (Ec)	30° or 10 cm/*0.33 ft*, 2 falls
Plugging/Unplugging	**IEC/EN 61131-2**	For modules and connectors: Operations: 50 for permanent connections, 500 for non-permanent connections

(1) Devices must be installed, wired, and maintained in accordance with the instructions provided in the manual "Grounding and Electromagnetic Compatibility of PLC Systems" (see page 8/4).
(2) When using fast actuators (response time ⩽ 5 ms) driven by relay outputs: 15 g, 11 ms; 3 shocks/direction/axis.
(3) When using fast actuators (response time ⩽ 15 ms) driven by relay outputs: 15 g, 6 ms; 100 bumps/direction/axis.
(4) Refer also to the section "Treatment for severe environments".

(CE): *Tests required by European CE directives and based on IEC/EN 61131-2 standards.*

Environment tests *(continued)*

Name of test	Standards	Levels
Equipment and personnel safety *(1)* (CE)		
Dielectric strength and insulation resistance	**IEC/EN 61131-2; IEC 61010-2-201; UL; CSA**	Dielectric: 2 Un + 1000 V; t = 1 min Insulation: Un ⩽ 50 V: 10 MΩ, 50 V ⩽ Un ⩽ 250 V : 100 MΩ
Ground continuity	**IEC/EN 61131-2; IEC 61010-2-201; UL; CSA**	30A, R ⩽ 0,1Ω; t = 2 min
Leakage current	**IEC/EN 61131-2; IEC 61010-2-201; UL; CSA**	⩽ 0.5 mA in normal condition ⩽ 3.5 mA in single fault condition
Protection offered by enclosures	**IEC/EN 61131-2; IEC61010-2-201**	IP20 and protection against standardized pins
Impact withstand	**IEC/EN 61131-2; IEC 61010-2-201; UL; CSA**	Sphere of 500 g, fall from 1.3 m/*4.27 ft* (energy 6.8 J minimum)
Overload	**IEC/EN 61131-2; IEC 61010-2-201; UL; CSA**	50 cycles, Un, 1.5 In; t = 1 s ON + 9 s OFF
Endurance	**IEC/EN 61131-2; IEC 61010-2-201; UL; CSA**	In, Un; 6,000 cycles: t = 1 s ON + 9 s OFF
Temperature rise	**IEC/EN 61131-2; UL; CSA; ATEX; IECEx**	Ambient temperature 60 °C/*140 °F* [for ruggedized range: 70 °C/*158 °F*] *(4)*

(1) Devices must be installed, wired, and maintained in accordance with the instructions provided in the manual "Grounding and Electromagnetic Compatibility of PLC Systems" (see page 8/4).
(2) When using fast actuators (response time ⩽ 5 ms) driven by relay outputs: 15 g, 11 ms; 3 shocks/direction/axis.
(3) When using fast actuators (response time ⩽ 15 ms) driven by relay outputs: 15 g, 6 ms; 100 bumps/direction/axis.

(CE): *Tests required by European CE directives and based on IEC/EN 61131-2 standards.*

Some countries require certain electrical components to undergo certification by law. This certification takes the form of a certificate of conformity to the relevant standards and is issued by the official body in question. Where applicable, certified devices must be labeled accordingly. Use of electrical equipment on board merchant vessels generally implies that it has gained prior approval (i.e. certification) by certain shipping classification societies.

Abbreviation	Certification body/authority	Country
CE	European Community	European Union
UL	Underwriters Laboratories	USA
CSA	Canadian Standards Association	Canada
RCM	Australian Communications and Media Authority	Australia, New Zealand
EAC	Eurasian conformity	Russia and Eurasian Economic Union
UKCA	United Kingdom Central Authority	United Kingdom
cULus	Underwriters Laboratories	USA, Canada
cCSAus	Canadian Standards Association	Canada, USA
IECEx	International Electrotechnical Commission Explosive	International
ATEX	ATmosphères EXplosives	International
TÜV Rheinland (functional safety)	Technischer Überwachungsverein Rheinland	International
ABS	American Bureau of Shipping	USA
BV	Bureau Veritas	France
DNV	Det Norske Veritas	Norway, Germany
LR	Lloyd's Register	UK
RINA	Registro Italiano Navale	Italy
RMRS	Russian Maritime Register of Shipping	Russia
RRR	Russian River Register	Russia
CCS	China Classification Society	China
KRS	Korean Register of Shipping	Korea
Class NK	Nippon Kaiji Kyokai	Japan

***Note**: Although DNV GL rebranded to DNV as of March 1st, 2021, all certificates with DNV GL name and logo keep their initial validity date. Only rules in force on or after March 1st, 2021, are rebranded to DNV.*

The following tables provide an overview of the situation as of January 2024, in terms of which certifications (listed next to their respective bodies) have been granted or are pending for our automation products.
Up-to-date information on which certifications have been obtained by products bearing the Schneider Electric brand can be viewed on our website.

Product certifications

Certified
Certification pending

	Certifications								
	CE	UL	CSA	RCM	EAC	UKCA	UL - CSA Hazardous locations *(1)*	ATEX - IECEx	TÜV Rheinland
	EU	USA	Canada	Australia	Russia	UK	USA, Canada	International	Germany
Modicon STB							Cl. I, Div. 2, Grps ABCD	Zone 2 *(2) (4)*	
Modicon Telefast ABE 7									
Modicon Switch			*(3)*				Cl. I, Div. 2, Grps ABCD *(2)*	Zone 2 *(2)*	
Modicon MC80							Cl. I, Div. 2, Grps ABCD		
Modicon M340							Cl. I, Div. 2, Grps ABCD	Zone 2/22 *(2) (5)*	
Modicon M580							Cl. I, Div. 2, Grps ABCD	Zone 2/22 *(2) (5)*	
Modicon M580 Safety							Cl. I, Div. 2, Grps ABCD	Zone 2/22 *(2) (5)*	SIL3, SILCL3, SIL4, Cat.4/PLe *(6)*
Modicon X80							Cl. I, Div. 2, Grps ABCD	Zone 2/22 *(2) (5)*	
Modicon Momentum							Cl. I, Div. 2, Grps ABCD		
Modicon Quantum					*(2)*		Cl. I, Div. 2, Grps ABCD	Zone 2/22 *(2) (5)*	

(1) Refer to user manual for installation in hazardous locations.
(2) Depends on product; Refer to the product certificates on our website.
(3) North American certification cULus (Canada and USA).
(4) For zones not covered by this specification, Schneider Electric offers a solution as part of the TPP (Technology Partner Program). Please contact our Customer Care Center.
(5) Certified by INERIS. Refer to the instructions supplied with each ATEX and/or IECEx certified product.
(6) Certified by TÜV Rheinland for integration into a functional safety:
- up to SIL2 or SIL3 in accordance with IEC 61508/61511 for Process.
- up to SILCL3 in accordance with IEC 62061 and up to Cat.4/PLe in accordance with ISO 13849 for Machine.
- up to SIL4 in accordance with EN 50126/50128/50129 for Railway.

Marine certifications

	Shipping classification societies							
Certified	ABS	BUREAU VERITAS	DNV	Lloyd's Register	RINA	CCS	KR KOREAN REGISTER	NK Class NK
Certification pending								
Only part of range certified								
	ABS	**BV**	**DNV**	**LR**	**RINA**	**CCS**	**KRS**	**Class NK**
	USA	France	Norway/ Germany	United Kingdom	Italy	China	Korea	Japan
Modicon STB	■	■	■	■	■			
Modicon Telefast ABE 7		■	■	■				
Modicon Networking		*(1)*	*(1)*	*(1)*				
Modicon MC80								
Modicon M340	■	■	■	■	■	■	■	■
Modicon M580	■	■	■	■	■	■	■	■
Modicon M580 Safety	■	■	■	■	■	■	■	■
Modicon X80	■	■	■	■	■	■	■	■
Modicon Momentum								
Modicon Quantum	■	■	■	■	■			

EC regulations

European Directives

The open nature of the European markets assumes harmonization between the regulations set by the member states of the European Union. European Directives are texts intended to remove restrictions on free circulation of goods and must be applied within all European Union states.
Member states are obligated to incorporate each Directive into their national legislation, and to simultaneously withdraw any regulations that contradict it.
Directives - and particularly those of a technical nature with which we are concerned - merely set out the objectives to be fulfilled (referred to as “essential requirements”). Manufacturers are responsible for taking the necessary measures to establish that their products conform to the requirements of each Directive applicable to their equipment.
As a general rule, manufacturers certify compliance with the essential requirements of the Directive(s) that apply to their products by applying a CE mark. The CE mark is affixed to our products where applicable.

Significance of the CE mark

The CE mark on a product indicates the manufacturer's certification that the product conforms to the relevant European Directives; this is a prerequisite for placing a product that is subject to the requirements of one or more Directives on the market and allowing its free circulation within European Union countries. The CE mark is intended for use by those responsible for regulating national markets.
Where electrical equipment is concerned, conformity to standards indicates that the product is fit for use. Only a warranty by a well-known manufacturer can provide reassurance of a high level of quality.
As far as our products are concerned, one or more Directives are likely to apply in each case, in particular:

- The Low Voltage Directive (2014/35/EU)
- The Electromagnetic Compatibility Directive (2014/30/EU)
- The ATEX CE Directive (2014/34/EU)
- The Machinery Directive (2006/42/EU)

Hazardous substances

These products are compatible with:

- The WEEE Directive (2012/19/EU)
- The RoHS Directive (2011/65/EU)
- The China RoHS Directive (Standard GB/T 26572-2011)
- REACH regulations (EC No. 1907/2006)

Note: *Documentation on sustainable development is available on our website (product environmental profiles and instructions for use, RoHS and REACH directives).*

End of life (WEEE)

End of-life products containing electronic cards must be dealt with by specific treatment processes.
When products containing backup batteries are unusable or at end of life they must be collected and treated separately. Batteries do not contain a percentage by weight of heavy metals above the limit specified by European Directive 2013/56/EU.

(1) Please refer to the Modicon Networking catalog for more details.

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Dedicated service offers for your installed base



Schneider Electric, with its experts, products, and dedicated tools, provides services such as system design, consultancy, maintenance contracts, modernization of facilities, and project delivery.

The Schneider Electric services offer is structured around several key areas:

- Maintenance and support services:
  - A set of services to help maintain reliability and availability of automated control systems. These services may be the subject of a bespoke maintenance contract to meet your requirements more closely.
- Consultancy services:
  - Diagnostics of the installed base
- Modernization solutions:
  - Migration solutions including consultancy, expertise, tools, and technical support to help ensure a smooth transition to newer technology while retaining the wiring and encoding in most cases.

Customization services are also available to accommodate specific requirements. For more information, please consult the specific pages on our website.

Maintenance and support services

Spare parts, exchanges, and repairs

Everything you need to get equipment working again as quickly as possible



DIA6ED2171102EN

Solutions to respond very quickly to requests for spare parts, exchanges, and repairs to your installed automation equipment (automation platforms, Human Machine Interfaces, drives, distributed I/O):

- Spare parts management:
  - Identification of critical parts
  - Stock of spare parts: a Schneider Electric owned stock of spare parts, on your site or in one of our warehouses, with immediate availability on site or a contractually agreed delivery time if stored off site
  - Testing of spare parts stored on site
  - Automatic stock filling
- Repairs:
  - Products that have broken down are repaired in a network of worldwide repair centers. For each repaired product, our experts provide a detailed report.
- On-site repair:
  - Our experts' knowledge and expertise
  - Monitoring of specific repair procedures
  - Availability of our teams to respond 24/7
- Exchanges:
  - With standard replacements, receive a new or reconditioned product before the product that has broken down has even been sent back
  - Fast exchanges offer the option to receive the replacement product within 24 hours (in Europe)

Preventive maintenance

Improving and helping to ensure the long-term reliability and performance of your installations

Schneider Electric's preventive maintenance expert assesses your site and the equipment to be managed and sets up a maintenance program to accommodate your specific requirements. A list is provided of the tasks to be performed and their frequency, including site-specific tasks, describing how preventive maintenance is to be managed.

Extended warranty

An additional manufacturer warranty covering replacement or repair of the equipment

The extended warranty offers the option to take out a 3-year warranty. The warranty period can vary according to the geographical area (please contact our Customer Care Center for more information).

Online support

Access to dedicated experts

Priority access to experts who can answer technical questions promptly concerning equipment and software both on sale and no longer commercially available.

Software subscription

Access to software upgrades and new features

By subscribing to software updates, users are able to:

- Purchase licences
- Receive updates, upgrades, software migrations, and transitions
- Download software from Schneider Electric's software library

Dedicated service offers for your installed base

Consultancy services

EcoConsult Industrial Automation LifeCycle Audit

Professional tools and methods, proven experience of managing obsolescence and updating installed bases, helping to reduce downtime and improve performance

With our maintenance and modernization consultancy offer, Schneider Electric will help you check the state of your installed base by:

- Defining the scope and depth of the analysis in collaboration with you
- Collecting the technical data without shutting down production
- Analyzing and identifying avenues for improvement
- Producing a recommendation plan

Customer benefits:

- Learning about the components that make up the installed base and what their life cycle state is (i.e. commercialized or obsolete)
- Better downtime anticipation
- Expert advice designed to improve performance

EcoFit PLC Replacement: PLC Modernization and Migration Solutions

Moving to EcoStruxure

Proven expertise, tools, and methods to give you a clear vision of the improvement opportunities and guide you towards a successful modernization project

EcoStruxure™

Find out more about EcoStruxure architectures on our website www.se.com

Schneider Electric offers gradual solutions of modernization through a set of products, tools, and services that allow you to upgrade your installations with our latest technologies. Our solutions offer you the choice to plan your modernization:

- Partial modernization: replacement of an old set of components with a new one
- Step-by-step modernization: gradual incorporation of new solutions or offers in the system
- Complete modernization: total renovation of the system

The table below lists our various migration offers:

Wide range of migration offers		Moving to Modicon M580/M340 platforms and Modicon X80 station						
		Solution type			Tools	Solution services		
Solution		Change the CPU and retain the I/O racks and wiring	Change the CPU and the I/O racks and retain I/O field wiring with wiring system	Change the CPU, the I/O racks, and the I/O wiring	Software application conversion tool	Modernization/ migration service	Manage your project	Execute your project
Platform	Modicon Premium	☑	☑	☑	☑	☑	☑	☑
	Telemecanique TSX7		☑	☑	☑	☑	☑	☑
	Modicon Quantum	☑	☑	☑	☑	☑	☑	☑
	Modicon 984 & 800 Series I/O	☑	☑	☑	☑	☑	☑	☑
	Modicon Compact		☑	☑	☑	☑	☑	☑
	SquareD Symax	☑	*(1)*	☑	☑	☑	☑	☑
	April Series 1000		*(2)*	☑	☑	☑	☑	☑
	April SMC			☑	☑	☑	☑	☑
	Merlin Gerin PB			☑		☑	☑	☑
	AEG A series			☑		☑	☑	☑
	Rockwell SLC500		☑	☑	☑	☑	☑	☑
	Rockwell PLC 5	☑	☑	☑	☑	☑	☑	☑
	Siemens S5 and S7	☑ *(3)*	☑ *(4)*	☑	☑	☑	☑	☑

☑ **Service available**

(1) Consult Schneider Services - project-specific solution is possible
(2) For April Series 1000 (April 5000-7000 and April 2000-3000) Consult Schneider Services - project-specific solution is possible
(3) Over Profibus-DP
(4) With partner

Customization services

Schneider Electric is able to meet your specific requirements and provide you with adapted products:

- Customized wiring adapters cable lengths to match your specific needs
- The multi-use flying lead I/O adapter can be prepared in the factory before use on request
- Protective coating for HMIs, automation platforms, and distributed I/O modules for use in harsh environments
- Customized front panels for HMIs
- SCADA Software application modernization

***Note**: To check availability of services required, please contact our Customer Care Center.*

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