



Modicon M580 automation platform

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



Modicon

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Edge control for Industrial IoT

Modicon IIoT-native edge controllers manage complex interfaces across assets and devices or directly into the cloud, with embedded safety and cybersecurity. Modicon provides performance and scalability for a wide range of industrial applications up to high-performance multi-axis machines and high-available redundant processes.

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- [Modicon I/O](#)
- [Modicon Networking](#)
- [Modicon Power Supply](#)
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Life Is On



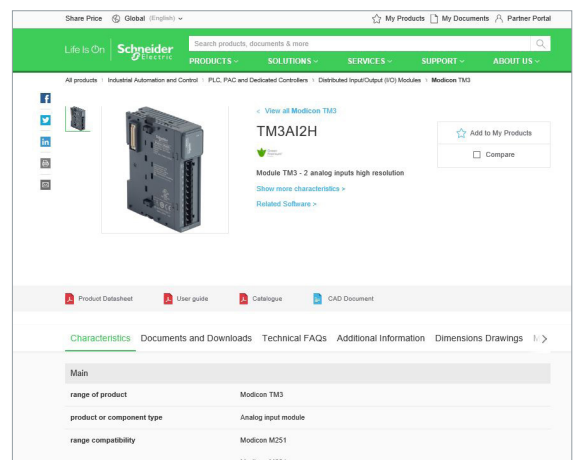
Quick access to product information

Get technical information about your product

References

Modicon TM3
I/O expansion modules for Modicon controllers
Analog I/O modules

Number and type of channels	Input range	Output range	Resolution	Input format (mA)	Reference	Weight (kg)
2 voltage inputs	-15...+10 VDC 0...10 VDC 0...20 mA, I _{sc} 20 mA	16.0% of 10.0% of	16.0% of 10.0% of	0/20 mA 0/20 mA	TM3AI2H TM3AI2HG	0.110 0.204
4 voltage inputs	-15...+10 VDC 0...10 VDC 0...20 mA, I _{sc} 20 mA	12.0% of 10.0% of	12.0% of 10.0% of	0/20 mA 0/20 mA	TM3AI4 TM3AI4G	0.100 0.204
4 voltage or temperature inputs	-15...+10 VDC 0...10 VDC 0...20 mA, I _{sc} 20 mA	16.0% of 10.0% of	16.0% of 10.0% of	0/20 mA 0/20 mA	TM3AI4T TM3AI4TG	0.110 0.204
4 differential temperature inputs	0...10 VDC 0...20 mA, I _{sc} 20 mA	16.0% of 10.0% of	16.0% of 10.0% of	0/20 mA 0/20 mA	TM3TI4 TM3TI4G	0.110 0.204
8 self-diagnosing	-15...+10 VDC	12.0% of	12.0% of	0/20 mA	TM3AI8	0.100



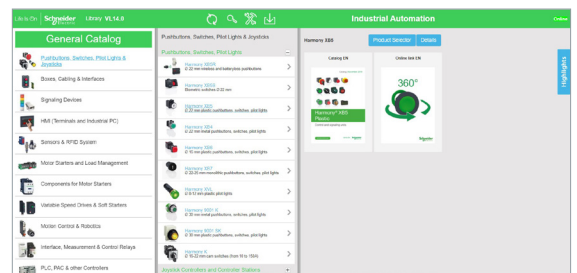
Each commercial reference presented in a catalog contains a hyperlink. Click on it to obtain the technical information of the product:

- 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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- > With just 3 clicks, you can access the Industrial Automation and Control catalogs, in both English and French
- > Consult digital automation catalogs at [Digi-Cat Online](#)

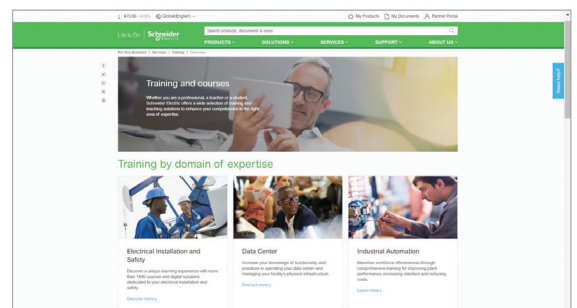


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Schneider Electric's IoT-enabled, plug-and-play, open, secure, interoperable architecture and platform, in Industries, Infrastructures, Data Centers, and Buildings.

Innovation at every level

EcoStruxure is based on a three-tiered technology stack delivering innovation at every level, from connected products to edge control and apps, analytics, and services.

Together with our hybrid segments approach, this enhances your value around safety, reliability, operational efficiency, sustainability, and connectivity across 6 domains of expertise:

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

Dedicated architectures and IoT

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

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

The Industrial Internet of Things (IIoT) gives an additional boost to technologies. That's why we provide our customers with an IoT-enabled architecture and platform offering simple, reliable, productive, and cost-efficient solutions.

Cybersecurity solutions

Robust cybersecurity protection is a must, and Schneider Electric's solutions can deliver it, regardless of business type or industry.

The vendor-agnostic services provided by our skilled professionals help to protect your entire critical infrastructure. We help to assess your risk, implement cyber-specific solutions, and maintain your onsite defenses over time, while integrating appropriate IT policies and requirements.

This is our difference and your advantage.

Enhanced safety

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

This consolidates our position as one of the most trusted industrial safety vendor, with thousands of Modicon and Triconex safety systems protecting the most critical industrial processes globally.

EcoStruxure™ for Plant
Innovation At Every Level



*The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group plc, a UK listed company. The Schneider Electric and Life is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.

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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. They support Modicon X80 I/O modules common with Modicon M340, 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/Os



Modicon X80 Remote I/O Drop Adapter



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 is 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 50ms recovery time
- > PLC availability enhanced by Ethernet link providing a redundant path
- > Automatic take over of alternative equipment in case of a shortcoming happening on one control equipment
- > High-availability system is used where no interruption of the process can be tolerated
- > Critical infrastructures, utilities and continuous process plants are typical applications

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



Modicon M580 turning into grey color

+ Open and secure solution based on standards



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, HART, etc.

Reliable and robust

- > Advanced integration of electrical power system and RTU capabilities with IEC61850, IEC101/104, and DNP3
- > Based on proven in use in-rack Modicon X80 I/Os
- > Compliance to 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 environment to withstand dust, extreme temperature, shocks, vibrations above IEC standards

Optimized maintenance

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

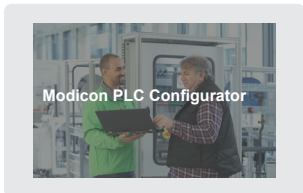
Easy configuration with online tool

- > Select your Modicon M580 system configuration in 3 simple steps using the online EcoStruxure Modicon PLC Configurator (standalone local I/O only)



ODVA organization:
Supports network technologies built on EtherNet/IP

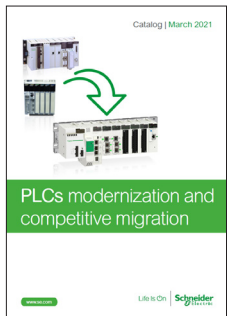
FDT technology:
A widely accepted international standard in the automation industry



Click on the pictogram to access Modicon PLC Configurator on line



DIA6ED2131203EN



DIA6ED2171102EN

Smooth modernization

- > Software converter tools to modernize legacy code to Modicon M580: tools are embedded into EcoStruxure Control Expert or additional tools (UMAC, EcoStruxure Control Engineering).
- > Legacy cabling can be adapted through hardware kits to connect existing I/Os 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, or Interbus-S.
- > Dedicated service teams can support in modernization.

+ Modify your process and architecture during runtime

1



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 facilitate 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 Modicon M580 Standard offer



+ Open and secure solution based on standards



More secure operations

Cybersecurity-ready

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

- > Protection against growing cyberattacks in industrial space
- > The Modicon M580 controller is certified CSPN by ANSSI (French National Cybersecurity Agency)
- > Modicon M580 Controller is aligned with IEC 62443-4-2 SL 1
- > With 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 IPSEC
 - > IPSEC protocols also helps secure all protocols for communication to control, 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, IEC 60870-5-104 can be used for SCADA or enterprise communications



Achilles Level 2 certification

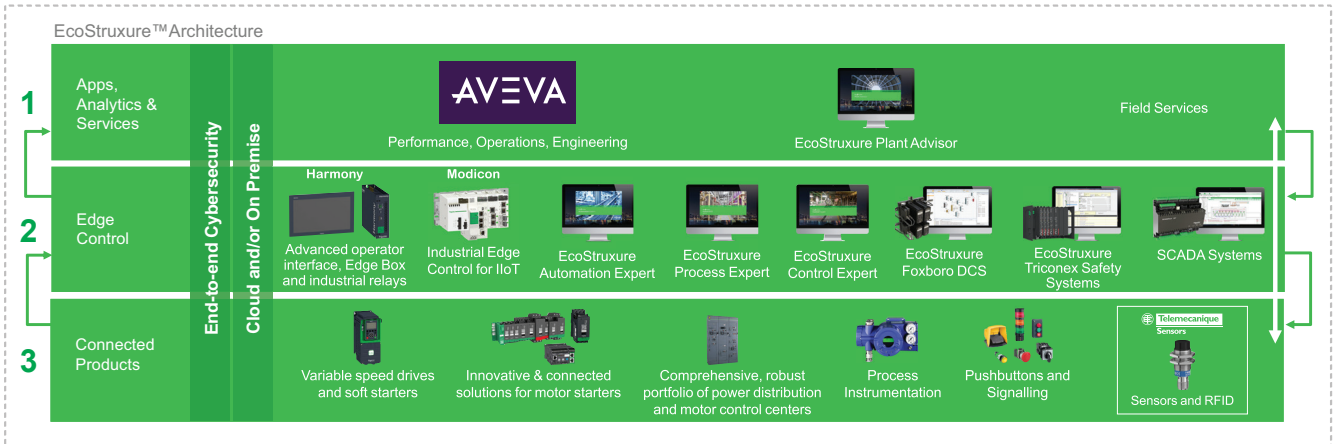


Schneider Electric provides a large scope of security related solutions and services. Please consult our website at following pages :

- [Industrial Cybersecurity](#)
- [Industrial Cybersecurity solutions](#)

1

Winning associations in EcoStruxure Plant architecture



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

1

Apps, Analytics and Services layer

- > Integrated Control and Software Solutions with AVEVA System platform. For more details, see our website www.se.com.
- > 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 our website www.se.com.
 - > See 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 Partners modules
 - > See our [website partner 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 diagnostic 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 offers easy connection and media redundancy (ring topology)
 - > Standard and 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 Power Logic (IEDs)
 - > Integration of Schneider Electric Pact series breakers and switches, as well as Power Logic power meters and protection relays via IEC 61850 protocol support into Modicon M580



+ 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 7/2 to 7/9)
- > Merchant navy: 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 7/2 to 7/9 for more information.

International certifications



Merchant Navy



Hazardous locations

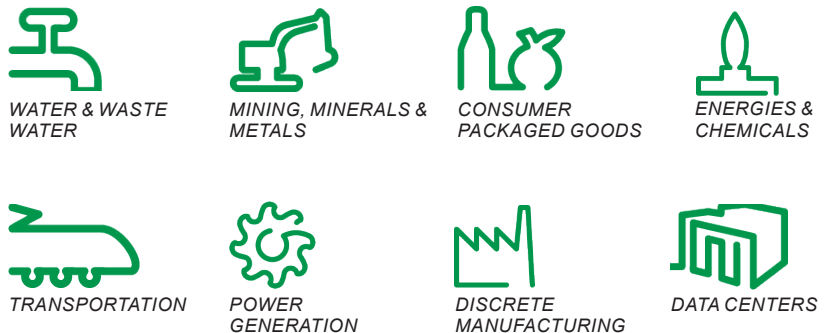


Functional safety

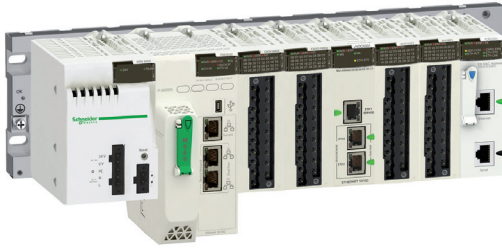


Market segments

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



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Modicon M580 automation platform

Presentation

The Modicon M580 automation platform allows two types of architecture: standard applications and high-availability applications. Those architectures can be declined for both standard and Safety applications.

The processors can manage the Modicon X80 module platform 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 supplies options are provided (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 racks. The QR code printed on the front provides access to the product datasheet.

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●●●●** Ethernet + X-bus racks and **BMXXBP●●●●** (PV02 or later) X-bus racks. 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 2/10](#)).

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●●●●** X-bus Ethernet + racks, **BMXXBP●●●●** (PV02 or later) X-bus racks, and the dual power supply racks **BMEXBP0602/1002** (allowing the use of redundant power supplies **BMXCPS4002●**).



BMEP582020 standalone processor



BMEH584040 redundant processor



BMEP582040S processor



BMEH584040S processor



BMEP586040 processor



Click on the pictogram to access Modicon PLC Configurator on line

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 performances as their corresponding and respective non-safety related processors, but they allow further integration of specific Safety related functions for Process, Machine, and Railway that make Safety processors using safety I/O modules compliant with:

- up to Safety Integrity Level 3 (SIL3) for Industrial Process safety regarding IEC61508/IEC61511
- up to Category 4, Performance Level «e» (Cat.4/PLe) for Machine safety regarding ISO13849
- up to SILCL3 for Machine safety regarding IEC62061
- up to SIL4 for Railway safety regarding EN50126/EN50128/EN50129.

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 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:

- Safety standalone 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 safety and critical processes.

Processor performance

The M580 standalone processor supports up to 8 local racks (depending on the CPU performance level), using existing X80 modules and accessories. The M580 processor must be installed in the main rack, which can be a dual (Ethernet + X-bus) bus rack. M580 PLCs can support up to 7 expansion racks of 4, 6, 8, or 12 slots for single power supply and 6 or 10 slots for dual power supply. These standalone and redundant processors physically occupy two module slots on a backplane.

The processors can manage the Modicon X80 module 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 SL
- AS-Interface actuator/sensor buses and RTU (remote terminal unit) serial link
- Expert modules

The 9 standalone processors and the 3 Hot Standby processors have different memory capacities, processing speeds, number of I/O, number of supported local racks, and embedded Ethernet port functions (see [page 2/10](#)).

The M580 processor range offers the choice of 6 memory levels from 4 MB to 64 MB (see [page 2/6](#) 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 M580 processors for application and data storage.

Modicon PLC Configurator

Select your Modicon M580 system configuration in 3 simple steps using the online EcoStruxure Modicon PLC Configurator (standalone local I/O only)

1



Modicon X80 modules platform



DIA6ED2131203EN



HART integrated analog input module



Modicon X80 module platform

The Modicon X80 module platform serves as the common base for automation platforms by simply adding a dedicated processor such as the M580 or M340. It may also:

- Form part of a Quantum Ethernet I/O architecture as an Ethernet RIO (EIO) drop with a CRA bus terminal module
- Form an Ethernet Modbus/TCP DIO drop with a PRA module

The Modicon X80 module platform is available in a single-rack or multi-rack configuration. This platform 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.

This platform, common to several automation platforms, can reduce maintenance and training costs as it comprises:

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

Based on the latest I/O technology, the Modicon X80 module platform offers:

- 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 module platform" catalog available on our website www.se.com.

Dedicated modules

HART integrated analog I/O modules

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 to the network architecture.

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

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

Note: For further information, please consult the "Modicon X80 module platform" catalog available on our website www.se.com.

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 a MMS client to communicate with IEDs and supports GOOSE)
- IEC 61850 based process control (Process control objects modeled with IEC61850 (hydro, DERs, etc.)). Module acts at the same type as a Server to communicate to SCADA and as a Client to communicate to IEDs
- Integration of a Modicon M580 acting as a data concentrator into other electrical automation systems. (module uses the IEC61850 server functionality)

OPC UA module

The **BMENUA0100** OPC UA module is an Ethernet communications 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 to connect up to 10 OPC UA clients, 50.000 monitored items and managing hot and warm redundancy in non-transparent modes as well as certificate authority for cybersecure authentication.

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

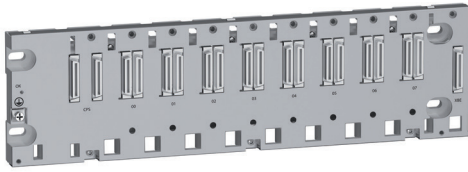


IEC 61850 module

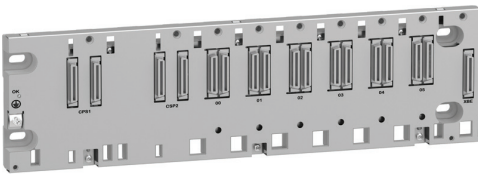


OPC UA module





8-slot Ethernet + X-bus rack



6-slot dual power supply backplane

Three types of rack

Racks for standard applications

M580 processors can work in either an X-bus rack or a dual (Ethernet + X-bus) rack. The M580 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 7 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 the Ethernet racks 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 2/10](#)).

Racks for high-availability applications

- For higher availability, M580 processors or X80 drops can work in a dual power supply backplane **BMEXBP●●02**, which supports the redundant power supply **BMXCP54002●** in pairs.
- Dual power supply backplanes are available with 6 and 10 dual (Ethernet + 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.

Backplanes

Ethernet backplanes

The M580 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 2 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 [Modicon X80 module platform catalog](#), chapter 2).

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 2 redundant power supply modules and supporting up to 10 modules.

However, an expanded backplane can only be an X-bus rack, 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 1/16](#)).

It is also possible to expand a drop's backplane.

Each rack will be assigned a physical address using 4 micro switches located in the bus expansion module:

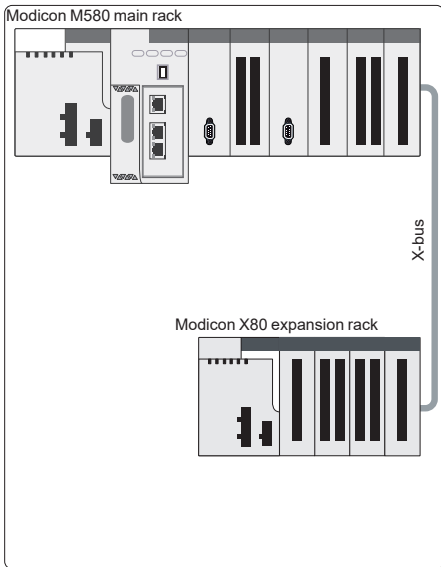
- The main rack containing the processor will be assigned address 0.
- The other racks will be assigned addresses 1 to 7.

Different architectures

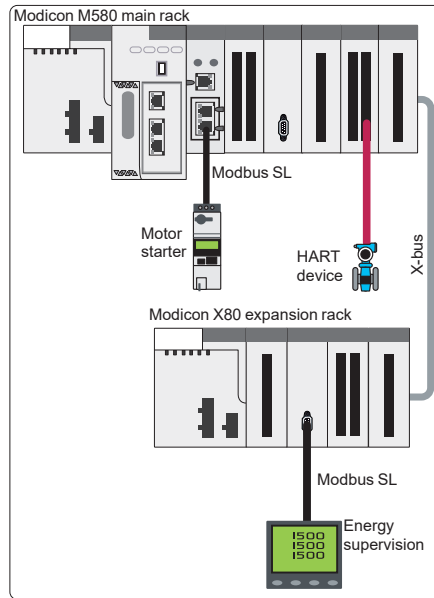
The Modicon M580 ePAC offers different embedded networks to meet various architecture needs:

- 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

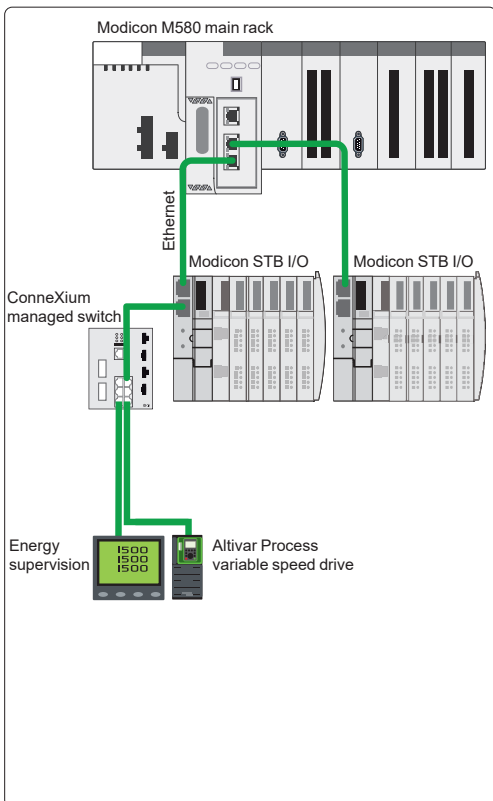
Local I/O architecture: Composed of hard-wired I/O; mainly compact topology



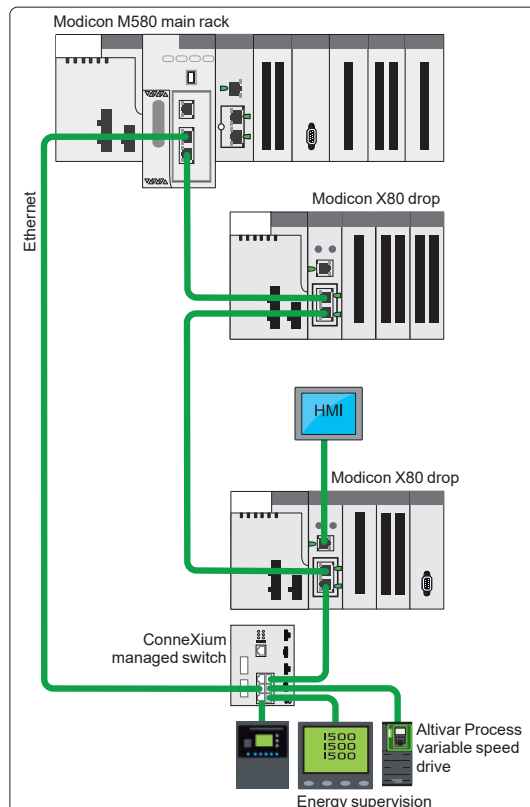
Integrated fieldbus architecture: Composed of devices distributed over fieldbuses; mainly compact topology



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

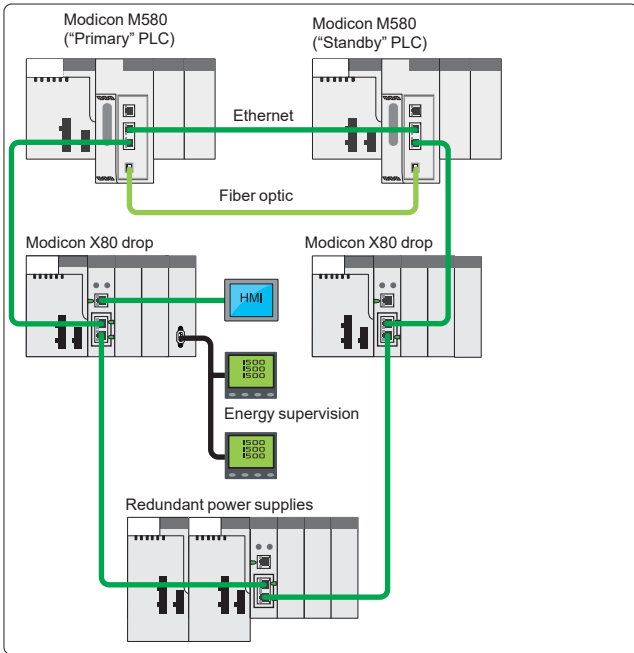


High-availability architectures

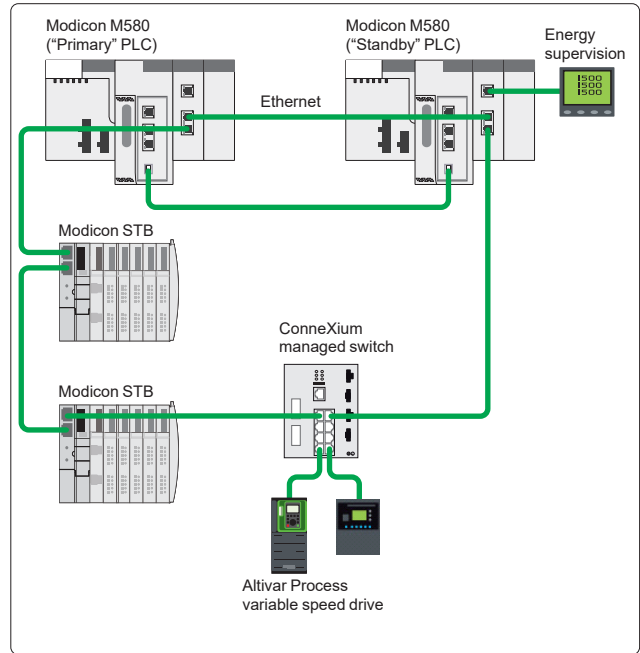
With **BMEH58●●40** processors dedicated to the Hot Standby system, high-availability architectures are used for more demanding applications:

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

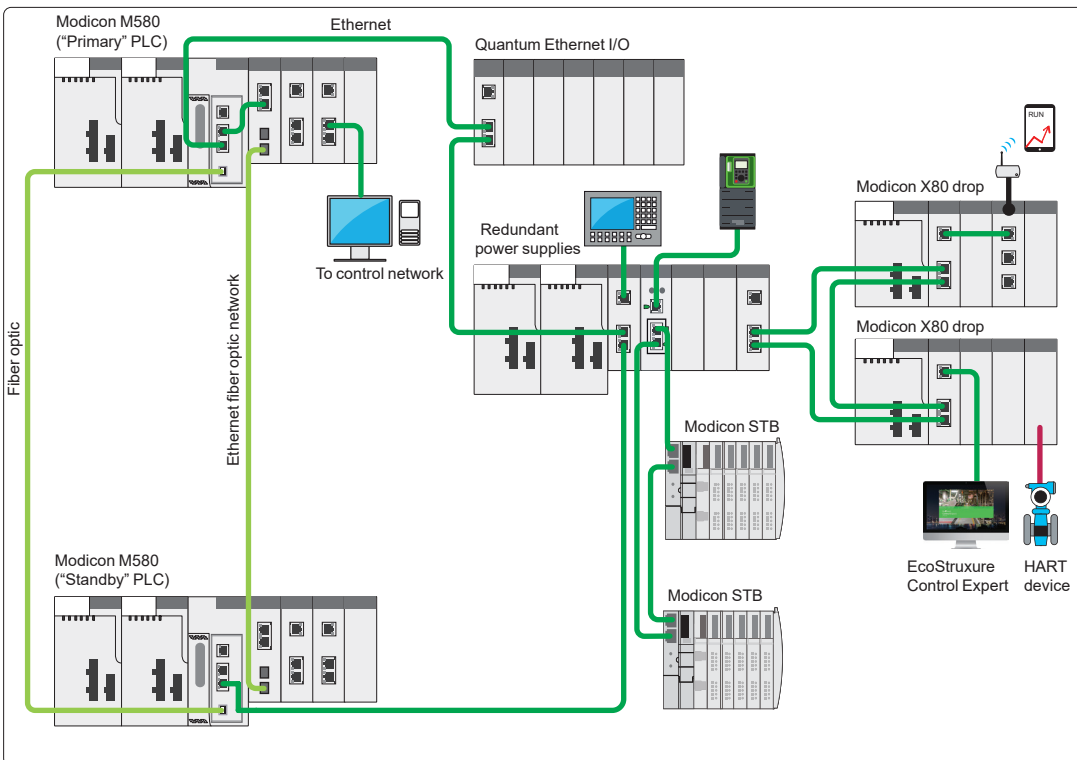
Remote I/O architecture: Composed of remote devices and featuring remote functions



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

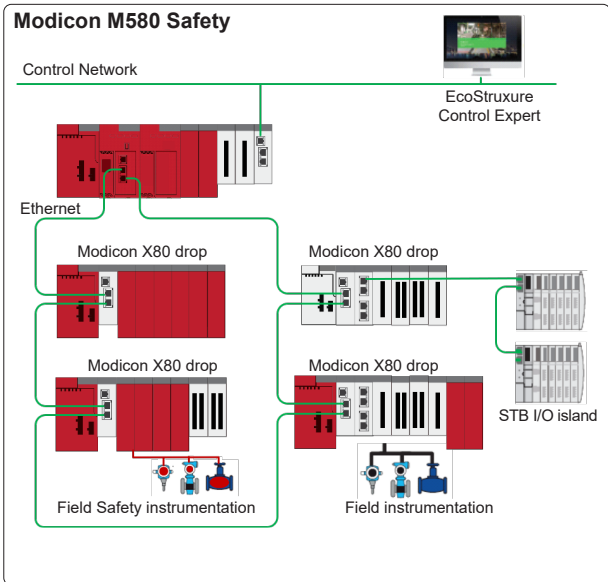
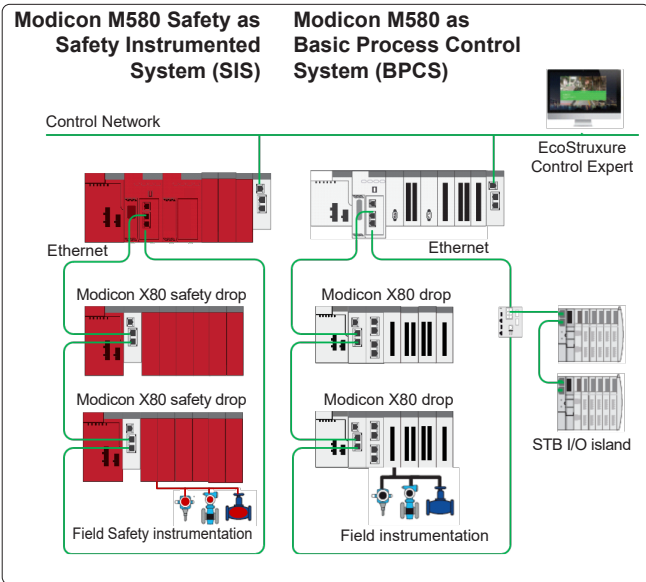


1

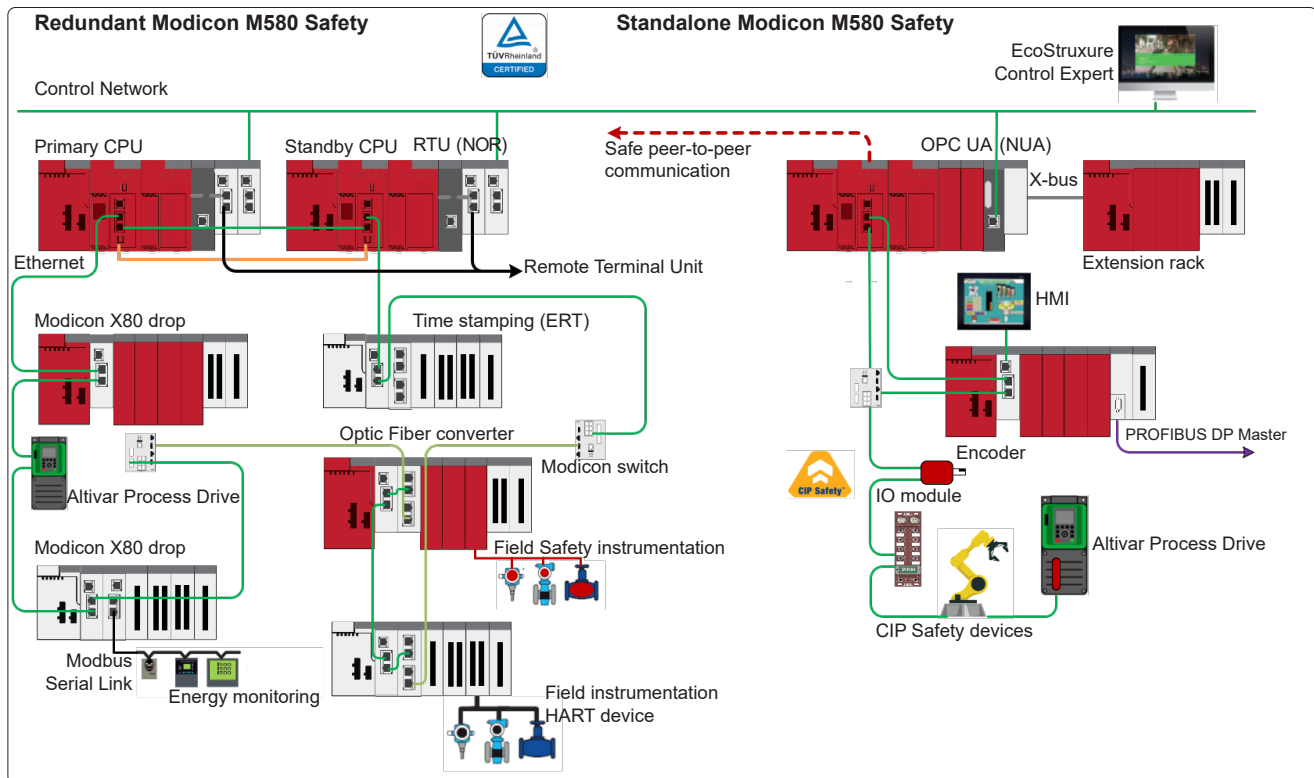
Safety architectures

Integrated Safety architecture: based on two separated 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 X80 Safety I/O as well as Basic Process Control System (BPCS) with X80 I/O



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





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 “EcoStruxure™ Control Expert and OPC software” catalog available on our website www.se.com.

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 6/2](#)).

This treatment improves the cards’ 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 °C to +70 °C / -13 °F 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 M580/M340/X80 platforms

Product compatibility according to network architecture and platform

For safety product compatibility, please refer to page 0526Q/2

Product type	Commercial reference (1)	Module type	M340		M580						M580 + M340		
					Local rack with CPU				X80 drops on Ethernet remote I/O				X80 drops on distributed I/O
					Standalone		Redundant		Standalone or redundant X-bus rack BMXXBP●●●●		Standalone	Redundant	X-bus rack BMXXBP●●●●
					X-bus rack (2) BMXXBP●●●●	X-bus + Ethernet rack BMEXBP●●●●	X-bus rack (2) BMXXBP●●●●	X-bus + Ethernet rack BMEXBP●●●●	BMXCRA31200	BMXCRA31210	BMECRA31210		BMXPRA0100
Power supplies	BMXCPS2000	X80 Power supply											
	BMXCPS2010	X80 Power supply											
	BMXCPS3020 (H)	X80 Power supply											
	BMXCPS3500 (H)	X80 Power supply											
	BMXCPS3540T	X80 Power supply											
	BMXCPS4002 (H)	X80 Redundant power supply											
	BMXCPS4022 (H)	X80 Redundant power supply											
	BMXCPS3522 (H)	X80 Redundant power supply											
	Backplanes	BMXXBP0400 (H)	X80 X-bus backplane										
BMXXBP0600 (H)		X80 X-bus backplane											
BMXXBP0800 (H)		X80 X-bus backplane											
BMXXBP1200 (H)		X80 X-bus backplane											
BMXXBE1000 (H) (3)		X80 X-bus rack expansion module											
BMXXBE2005 (4)		X80 X-bus rack expansion kit											
BMEXBP0400 (H)		X80 X-bus+Eth backplane											
BMEXBP0800 (H)		X80 X-bus+Eth backplane											
BMEXBP1200 (H)		X80 X-bus+Eth backplane											
BMEXBP0602 (H) (5)		X80 X-bus+Eth dual power supplies backplane											
BMEXBP1002 (H) (5)		X80 X-bus+Eth dual power supplies backplane											
BMXXEM010 (6)		Protective cover											
I/O		BMXAMI0410 (H)	X80 Analog I/O										
		BMXAMI0800	X80 Analog I/O										
	BMXAMI0810 (H)	X80 Analog I/O											
	BMXAMM0600 (H)	X80 Analog I/O											
	BMXAMO0210 (H)	X80 Analog I/O											
	BMXAMO0410 (H)	X80 Analog I/O											
	BMXAMO0802 (H)	X80 Analog I/O											
	BMXART0414 (H)	X80 Analog I/O											
	BMXART0814 (H)	X80 Analog I/O											
	BMEAHI0812 (H)	X80 Analog HART I/O											
	BMEAHO0412 (C)	X80 Analog HART I/O											
	BMXDAI0805	X80 Discrete I/O											
	BMXDAI0814	X80 Discrete I/O											
	BMXDAI1602 (H)	X80 Discrete I/O											
	BMXDAI1603 (H)	X80 Discrete I/O											
	BMXDAI1604 (H)	X80 Discrete I/O											
	BMXDAI1614 (H)	X80 Discrete I/O											
	BMXDAI16142	X80 Discrete I/O											
	BMXDAI1615 (H)	X80 Discrete I/O											
	BMXDAO1605 (H)	X80 Discrete I/O											
	BMXDAO1615 (H)	X80 Discrete I/O											
	BMXDDI1602 (H)	X80 Discrete I/O											
	BMXDDI1603 (H)	X80 Discrete I/O											
	BMXDDI1604T	X80 Discrete I/O											
	BMXDDI3202K (H)	X80 Discrete I/O											
	BMXDDI3203 (H)	X80 Discrete I/O											
	BMXDDI3232 (H)	X80 Discrete I/O											
	BMXDDI6402K (H)	X80 Discrete I/O											
	BMXDDM16022 (H)	X80 Discrete I/O											
	BMXDDM16025 (H)	X80 Discrete I/O											
	BMXDDM3202K	X80 Discrete I/O											
	BMXDDO1602 (H)	X80 Discrete I/O											
	BMXDDO1612 (H)	X80 Discrete I/O											
	BMXDDO3202K (C)	X80 Discrete I/O											
	BMXDDO6402K (C)	X80 Discrete I/O											
	BMXDRA0804T	X80 Discrete I/O											
	BMXDRA0805 (H)	X80 Discrete I/O											
	BMXDRA0815 (H)	X80 Discrete I/O											
	BMXDRA1605 (H)	X80 Discrete I/O											
	BMXDRC0805 (H)	X80 Discrete I/O											

(1) Optional versions: (C) - "Coated", (H) - "Hardened", and (T) - "Extended Temperature"
 (2) BMXXBP●●●● with PV02 or later required
 (3) Extended rack can be any type of rack, but only X-bus modules (BMX) can be used

(4) Extended rack kit
 (5) Not compatible with single power supplies
 (6) Protective cover for all X-bus or Eth bus connectors

Compatible Not compatible

Modicon M580/M340/X80 platforms

Product compatibility according to network architecture and platform

For safety product compatibility, please refer to page 0526Q/2

Product type	Commercial reference (1)	Module type	M340	M580						M580 + M340	
				Local rack with CPU				X80 drops on Ethernet remote I/O			X80 drops on distributed I/O
				Standalone		Redundant		Standalone or redundant X-bus rack BMXXBP●●●●			
				X-bus rack (2) BMXXBP●●●●	X-bus + Ethernet rack BMEXBP●●●●	X-bus rack (2) BMXXBP●●●●	X-bus + Ethernet rack BMEXBP●●●●	BMXCRA31200	BMXCRA31210		BMECRA31210
Expert modules	BMXEAE0300 (H)	X80 SSI encoder interface module									
	BMXEHC0200 (H)	X80 Counter module									
	BMXEHC0800 (H)	X80 Counter module									
	BMXERT1604T/H	X80 Time-stamping module									
	BMXMSP0200	X80 Motion control module									
	BMXETM0200H	X80 Frequency input module									
	PMESWT0100	X80 Weighing module (3)									
Communication modules (4)	BMXNOM0200 (H)	X80 Serial link module									
	BMXEIA0100	X80 AS-Interface module									
	BMECXM0100 (H)	X80 CANopen master module									
	BMXNRP0200 (C)	X80 Fiber converter module									
	BMXNRP0201 (C)	X80 Fiber converter module									
	PMEPXM0100 (H)	X80 PROFIBUS DP Master module									
	BMENOS0300 (C)	X80 Ethernet switch module									
	BMENOC0301 (C)	M580 Ethernet module									
	BMENOC0311 (C)	M580 Ethernet FactoryCast module									
	BMENOC0321 (C)	M580 Ethernet control router									
	BMENOP0300	M580 IEC 61850 module									
	BMXNGD0100	M580 Ethernet Global Data module									
	BMENUA0100 (H)	M580 OPC UA module									
	BMXNOR0200H	M580/M340 RTU module									
	BMENOR2200H	M580 Advanced RTU module									
		BMXNOE0100 (H)	M340 Ethernet module								
	BMXNOE0110 (H)	M340 Ethernet FactoryCast module									
	BMXNOC0401	M340 Ethernet module									
I/O expansion modules	BMXCRA31200	X80 Remote I/O drop adapter									
	BMXCRA31210 (C)	X80 Remote I/O drop adapter									
	BMECRA31210 (C)	X80 Remote I/O drop adapter									
	BMXPRA0100	X80 Peripheral remote I/O adapter									

(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, communication modules description is included within X80 catalog, M580 catalog, or M340 catalog.

Compatible Not compatible

<i>Processor selection guide</i>	page 2/2
■ Processor offer presentation	page 2/6
■ Standalone processors	page 2/7
■ Redundant processors	page 2/8
■ Memory structure	page 2/9
■ References	page 2/10

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 + extension) Remote I/O drops (1)																																											
Local X80 I/O (2) (3)	Discrete I/O channels Safe discrete I/O channels Analog I/O channels Safe analog I/O channels Application-specific channels (4)																																											
Combined Local and Remote X80 I/O (3)	Discrete I/O channels Safe discrete I/O channels Analog I/O channels Safe analog I/O channels Application-specific channels (4)																																											
Distributed equipment (DIO, CSIO)	EtherNet/IP or Modbus TCP devices (scanned by CPU) EtherNet/IP or Modbus TCP devices (scanned by CPU and Ethernet modules) BMENOC301/BMENOC311 CIP safety devices (scanned by CPU)																																											
Integrated communication ports	Ethernet service port (RJ45) Ethernet device network dual ports (RJ45) - RSTP USB type mini B port																																											
Communication	<table border="1"> <tr> <th colspan="3">Cumulative max number of :</th> </tr> <tr> <td>Ethernet networks</td> <td>Ethernet networks modules</td> <td>BMENOC/BMENOP/BMENOR</td> </tr> <tr> <td>EtherNet/IP and Modbus TCP</td> <td>EtherNet/IP and Modbus TCP module</td> <td>BMENOC0301</td> </tr> <tr> <td>FactoryCast</td> <td>FactoryCast module</td> <td>BMENOC0311</td> </tr> <tr> <td>IP Forwarding</td> <td>Ethernet control router</td> <td>BMENOC0321</td> </tr> <tr> <td>IEC 61850</td> <td>IEC 61850 module</td> <td>BMENOP0300</td> </tr> <tr> <td>OPC UA</td> <td>OPC UA module</td> <td>BMENUA0100</td> </tr> <tr> <td>DNP3 Serial/NET, IEC60870-5-101/104</td> <td>Advanced RTU module</td> <td>BMENOR2200H</td> </tr> <tr> <td>DNP3 Serial / IEC 60870-5-101</td> <td>RTU module</td> <td>BMXNOR0200H (5)</td> </tr> <tr> <td>Global Data</td> <td>Global Data module</td> <td>BMXNGD0100</td> </tr> <tr> <td>AS-Interface</td> <td>AS-Interface module</td> <td>BMXEIA0100</td> </tr> <tr> <td>Serial Link (Modbus and Character)</td> <td>Serial link module</td> <td>BMXNOM0200</td> </tr> <tr> <td>CANopen</td> <td>CANopen module</td> <td>BMECXM0100</td> </tr> <tr> <td>PROFIBUS DP</td> <td>PROFIBUS DP module</td> <td>PMEPXM0100</td> </tr> </table>		Cumulative max number of :			Ethernet networks	Ethernet networks modules	BMENOC/BMENOP/BMENOR	EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module	BMENOC0301	FactoryCast	FactoryCast module	BMENOC0311	IP Forwarding	Ethernet control router	BMENOC0321	IEC 61850	IEC 61850 module	BMENOP0300	OPC UA	OPC UA module	BMENUA0100	DNP3 Serial/NET, IEC60870-5-101/104	Advanced RTU module	BMENOR2200H	DNP3 Serial / IEC 60870-5-101	RTU module	BMXNOR0200H (5)	Global Data	Global Data module	BMXNGD0100	AS-Interface	AS-Interface module	BMXEIA0100	Serial Link (Modbus and Character)	Serial link module	BMXNOM0200	CANopen	CANopen module	BMECXM0100	PROFIBUS DP	PROFIBUS DP module	PMEPXM0100
Cumulative max number of :																																												
Ethernet networks	Ethernet networks modules	BMENOC/BMENOP/BMENOR																																										
EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module	BMENOC0301																																										
FactoryCast	FactoryCast module	BMENOC0311																																										
IP Forwarding	Ethernet control router	BMENOC0321																																										
IEC 61850	IEC 61850 module	BMENOP0300																																										
OPC UA	OPC UA module	BMENUA0100																																										
DNP3 Serial/NET, IEC60870-5-101/104	Advanced RTU module	BMENOR2200H																																										
DNP3 Serial / IEC 60870-5-101	RTU module	BMXNOR0200H (5)																																										
Global Data	Global Data module	BMXNGD0100																																										
AS-Interface	AS-Interface module	BMXEIA0100																																										
Serial Link (Modbus and Character)	Serial link module	BMXNOM0200																																										
CANopen	CANopen module	BMECXM0100																																										
PROFIBUS DP	PROFIBUS DP module	PMEPXM0100																																										
Internal memory capacity	Program process (MB) Data process (KB) Data storage (GB)																																											
No. of K instructions executed per ms	100% Boolean (Kinstr/ms) 65% Boolean + 35% fixed arithmetic (Kinstr/ms)																																											
Product compatibility with Quantum	Support of Quantum Ethernet I/O (QEIO) and LL984 Editor																																											
References																																												
Pages	2/7																																											

	BMEP5810 model	BMEP5820 models	BMEP5830 models	BMEP5840 models	BMEP5850 model	BMEP5860 model
Racks	4		8			
Local X80 I/O (2) (3)	Not supported		Not supported			
Discrete I/O channels	1024	2048	3072	4096	5120	6144
Safe discrete I/O channels	Not supported					
Analog I/O channels	256	512	768	768	1024	1536
Safe analog I/O channels	Not supported					
Application-specific channels (4)	36	72	108	108	144	216
Combined Local and Remote X80 I/O (3)	1024	2048	10240	19456	20480	37888
Discrete I/O channels	Not supported					
Safe discrete I/O channels	256	512	2560	4864	5120	9472
Analog I/O channels	Not supported					
Safe analog I/O channels	36	72	360	684	720	1332
Application-specific channels (4)	61	125	61	61	61	
Distributed equipment (DIO, CSIO)	317	381	317	509	637	573
Integrated communication ports	Not supported					
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)					
USB type mini B port	RIO network (RIO/DIO scanner)					
Communication	DIO network (DIO scanner)					
Ethernet networks	RIO network (RIO/DIO scanner)					
EtherNet/IP and Modbus TCP	DIO network (DIO scanner)					
FactoryCast	RIO network (RIO/DIO scanner)					
IP Forwarding	DIO network (DIO scanner)					
IEC 61850	RIO network (RIO/DIO scanner)					
OPC UA	DIO network (DIO scanner)					
DNP3 Serial/NET, IEC60870-5-101/104	RIO network (RIO/DIO scanner)					
DNP3 Serial / IEC 60870-5-101	DIO network (DIO scanner)					
Global Data	RIO network (RIO/DIO scanner)					
AS-Interface	DIO network (DIO scanner)					
Serial Link (Modbus and Character)	RIO network (RIO/DIO scanner)					
CANopen	DIO network (DIO scanner)					
PROFIBUS DP	RIO network (RIO/DIO scanner)					
Internal memory capacity	Program process (MB)					
Data process (KB)	Data process (KB)					
Data storage (GB)	Data storage (GB)					
No. of K instructions executed per ms	100% Boolean (Kinstr/ms)					
Product compatibility with Quantum	65% Boolean + 35% fixed arithmetic (Kinstr/ms)					
References	Support of Quantum Ethernet I/O (QEIO) and LL984 Editor					
Pages	2/7					

(1) A Remote I/O drop can be either a X80 RIO Drop (RIO) or a Quantum Ethernet I/O drop (QEIO). One X80 RIO drop can support up to 2 racks (via X-bus extension).
 (2) Local X80 I/O are localized in local racks (main or extension). Redundant controllers do not support Local X80 I/O.
 (3) Maximum number of I/O channels (Discrete, Safe Discrete, Analog and Safe Analog) as well as application-specific channels is not cumulative.
 (4) Application-specific channels include counters, time-stamping, SSI encoder, Motion control, Serial and Frequency input modules.
 (5) Maximum number of BMXNOR modules is not cumulative with other Ethernet network modules.
 (6) With BMEP58040 CPUs, additional BMXEIA0100 modules can be installed in remote drops : 2 per drop and with a maximum of 16 BMXEIA0100 modules.

Modicon M580 automation platform

BMEH5820 model

BMEH5840 model

BMEH5860 model



Racks	Local racks (main + extension) Remote I/O drops (1)	
Local X80 I/O (2) (3)	Discrete I/O channels Safe discrete I/O channels Analog I/O channels Safe analog I/O channels Application-specific channels (4)	
Combined Local and Remote X80 I/O (3)	Discrete I/O channels Safe discrete I/O channels Analog I/O channels Safe analog I/O channels Application-specific channels (4)	
Distributed equipment (DIO, CSIO)	EtherNet/IP or Modbus TCP devices (scanned by CPU)	
	EtherNet/IP or Modbus TCP devices (scanned by CPU and Ethernet modules)	BMENOC301/ BMENOC311
	CIP safety devices (scanned by CPU)	
Integrated communication ports	Ethernet service port (RJ45) Ethernet device network dual ports (RJ45) - RSTP USB type mini B port	
Communication	Ethernet networks	Cumulative max number of : Ethernet networks modules
	EtherNet/IP and Modbus TCP	BMENOC/BMENOP/ BMENOR
	EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module
	FactoryCast	BMENOC0301
	IP Forwarding	BMENOC0311
	IEC 61850	Ethernet control router
	OPC UA	BMENOC0321
	DNP3 Serial/NET, IEC60870-5-101/104	IEC 61850 module
	DNP3 Serial / IEC 60870-5-101	BMENOP0300
	Global Data	OPC UA module
	AS-Interface	BMENUA0100
	Serial Link (Modbus and Character)	Advanced RTU module
	CANopen	BMENOR2200H
PROFIBUS DP	RTU module	
Internal memory capacity	Program process (MB)	BMXNOR0200H (5)
	Data process (KB)	Global Data module
	Data storage (GB)	BMXNGD0100
No. of K instructions executed per ms	100% Boolean (Kinstr/ms)	BMXEIA0100
	65% Boolean + 35% fixed arithmetic (Kinstr/ms)	Serial link module
Product compatibility with Quantum	Support of Quantum Ethernet I/O and LL984 Editor	BMXNOM0200
		CANopen module
References		BMECXM0100
Pages		PMEPXM0100

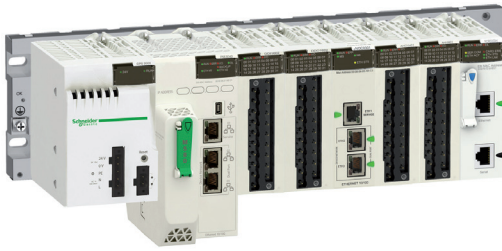
1		
8	16	31
Not supported		
8192	16384	31744
Not supported		
2048	4096	7936
Not supported		
288	576	1116
61		
317	573	573
Not supported		
Engineering and Maintenance console (EcoStruxure Control Expert, Web browser, external tools), HMI, SCADA, Distributed equipment (DIO)		
RIO network (RIO/DIO scanner)		
Programming port for Engineering Console (EcoStruxure Control Expert)		
2	4	
2	4	
2	4	
2		
2	4	
2		
2	4	
2		
2	4	
2		
2	4	
2		
2	4	
2		
2	6	10
8	16	64
768	2048	Up to 64MB
4		
10	40	50
7.5	30	40
No	Yes	
BMEH582040	BMEH584040	BMEH586040
2/8		

(1) A Remote I/O drop can be either a X80 RIO Drop (RIO) or a Quantum Ethernet I/O drop (QEIO). One X80 RIO drop can support up to 2 racks (via X-bus extension).
 (2) Local X80 I/O are localized in local racks (main or extension). Redundant controllers do not support Local X80 I/O.
 (3) Maximum number of I/O channels (Discrete, Safe Discrete, Analog and Safe Analog) as well as application-specific channels is not cumulative.
 (4) Application-specific channels include counters, time-stamping, SSI encoder, Motion control, Serial and Frequency input modules.
 (5) Maximum number of BMXNOR modules is not cumulative with other Ethernet network modules.
 (6) Not supported with redundant controllers.
 (7) Only supported in Remote I/O drops and with a maximum of 16 BMXEIA0100 modules.
 (8) Only supported in Remote I/O drops.

Modicon M580 automation platform

M580 processors

2



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 2 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 M580 processor range offers the choice of 6 memory levels:

- 4 MB for **BMEP581020** processor
- 8 MB for **BMEP5820●●** and **BMEH582040** processors
- 12 MB for **BMEP5830●●** processors
- 16 MB for **BMEP5840●●** and **BMEH584040** processors
- 24 MB for **BMEP585040** processor
- 64 MB for **BMEP586040** and **BMEH586040** processors

An optional 4 GB SD memory card **BMXRMS004GPF** is used with 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 **BMEP58●●40/BMEH58●●40** processors
- 4 extended master AS-Interface V3 actuator/sensor buses, profile M4.0

Applications can be downloaded to the 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 **BMECRA31210** Ethernet drop adapters and ConneXium 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 www.se.com.

(3) By using remote drops, these limits can be extended to the maximum configuration managed by one M580 station.

(4) Unity Pro software in earlier versions.

Modicon M580 automation platform

M580 processors
Standalone processors



BMEP5810/20/30/40



BMEP585040/6040

Description of BMEP58 processors

BMEP58 processors include:

- 1 Display block comprising 8 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 (a 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 2 hooks and 2 screws for mechanical attachment and grounding connection to backplane
- 8 2 connectors for electrical connection to an M580 backplane (X-bus only or Ethernet backplane)

BMEP5820 processors

- 4 BMEP5820 processors have dual RJ45 Ethernet ports for connection to the distributed equipment (DIO).

BMEP5840 processors

- 4 BMEP5840 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 feature embedded Ethernet and X-bus connectivity. With 4, 8, and 12 slots for standard power supply or 6 and 10 slots for redundant power supply, these two connectors allow the existing M580/X80 modules to be incorporated into an M580 architecture (see page 4/4).

(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 ConneXium switches: TCSESM083F23F1/063F2CU1/063F2CS1.
 (3) Please refer to the HMI catalogs on www.se.com.
 (4) Unity Pro software in earlier versions.

Modicon M580 automation platform

M580 processors
Redundant processors

2



Description of BMEH580000 processors

BMEH580000 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 malfunction
 - 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 (a 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 2 hooks and 2 screws for mechanical attachment and grounding connection to backplane
- 8 2 connectors for electrical connection to an M580 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

BMEH580040 processors

- 4 BMEH580040 processors have dual RJ45 Ethernet ports for connection to the remote I/O drops (EIO) and distributed equipment.

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).

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:

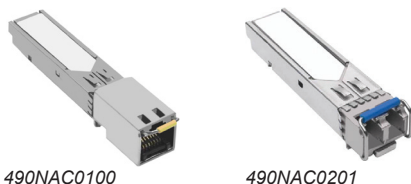
- Copper if the 490NAC0100 SFP socket is used
- Fiber optic if the 490NAC0201 SFP socket is used

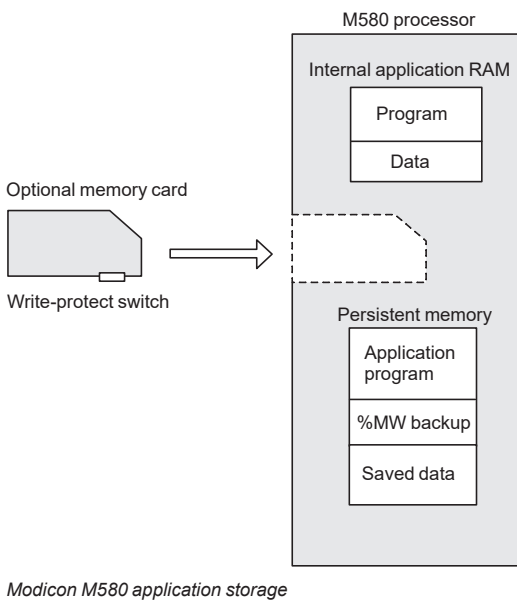
Ethernet backplanes

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

(1) Please refer to the HMI catalogs on www.se.com.

(2) Unity Pro software in earlier versions.





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 °C/-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 for protecting know-how by means of a signature that can be loaded and stored in the 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 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

M580 processors
Standalone processors

2



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 24 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 32 application-specific channels 8 MB integrated (memory program)	2 Ethernet networks	2 DIO	1	BMEP582020	0.849/ 1.872
		2 RIO	1	BMEP582040	0.849/ 1.872
3,072 discrete I/O 768 analog I/O 64 application-specific channels 12 MB integrated (memory program)	3 Ethernet networks	2 DIO	1	BMEP583020	0.849/ 1.872
		2 RIO	1	BMEP583040	0.849/ 1.872
4,096 discrete I/O 1,024 analog I/O 64 application-specific channels 16 MB integrated (memory program)	4 Ethernet networks	2 DIO	1	BMEP584020	0.849/ 1.872
		2 RIO	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	1	BMEP586040	0.849/ 1.872



BMXRMS004GPF

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



BMXXCAUSBH0●●

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	1.8/5.905	BMXXCAUSBH018	0.065/ 0.143
		- Harmony HMI graphic terminal	4.5/14.764	BMXXCAUSBH045	0.110/ 0.243

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

Modicon M580 automation platform

M580 processors

Redundant processors



BMEH58000000



BMEH580040K 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	1	BMEH582040	0.849/ 1.872
16 MB integrated (memory program)	4 Ethernet networks	2 RIO	1	BMEH584040	0.849/ 1.872
64 MB integrated (memory program)	4 Ethernet networks	2 RIO	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 BMEH580040 redundant processors	RJ45 copper	490NAC0100	—
	To be inserted in pair in 2 BMEH580040 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 M580 processors - 2 490NAC0100 RJ45 SFP sockets	BMEH582040K	—
	- 2 BMEH584040 redundant M580 processors - 2 490NAC0100 RJ45 SFP sockets	BMEH584040K	—

(1) For additional characteristics, see our website www.se.com.

- [Safety processor selection guide..... page 3/2](#)
- **Safety product compatibility table..... page 3/6**
- **Safety standalone processors**
 - [Overview, architecture..... page 3/8](#)
 - [Safety level..... page 3/9](#)
 - [CIP safety..... page 3/10](#)
 - [Description, references.....page 3/11](#)
- **Safety redundant processors (HSBY)**
 - [Overview, architecture, Safety level..... page 3/12](#)
 - [Description, references..... page 3/13](#)

Modicon M580 automation platform

Modicon M580 Safety standalone processors

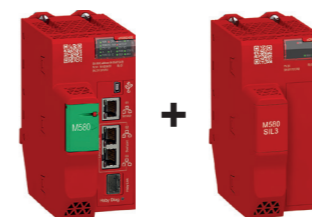
Modicon M580 automation platform			BMEP582040S + BMEP58CPROS3 mandatory coprocessor (1)	BMEP584040S + BMEP58CPROS3 mandatory coprocessor (1)	BMEP586040S + BMEP58CPROS3 mandatory coprocessor (1)
Racks	Local racks (main + extension) Remote I/O drops (2)		4 8	8 16	31
Local X80 I/O (3) (4)	Discrete I/O channels		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			Engineering and Maintenance console (EcoStruxure Control Expert, Web browser, external tools), HMI, SCADA, Distributed equipment (DIO, CSIO)		
Ethernet service port (RJ45)			RIO network (RIO/DIO/CSIO scanner)		
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	Cumulative max number of Ethernet networks modules	2	4	
	EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module	2	3	
	FactoryCast	FactoryCast module	2	3	
	IP Forwarding	Ethernet control router	2		
	IEC 61850	IEC 61850 module	2	4	
	OPC UA	OPC UA module	2		
	DNP3 NET / IEC 60870-5-104	Advanced RTU module	2	4	
	DNP3 Serial / IEC 60870-5-101	RTU module	– (7)		
	Global Data	Global Data module	2	4	
	AS-Interface	AS-Interface module	4 (8)	8 (8)	
	Serial Link (Modbus and Character)	Serial link module			
	CANopen	CANopen module			
	PROFIBUS DP	PROFIBUS DP module			
	Internal memory capacity	Program process (MB)		2	16
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)		10	40	60
	65% Boolean + 35% fixed arithmetic (Kinstr/ms)		7.5	30	40
Product compatibility with Quantum	Support of Quantum Ethernet I/O (QEIO) and LL984 Editor		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 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.

Selection guide (continued) 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)
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Racks	Local racks (main + extension)	
	Remote I/O drops (2)	
Local X80 I/O (3) (4)	Discrete I/O channels	
	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	
	Safe discrete I/O channels	
	Analog I/O channels	
	Safe analog I/O channels	
	Application-specific channels (5)	
Distributed equipment (DIO, CSIO)	EtherNet/IP or Modbus TCP devices (scanned by CPU)	
	EtherNet/IP or Modbus TCP devices (scanned by CPU and Ethernet modules)	BMENOC301/ BMENOC311
	CIP safety devices (scanned by CPU)	
Integrated communication ports	Ethernet service port (RJ45)	
	Ethernet device network dual ports (RJ45) - RSTP	
	USB type mini B port	
Communication	Ethernet networks	Cumulative max number of Ethernet networks modules
	EtherNet/IP and Modbus TCP	EtherNet/IP and Modbus TCP module
	FactoryCast	FactoryCast module
	IP Forwarding	Ethernet control router
	IEC 61850	IEC 61850 module
	OPC UA	OPC UA module
	DNP3 NET / IEC 60870-5-104	Advanced RTU module
	DNP3 Serial / IEC 60870-5-101	RTU module
	Global Data	Global Data module
	AS-Interface	AS-Interface module
	Serial Link (Modbus and Character)	Serial link module
	CANopen	CANopen module
	PROFIBUS DP	PROFIBUS DP module
Internal memory capacity	Program process (MB)	
	Program safe (MB)	
	Data process (KB)	
	Data safe (KB)	
	Data storage (GB)	
No. of K instructions executed per ms	100% Boolean (Kinstr/ms)	
	65% Boolean + 35% fixed arithmetic (Kinstr/ms)	
Product compatibility with Quantum	Support of Quantum Ethernet I/O (QEIO) and LL984 Editor	
References		
Pages		

1		
8	16	31
Not supported		
8192	16384	31744
2944	5888	11408
2048	4096	7936
544	1088	2108
288	576	1116
61		
317	436	436
– (9)		
Engineering and Maintenance console (EcoStruxure Control Expert, Web browser, external tools), HMI, SCADA, Distributed equipment (DIO)		
RIO network (RIO/DIO scanner)		
Programming port for Engineering Console (EcoStruxure Control Expert)		
2	4	
2	3	
2	3	
2		
2	3	
2		
2	4	
– (7)		
– (9)		
4 (8)	8 (8)	
Each BMXNOM0200 channel counts as an application-specific channel (10)		
– (9)		
2	6	10
8	16	64
2	4	16
768	2048	Up to 64MB (11)
512	1024	1024
4		
10	40	50
7.5	30	40
No	Yes	
BMEH582040S	BMEH584040S	BMEH586040S
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 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) 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.

Modicon M580/X80 platforms

Safety product compatibility according to network architecture and platform

For non safety product compatibility, please refer to [page 1/16](#)

Product type	Commercial reference (1)	Module type	M580 Safety						
			Local rack with Safety CPU and coprocessor (X-bus + Ethernet rack BMEXBP are mandatory for Safety CPU and coprocessor)		X80 drops on Ethernet Remote I/O		X80 drops on distributed I/O		
			Standalone	Redundant (HSBY)	Standalone or redundant (HSBY)		Standalone		
			X-bus + Ethernet rack BMEXBP●●●●		X-bus rack BMXXBP●●●●		X-bus + Ethernet rack BMEXBP●●●●	X-bus rack BMXXBP●●●●	
				BMXCRA31200	BMXCRA31210	BMECRA31210	BMXPRA0100		
Safety power supplies	BMXCPS4002S	Redundant safety power supply							
	BMXCPS4022S	Redundant safety power supply							
	BMXCPS3522S	Redundant safety power supply							
Backplanes	BMXXBP0400 (H)	X-bus backplane							
	BMXXBP0600 (H)	X-bus backplane							
	BMXXBP0800 (H)	X-bus backplane							
	BMXXBP1200 (H)	X-bus backplane							
	BMXXBE1000 (H) (2)	X-bus rack expansion module							
	BMXXBE2005 (3)	X-bus rack expansion kit							
	BMEXBP0400 (H)	X-bus+Eth backplane							
	BMEXBP0800 (H)	X-bus+Eth backplane							
	BMEXBP1200 (H)	X-bus+Eth backplane							
	BMEXBP0602 (H) (4)	X-bus+Eth dual power supplies backplane							
	BMEXBP1002 (H) (4)	X-bus+Eth dual power supplies backplane							
	BMXXEM010 (5)	Protective cover connector							
	Safety I/O	BMXSAI0410	Safety analog input						
		BMXSDI1602	Safety discrete input						
BMXSDO0802		Safety discrete output							
BMXSRA0405		Safety relay output							
I/O expansion	BMXCRA31200	RIO drop X-bus adapter							
	BMXCRA31210 (C)	RIO drop X-bus adapter							
	BMECRA31210 (C)	RIO drop X-bus+Eth adapter							
	BMXPRA0100	DIO drop adapter							

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

Compatible **Not compatible**

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

Modicon M580 automation platform

Safety

M580 Safety standalone processors



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

Presentation

Overview

The Modicon M580 Safety processor is a 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 the X80 platform, and the EcoStruxure Control Expert (1) environment:

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

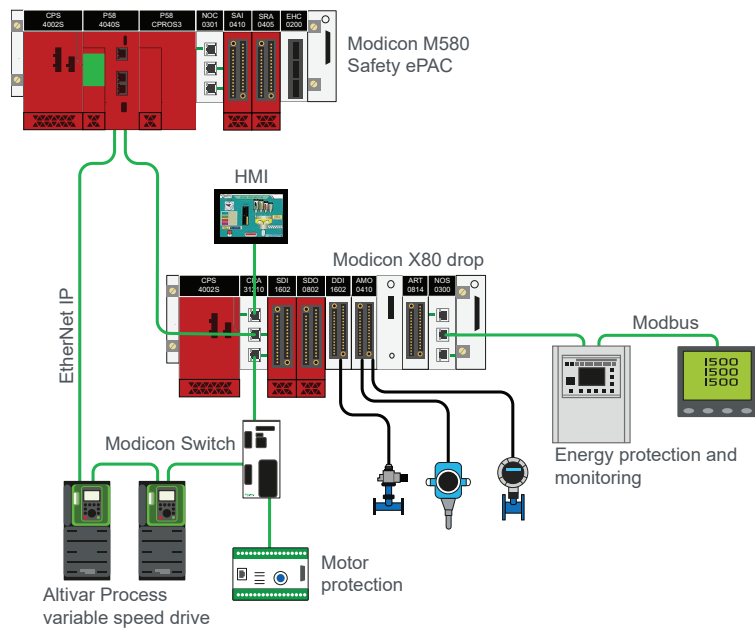
X80 Safety modules are only compatible with the M580 Safety processor.

Architecture

The 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

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 M580 Safety PAC comply with:

- up to Safety Integrity Level 3 (SIL3) for Industrial Process safety regarding IEC61508/IEC61511
- up to Category 4, Performance Level «e» (Cat.4/PLe) for Machine safety regarding ISO13849
- up to SILCL3 for Machine safety regarding IEC62061
- up to SIL4 for Railway safety regarding EN50126/EN50128/EN50129.

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

M580 Safety standalone processors



3

Presentation

CIP Safety

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

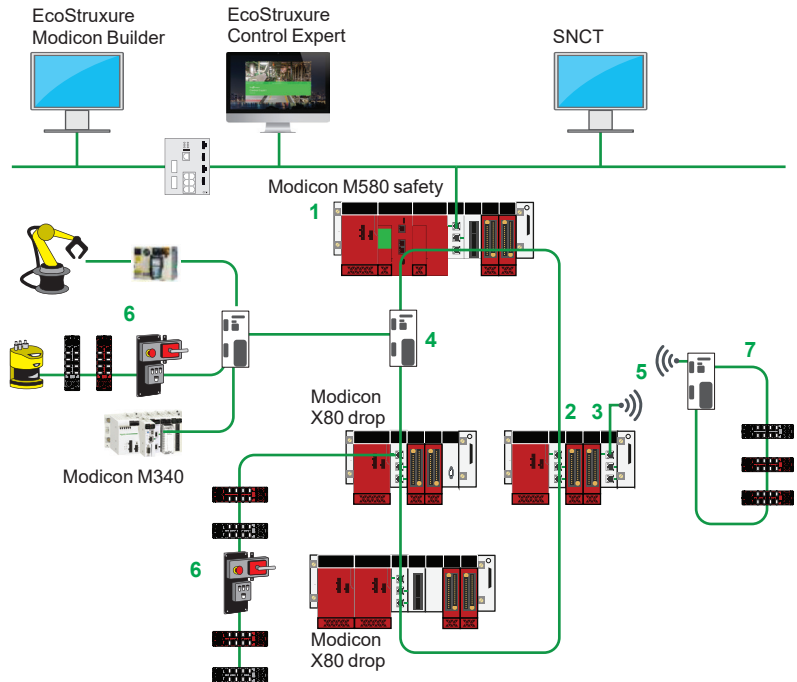
As an ODVA-conformant service, CIP Safety opens access over EtherNet/IP to third-party Safety products, compliant up to SIL3/PLe for Process and Machine, and SIL4 for Railway.

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 M580 Safety CPU 1 and X80 CRA modules 2
- Placed through an X80 BMENOS module 3 or the dual ring switches (DRS) 4
- A CIP Safety target cannot be scanned by a X80 BMENOC Ethernet module.
- The target must be placed in the same Ethernet network and IP domain as the M580S CPU.

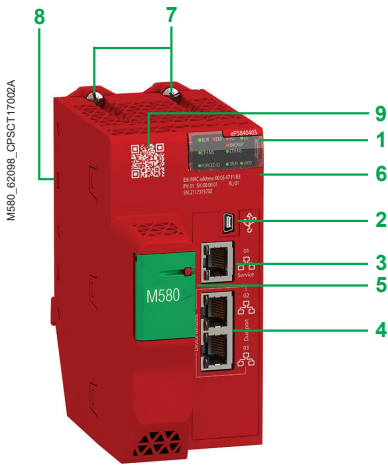
The ring topology 7 is enabled with DLR protocol.



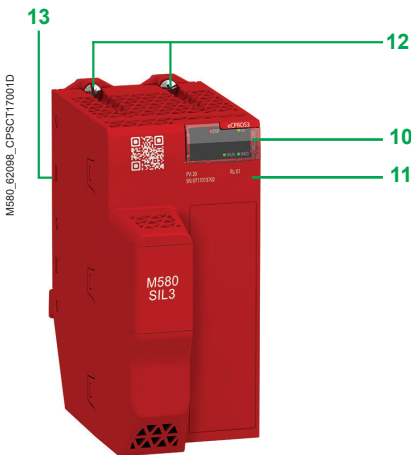
The CIP Safety service is available with standalone (1) Safety CPUs with firmware version V3.10 or later and EcoStruxure Control Expert V14.1. Depending on the CPU type, up to 16/64/128 CIP Safety devices can be connected to the CPU, in addition to other DIO devices. To ensure optimum performance of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

Description	BMPE582040S			BMPE584040S			BMPE586040S		
	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) M580 Safety redundant CPUs (HSBY) do not support CIP Safety.



BMEP58040S



BMEP58CPROS3



BMEP58040S

Description of M580 Safety processor and coprocessor

BMEP58040S processor

BMEP58040S processors include:

- 1 Display block comprising 8 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 2 hooks and 2 screws for mechanical attachment and grounding connection to backplane
- 8 2 connectors for electrical connection to an M580 backplane (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 2 LEDs to provide quick diagnostics of the coprocessor status:
 - ERR LED (red): coprocessor or system detected error
 - DL LED (green): firmware download in progress
- 11 Printed serial number and product version on the front panel of the coprocessor
- 12 2 hooks and 2 screws for mechanical attachment and grounding connection to backplane
- 13 2 connectors for electrical connection to an M580 backplane (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

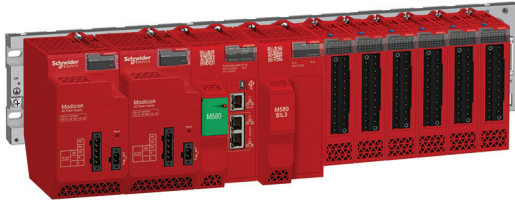
(1) DRS: Dual ring switches. Supported Modicon switches: **TCSESM083F23F1/063F2CU1/063F2CS1**

(2) **BMEP58040S** processors have a door that can be locked to prevent removal of the SD card.

Modicon M580 automation platform

Safety

M580 Safety redundant processors (HSBY)



Modicon M580 Safety configuration with the full safety rack

3

Presentation

Overview

The Modicon M580 Safety is a 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 the X80 platform and the EcoStruxure Control Expert (1) environment:

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

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

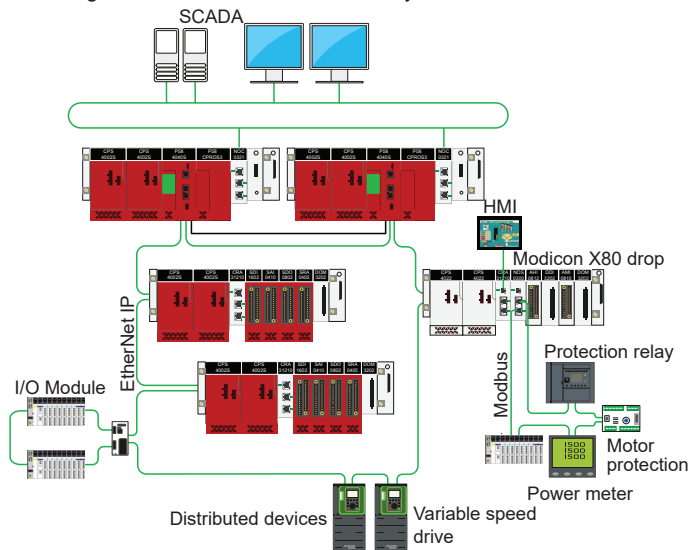
In a high availability architecture (HSBY), it is not possible to place I/O and Expert modules in the local rack (together with a CPU).

Architecture

The 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:

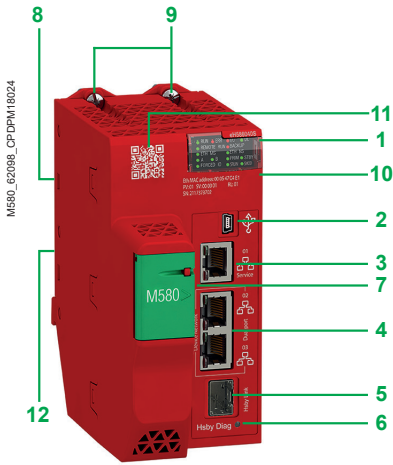
- Isolated safety memory cells
- Online error code correction
- Security watchdog
- Clock monitoring
- Safety application executed in a dedicated core
- Memory isolation helping to secure access to safety and non-safety memory
- Safety memory different from the standard CPU

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

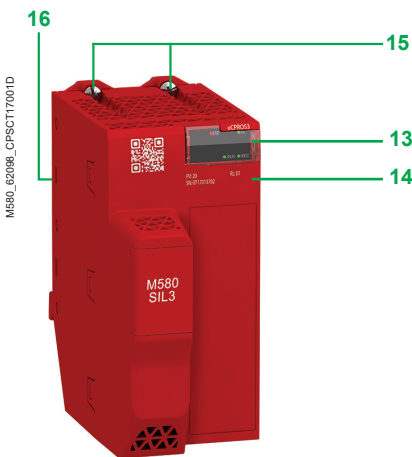
- up to Safety Integrity Level 3 (SIL3) for Industrial Process Safety regarding IEC61508/IEC61511
- up to Category 4, Performance Level «e» (Cat.4/PLe) for Machine Safety regarding ISO13849
- up to SILCL3 for Machine Safety regarding IEC62061
- up to SIL4 for Railway Safety regarding EN50126/EN50128/EN50129.

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

(1) Unity Pro software in earlier versions.



BMEH58040S



BMEP58CPROS3



BMEH58040S

Description of M580S redundant processor (HSBY) and coprocessor

BMEH58040S processor

BMEH58040S 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): processor or system detected 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 2 connectors for electrical connection to an M580 backplane (X-bus and Ethernet backplane)
- 9 2 hooks and 2 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 2 LEDs to provide quick diagnostics of the coprocessor status:
 - ERR LED (red): coprocessor or system detected error
 - DL LED (green): firmware download in progress
- 14 Printed serial number and product version on the front panel of the coprocessor
- 15 2 hooks and 2 screws for mechanical attachment and grounding connection to backplane
- 16 2 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) BMEH58040S processors have a door that can be locked to prevent removal of the SD card.

Industrial Ethernet services

- Modicon M580 communication services..... page 4/2
- Modicon M580 web services..... page 4/8

Communication modules

Communication modules selection guide..... page 4/12

■ Modbus/TCP and EtherNet/IP communication

- 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

- OPC UA module..... page 4/18

■ IEC 61850 communication

- IEC 61850 module..... page 4/22

■ RTU communication

- RTU module..... page 4/24
- Advanced RTU module..... page 4/28

■ Global Data communication

- Ethernet Global Data module..... page 4/30

* For all remaining communication modules compatible with Modicon M580, please refer to X80 catalog .



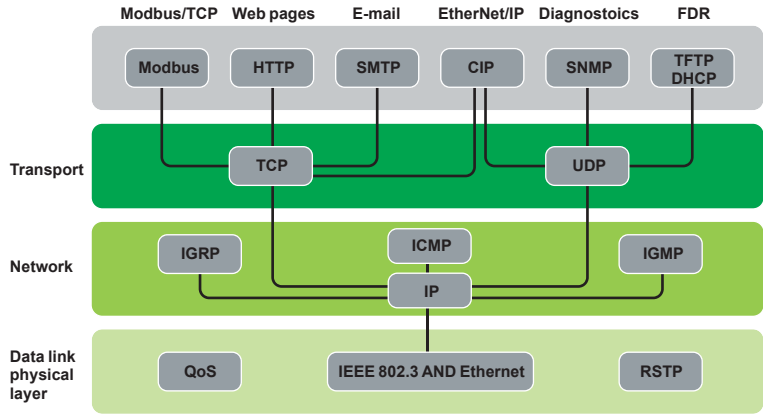
Modicon M580 automation platform

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 (HTTP, 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 in all devices. Please refer to the Selection Guide and Reference pages for a comprehensive list of the services offered by each device.

Functions

Ethernet basic services

HTTP (RFC 1945)

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. Web servers embedded in Schneider Electric automation products provide easy access to information and diagnostics from anywhere in the network.

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)

Simple Network Management Protocol (SNMP) 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.

Schneider Electric offers a network management software application tailored for the industrial control environment. ConneXium Network Manager has been developed with the Automation and Controls professional in mind. ConneXium Network Manager provides a window on network equipment operation to help improve plant productivity. The software can be used to:

- Discover network devices and generate a network map
- Set network performance thresholds and provide alerts on detected anomalies to help prevent downtime
- Manage ports (multiple ports at once)
- Baseline network performance
- Document the network
- Generate a report to send to technical support
- Interface to SCADA via the built-in OPC server

The software is compatible with third-party products as well as with Schneider Electric network devices.



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 on 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, 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

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



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)
EtherNet/IP Network	Modbus Object (44hex)
	QoS Object (48hex)
	Port Object (F4hex)
	TCP/IP Interface Object (F5hex)
Diagnostics	Ethernet Link Object (F6hex)
	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)

Modicon M580 automation platform

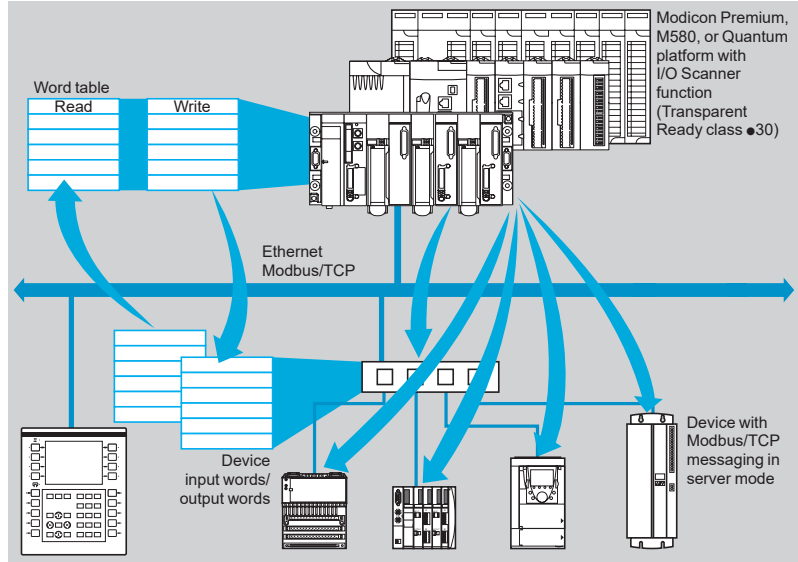
Industrial Ethernet services

Modicon M580 communication services

4

Functions (continued)

I/O Scanning service



The I/O Scanning service is used to manage the exchange of remote I/O states on 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.

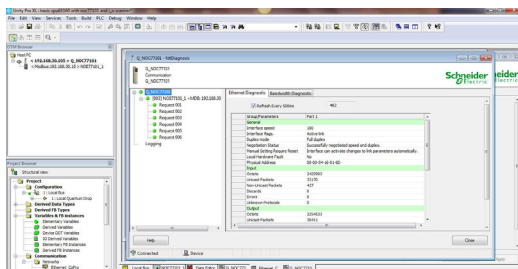
Characteristics

- 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 BME58040 processors, 1 Kword %MW in inputs and 1 Kword %MW in outputs with the manager PLC limited to 64 stations
 - For BME58020 processors and Ethernet communication module BMENOC030, 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

Industrial Ethernet services

Modicon M580 communication services



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●1**
- A Modicon M580 processor with integrated Ethernet port, **BME●58●●●●**

Modicon M580 automation platform

Industrial Ethernet services
Modicon M580 web services

HTML



4

Embedded web pages presentation

The M580 CPU includes a Hypertext Transfer Protocol (HTTP) 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.

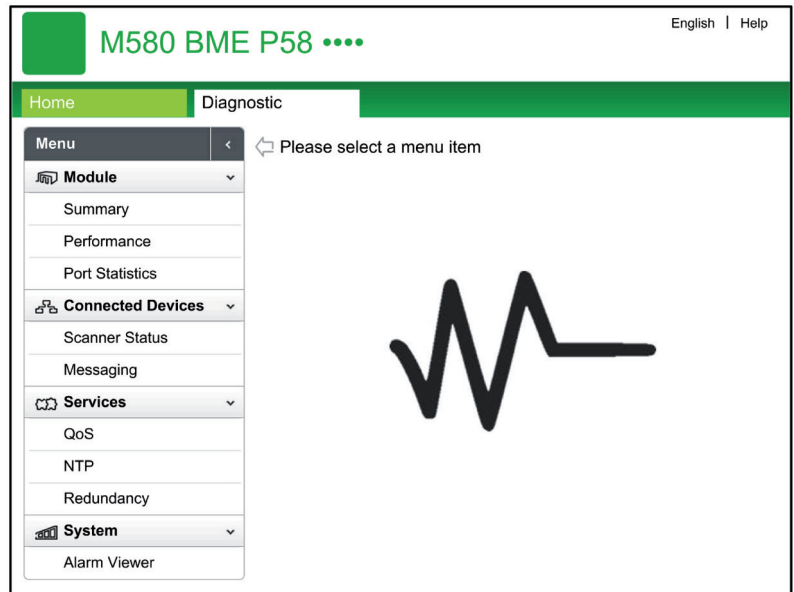
Requirements

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

Service Status	ERR	I/O	CARD_ERR
<ul style="list-style-type: none"> ● DHCP Server ● FDR Server ● Access Control ● Scanner Status ● NTP Status 	Unknown	Unknown	Unknown

Version Info.	
Exec. Version	0.4
Kernel Version	0.0
Web Server Version	1.0
Web Site Version	1.1.0.0
CIP Version	1.0

CPU Summary	
Model	M580 CPU
State	RUN
Scan Time	2ms
Logged In	No
CPU Exec. Version	4.01
Unity Program	NO PROG

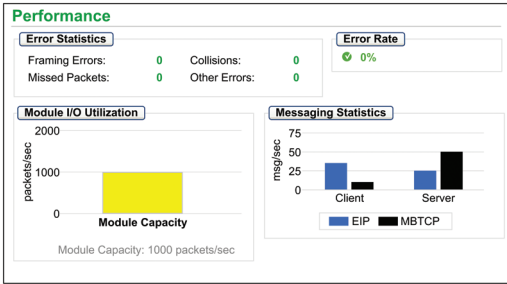
Network Info.	
IP Address	192.168.10.1
Subnet Address	255.255.0.0
Gateway Address	0.0.0.0
MAC Address	00 11 00 13 80 10
Host Name	FAILED

Status Summary page

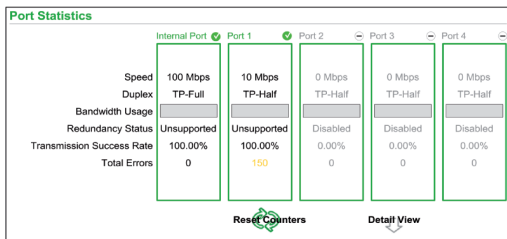
Status Summary page

The objects on this page provide status information.

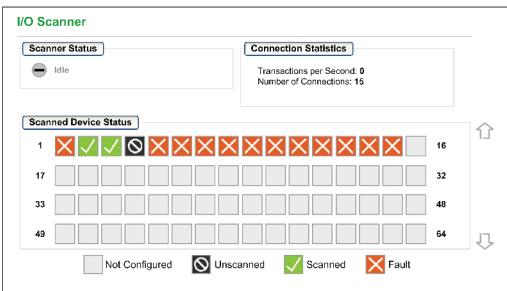
Parameters	Description
LEDs	The black field contains LED indicators (RUN, ERR, etc.)
Service Status	<ul style="list-style-type: none"> Green The available service is operational and running Red An error is detected in an available service Black The available service is not present or not configured
Version 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



Performance page



Port statistics page



I/O Scanner 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

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

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.

Modicon M580 automation platform

Industrial Ethernet services

Modicon M580 web services

Messaging						
Messaging Statistics						
Messages Sent:	6513	Messages Received:	6516	Success Rate:	100.00%	
Active Connections						
Remote Address	Remote Port	Local Port	Type	Msgs. Sent	Msgs. Received	Errors
127.0.0.1	65359	502	0	2173	2172	0

Messaging page

QoS	
Service Status	
Enabled	
Precision Time Protocol	
DSCP PTP Event Priority	15104
DSCP PTP General	12032
EtherNet/IP Traffic	
DSCP Value for I/O data Schedule Priority Messages	14080
DSCP Value for Explicit Messages	6912
Detail View	
Modbus/TCP Traffic	
DSCP Value for I/O Messages	11008
DSCP Value for Explicit Messages	6912
Network Time Protocol Traffic	
DSCP Value for Network Time	15104

QoS 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

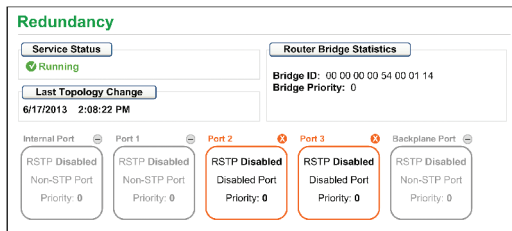
This page displays information about the NTP service. This service is configured in EcoStruxure Control Expert (1). The Network Time Service synchronizes computer clocks over the Internet for the purposes of event recording (sequencing events), event synchronization (triggering simultaneous events), 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

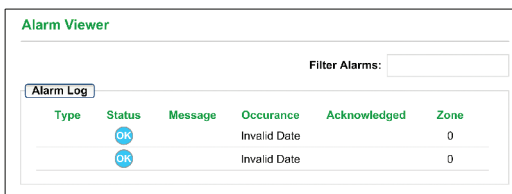
Network Time Service		
Service Status	Server Status	Server Type
Unknown	0.33.0.65	Unknown
DST Status	Current Date	Current Time
Unknown	7/24/2013	08:22:47
Time Zone		
UTC+02:00		
NTP Service Statistics		
Number of Requests: 1835026	Number of Responses: 655426	Number of Errors: 498775
Success Rate: 8.33%	Last Error: 0x01	

Network Time Service page

(1) Unity Pro software in earlier versions.



Redundancy page



Alarm Viewer page

Diagnostic web pages (continued)

Redundancy page

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



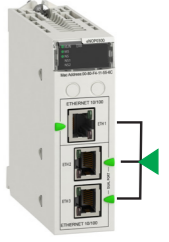
Parameters	Description						
Service Status	This is the status (enabled or disabled) of the RSTP bridge on the corresponding CPU						
Last Topology Change	These values represent the date and time that the last topology change was received for the corresponding Bridge ID						
Redundancy Status	<table border="0"> <tr> <td>Green</td> <td>The designated Ethernet port is learning or formatting information</td> </tr> <tr> <td>Yellow</td> <td>The designated Ethernet port is discarding information</td> </tr> <tr> <td>Gray</td> <td>RSTP is disabled for the designated Ethernet port</td> </tr> </table>	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
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	<table border="0"> <tr> <td>Bridge ID</td> <td>This unique bridge identifier is the concatenation of the bridge RSTP priority and the MAC address</td> </tr> <tr> <td>Bridge Priority</td> <td>In EcoStruxure Control Expert (1), configure the RSTP operating state of the Bridge ID</td> </tr> </table>	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		
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

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	<table border="0"> <tr> <td>STOP</td> <td>An alarm needs to be acknowledged</td> </tr> <tr> <td>ACK</td> <td>An alarm has been acknowledged</td> </tr> <tr> <td>OK</td> <td>An alarm does not require acknowledgment</td> </tr> </table>	STOP	An alarm needs to be acknowledged	ACK	An alarm has been acknowledged	OK	An alarm does not require acknowledgment
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.

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	10BASE-T/100BASE-TX	10BASE-T/100BASE-TX	10/100/1000 BASE-TX	10BASE-T/100BASE-TX				
Type of connector	3xRJ45 connectors: 1 connector for service and 2 connectors for a RSTP ring topology Ethernet backplane connection	3xRJ45 connectors: 1 for service and 2 for a RSTP ring topology (devices) Ethernet backplane connection	1xRJ45 connector (control port) Ethernet backplane connection	3xRJ45 connectors: 1 for service and 2 for a RSTP ring topology (device/control) Ethernet backplane connection				
Access method	CSMA-CD							
Data rate	10/100 Mbps	10/100 Mbps	10/100 Mbps/1 Gbps	10/100 Mbps				
Medium	Double shielded twisted pair copper cable, category CAT 5E							
Dimension	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	Up to 125 DIOs (1) 31 RIO drops and 61 DIOs	128 DIOs (EtherNet/IP or Modbus/TCP)	112 DIOs (EtherNet/IP or Modbus/TCP)	32 IED servers				
Maximum number of devices when module acts as Client/Scanner	3 EtherNet/IP adapter instances	16 EtherNet/IP adapter instances	12 EtherNet/IP adapter instances	10 OPC UA Clients				
Maximum number of devices when module acts as Server/Adapter	1	Up to 4 Ethernet modules depending on processor level (4)	Up to 2 Ethernet modules	Up to 2 OPC UA modules				
Number of modules of the same type per station				Up to 4 Ethernet modules depending on processor level (1)				
Web 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)	–	–	–				
Web page protocol	HTTP (HTML5)	HTTP (HTML5) Rack Viewer, PLC Program Viewer, Customizable dashboard (Trend Viewer), Data Editor access to PLC data and variables, Factory Cast Custom Web Pages	HTTPS (HTML5)	HTTP (HTML5)				
Communication services	Modbus TCP scanner (IO scanning)	Yes	Yes	No				
EtherNet/IP scanner (IO scanning)	Yes	Yes	Yes	No				
I/O scanning memory (data exchange with CPU)	–	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 slave)	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 (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)				
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 (if enabled, no IP forwarding)	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	BMENOC0311	BMENOC0321	BMENUA0100	BMENOP0300
Pages	2/7	2/7	2/8	4/16	4/16	4/16	4/18	4/22

(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

Applications
Type of device

RTU communication
RTU modules

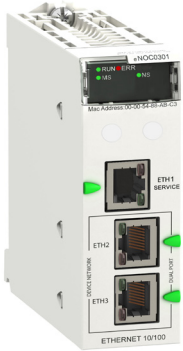
RTU communication
Advanced RTU module



Network protocols	
Structure	Physical interface
	Type of connector
	Access method
	Data rate
Medium	
Dimension	W x H x D
Configuration	Maximum number of devices when module acts as Client/Master
	Maximum number of devices when module acts as Server/Slave
	Number of modules of the same type per station
Web services	Standard services
	Advanced services
	Web page protocol
	Web page service
Communication services	Modbus TCP Client (messaging)
	SNMP network management
	NTP time synchronization
	FDR Service
	Syslog
	SMTP e-mail notification
	TLS
RTU communication services	Client or Server configuration
	Time- and date-stamped data exchange
	DNP3 Secure authentication Version 2 and Version 5
	IEC 60870-5-104 Channel Redundancy
	Event Routing
	RTU time synchronization
	Management and buffering of time- and date-stamped events
	Automatic transfer of time- and date-stamped events to the Client/SCADA
	Event Buffer Size
	Data logging service
Compatibility with processor	
Reference	
Pages	

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)
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)
1xRJ45	1xRJ45	Ethernet backplane connection	1xRJ45
CSMA/CD	Server/Client	CSMA/CD	Server/Client
10/100 Mbps	0.3...38.4 Kbps (serial link)	100 Mbps	0.3...115.2 Kbps (serial link)
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)
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.	
64 (IEC 104) 32 (DNP3 NET)	32	64	32
4 (1 main channel + 3 virtual channels)	1	4 (1 main channel + 3 virtual channels)	1
Up to 8 BMXNOR0200H RTU modules depending on processor level (1)		Up to 4 BMENOR2200H Advanced RTU modules depending on processor level (1)	
Rack Viewer Data Editor access to PLC data and variables		RTU module diagnostics Cybersecurity Settings	
Factory Cast Custom Web Pages		-	
HTTP (JAVA)		HTTPS (HTML5)	
SOAP/XML		No	
Yes	Reading/writing discrete and analog I/O, counters	Yes	
Yes (agent)	-	Yes (agent)	
Yes	-	Yes	
Yes (client)	-	Yes (client)	
No		Yes (client)	
Yes		No	
-		Yes (DNP3 NET and IEC 104)	
Yes (IEC104/DNP3 NET)	Yes (IEC101/DNP3)	Yes (IEC101/IEC104/DNP3 NET)	
Interrogation via polling and exchanges on change of status (RBE), unsolicited messaging		Interrogation via polling and exchanges on change of status (RBE), unsolicited messaging	
No	-	Yes	
No	-	Yes	
Yes	No	Yes	
Yes (IEC104/DNP3 NET)	Yes (IEC101/DNP3)	Yes (IEC101/IEC104/DNP3)	
Yes (IEC104/DNP3 NET)	Yes (IEC101/DNP3)	Yes (IEC101/IEC104/DNP3)	
Yes (IEC104/DNP3 NET)	Yes (IEC101/DNP3)	Yes (IEC101/IEC104/DNP3)	
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 clients, 4 clients max.)	
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	
All Modicon M340 processors, Modicon M580 standalone processors only		All Modicon M580 processors	
BMXNOR0200H		BMENOR2200H	
4/24		4/29	

(1) See Modicon M580 processors selection guide page 2/2



BMENOC0301



Presentation

BMENOC0301 network modules act as an interface between the M580 PLC and other Ethernet network devices via the Modbus/TCP and EtherNet/IP communication protocols.

BMENOC0301 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 Ethernet + X-bus backplane rack.

Functions

EtherNet/IP and Modbus/TCP network module

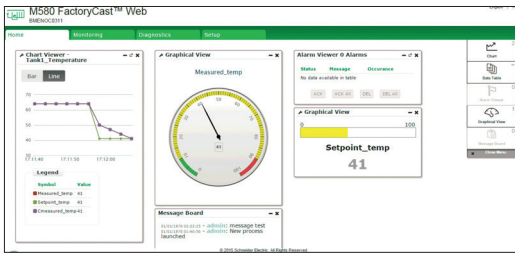
The **BMENOC0301** module offers the following functions:

- Modbus/TCP and EtherNet/IP protocols operating simultaneously
- Ring topologies on 2 Ethernet ports using RSTP (Rapid Spanning Tree Protocol)
- Priority of Ethernet packets using QoS (Quality of Service) 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
- Network management using SNMP (Simple Network Management Protocol)

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 adjusted online



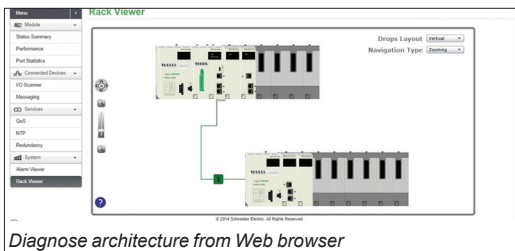
Customizable HTML5 Home page

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.

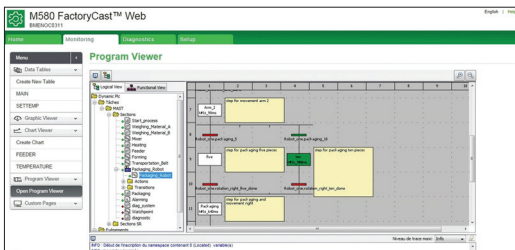
Ethernet control router

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 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, and CNM (ConneXium Network Manager)

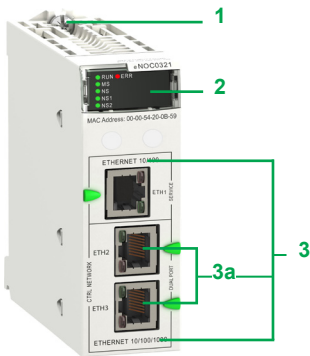


Diagnose architecture from Web browser



Simple application maintenance from Web browser

(1) Unity Pro software in earlier versions.



BMENOC0301



Example of BMEP58 and NOC module combination:
BMEP581020/BMENOC0301/BMENOC0301



BMENOC0301

BMENOC0311



BMENOC0321

Description

The front panel of **BMENOC0301** modules features:

- 1 Screw for locking the module in a slot in the rack
- 2 Display block with 4 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 2 additional LEDs:

- NS1 LED (green/red): Ethernet network status
 - NS2 LED (green/red): Ethernet network status
- 3 3 RJ45 connectors for connection to the Ethernet network (the bottom two connectors **3a** support ring topologies (RSTP protocol))

Each RJ45 connector has 2 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 3 NOC EtherNet/IP, Modbus/TCP network modules **2** are linked to the BMEP58000 CPU module **1**:

- 1 BMEP581020 CPU
- 2 BMENOC0301 EtherNet/IP and Modbus/TCP network module

References

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

Modicon M580 automation platform

M580 Communication modules OPC UA module



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 OPC UA module, 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, eliminating engineering repetition, simplifying system configuration, and reducing maintenance overhead.

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:
 - Secured
 - Standard
 - Security reset

The **BMENUA0100** module can be installed in any X80 Ethernet backplane 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 M580 CPU scan rate.
- **Simplified engineering:** Integrated access to 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

M580 OPC UA module

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

(1) For severe environments, see [page 6/5](#)



Front view

BMENUA0100

Rear view

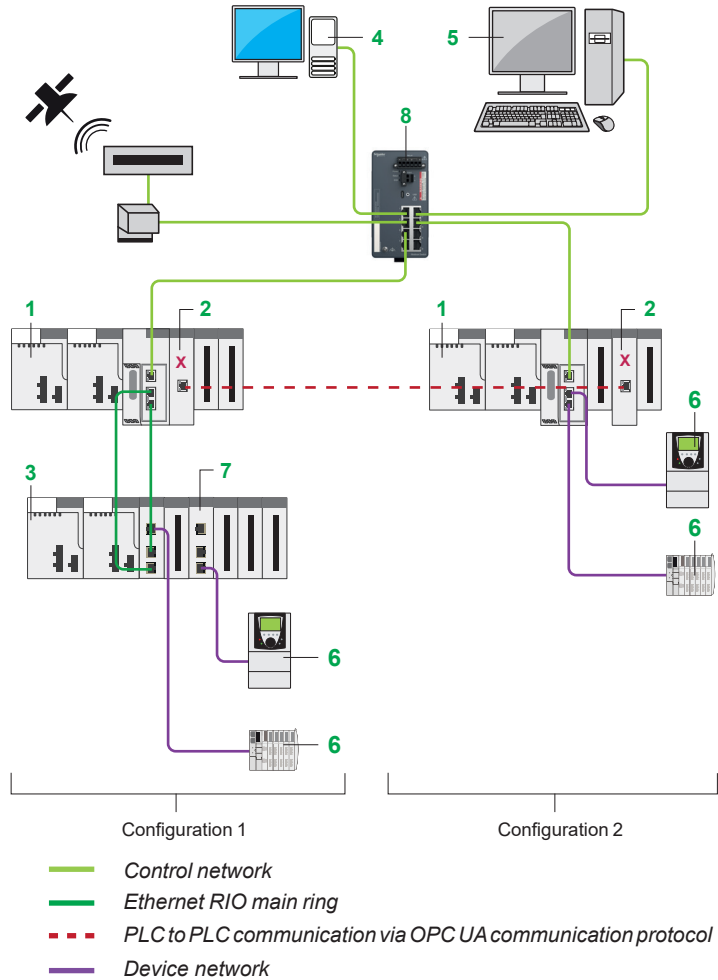
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Modicon M580 automation platform

M580 Communication modules
OPC UA module

Example architectures

Unified network with multiple 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

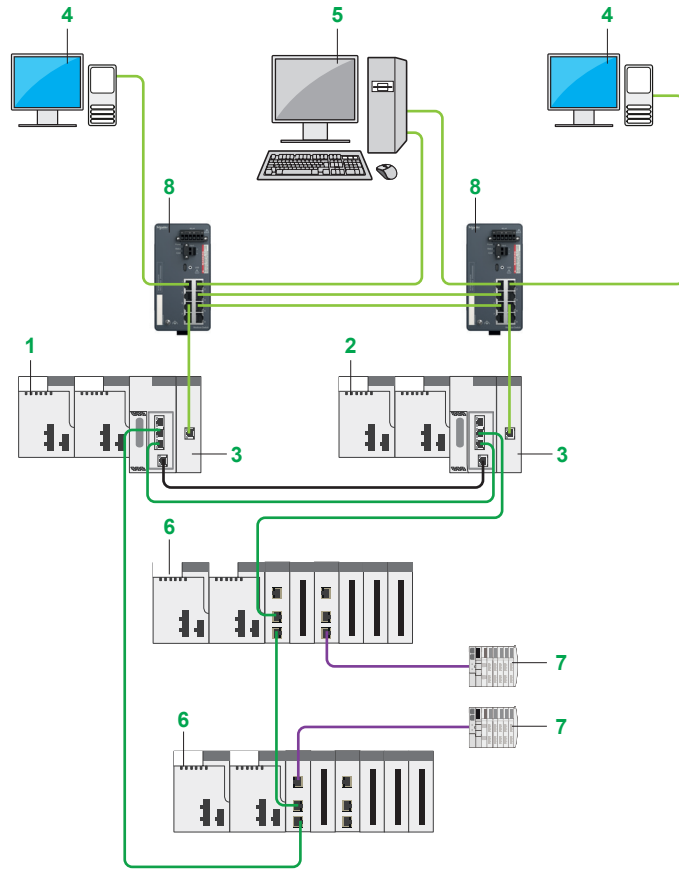
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Modicon M580 automation platform

M580 Communication modules
 OPC UA module

Example architectures (continued)

Isolated control network with 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

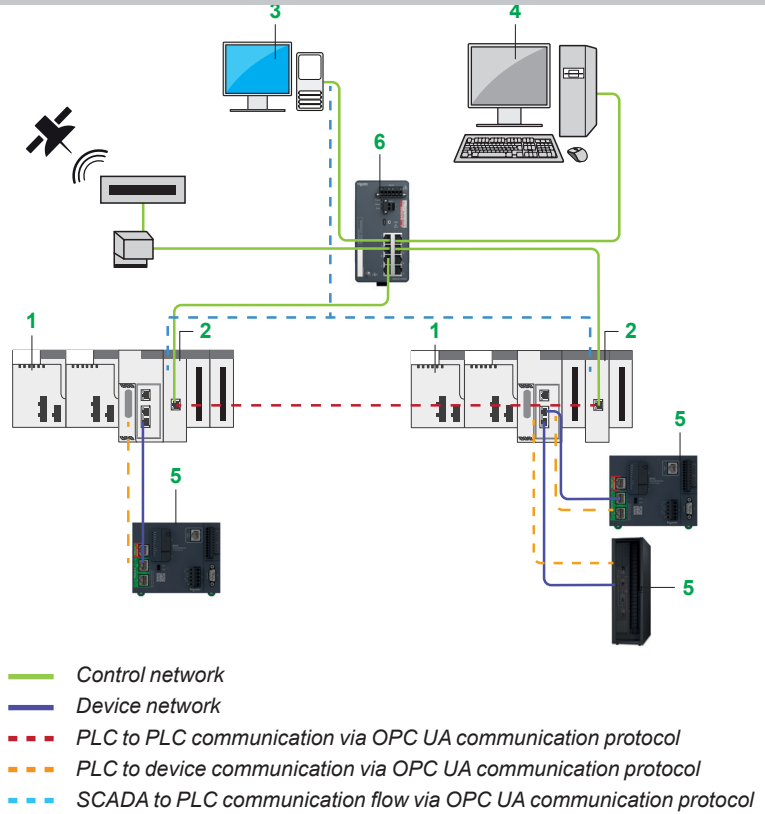
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Modicon M580 automation platform

M580 Communication modules
 OPC UA module

Example architectures (continued)

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



- 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

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.

M580 IEC 61850 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. M580 controllers support IEC 61850 standard engineering process and data objects. They also support the following data models:

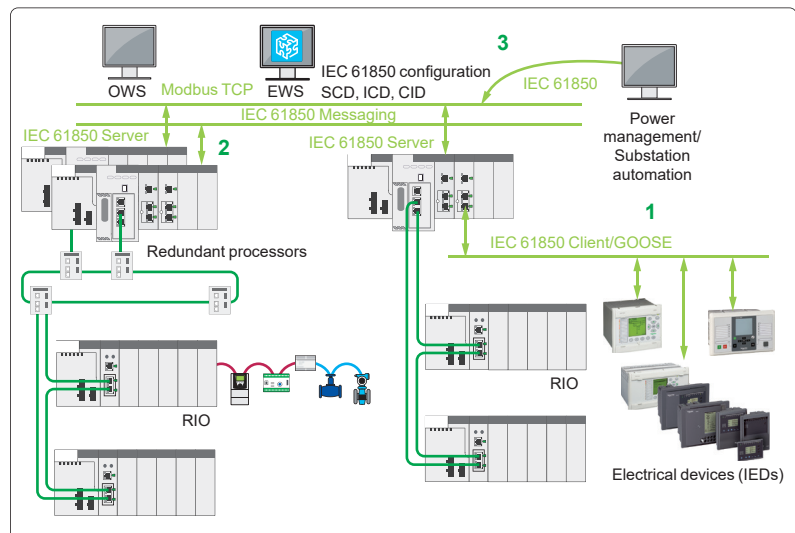
- Substation automation systems (IEC 61850-7-4)
- Hydroelectric power plants (IEC 61850-7-410)
- Distributed energy resources (IEC 61850-7-420)

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

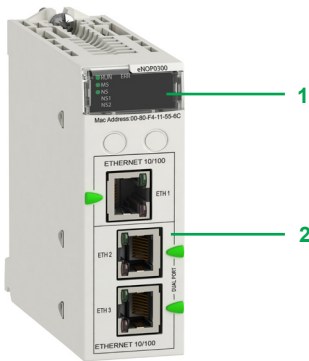


Different services that **BMENOP0300** can provide

Modicon M580 automation platform

M580 Communication modules

IEC 61850 module



BMENOP0300

Description

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

The 6 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	BMEP583020	BMEP584020
	BMEP582020	BMEP583040	BMEP584040(S)
	BMEP582040(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 2 Ethernet ports using RSTP (Rapid Spanning Tree Protocol)
- Cybersecurity features:
 - IEC 62443/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)

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, SBOs
- 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
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 www.se.com).

(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 6/5](#).



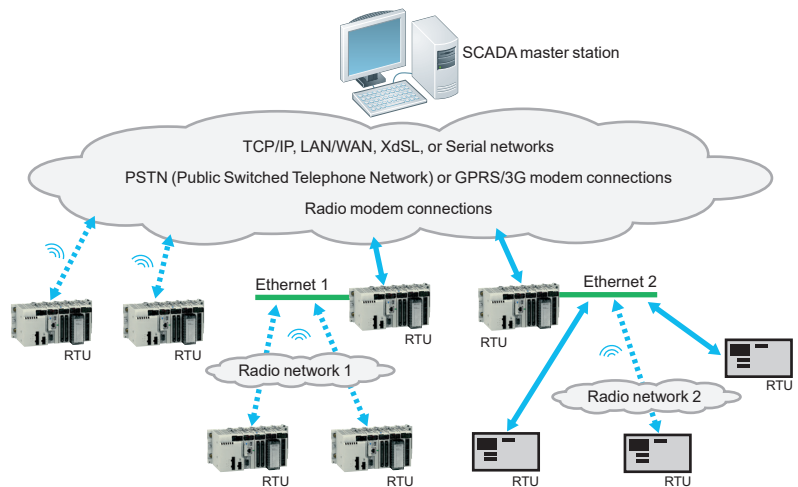
Presentation

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 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)

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 1131-3 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 range

- Advanced RTU systems also feature (see [page 4/28](#)):
 - Cybersecurity functions
 - Simplified architecture
 - Integrating RTU DTM in Control Expert for easier configuration
 - Compliance with M580 Hot Standby
 - Certificates under M580 Safety (Non-interfering Type1)
 - Bulk configuration via Excel format

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

Features	BMENOR2200H	BMXNOR0200H
Platform support	M580(S)	M340, M580
Compliance with M580 Hot Standby	Yes	No
RTU protocol	DNP3, DNP3 NET, IEC60870-5-101, IEC60870-5-104	DNP3, DNP3 NET, IEC60870-5-101, IEC60870-5-104
Ethernet protocol	SNMP V1/V3, SNTP, Modbus TCP, HTTPS	SNMP, SNTP, Modbus TCP, SMTP, FTP, HTTP
Firmware upgrade tool	Automation Device Maintenance	Unity loader
Cyber secure	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 totally (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/IEC104 Server, the value will be generated as a located variable.
 (4) TLS V1.2 for RTU protocols (DNP3/IEC104)

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 M580 PLC directly to a telemetry supervisor or to other RTU stations, via the standard DNP3 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 the PPPoE (Point-to-Point Protocol over Ethernet) protocol
 - Advanced Ethernet functions: NTP client, FTP client or server, HTTP server, SOAP/XML server, SNMP agent, SMTP agent
 - Communications on serial port:
 - Isolated RS232/RS485 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 the PPP (Point-to-Point Protocol) protocol

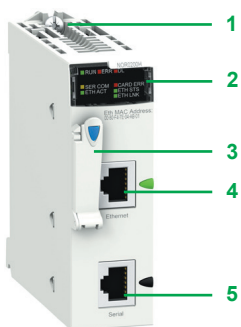
Description

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 8 LEDs, 4 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, 2 rotary switches for selecting the IP address assignment method for the module.





BMXNOR0200H

References

Description	Communication port	Communication Protocol	Reference	Weight kg/lb
M580 RTU communication module (1)	Ethernet 10BASE- 100BASE-TX	<ul style="list-style-type: none"> ■ Modbus/TCP (client or server), Transparent Ready class C30 ■ DNP3 IP (client or server) ■ IEC 60870-5-104 (over IP) (client or server) 	BMXNOR0200H (2)	0.205/ 0.452
		Serial, External modems <ul style="list-style-type: none"> ■ Isolated RS232/RS485 point-to-point serial links ■ DNP3 serial (master or slave) ■ IEC 60870-5-101 (master or slave) 		

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 6/2](#).

(2) The Web Designer software is supplied on CD-ROM with the module. 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 www.schneider-electric.com.

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 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).

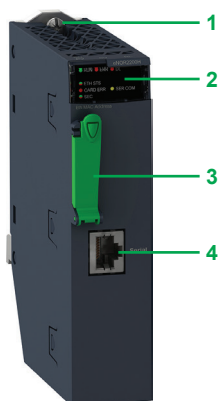
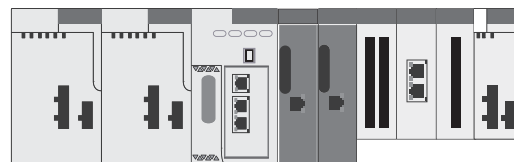
Functions

BMENOR2200H features the following key functions:

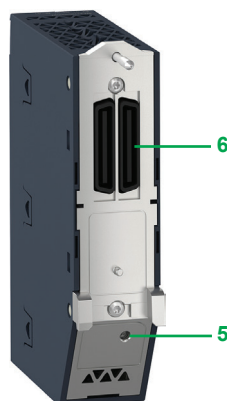
- DNP3 Net/Serial SA2/5 by pre-shared key, Server/Client
- System log for cybersecurity
- Time synchronized by CPU or RTU protocol
- Web page (HTTPS) for diagnostics and cybersecurity setting
- SNMP Client
- SNMP v1/v3 Agent
- RBAC Management
- IEC 60870-5-101/104, Server/Client
- Channel Redundancy 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 an Ethernet rack only (supports up to 4 Advanced RTU modules per CPU, including other Ethernet module, based on different CPU levels).



Front view
BMENOR2200H



Rear view

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 7 LEDs (hardware diagnostic information: RUN, detected error, download firmware, serial data status, detected SD Card error, Ethernet communication 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)

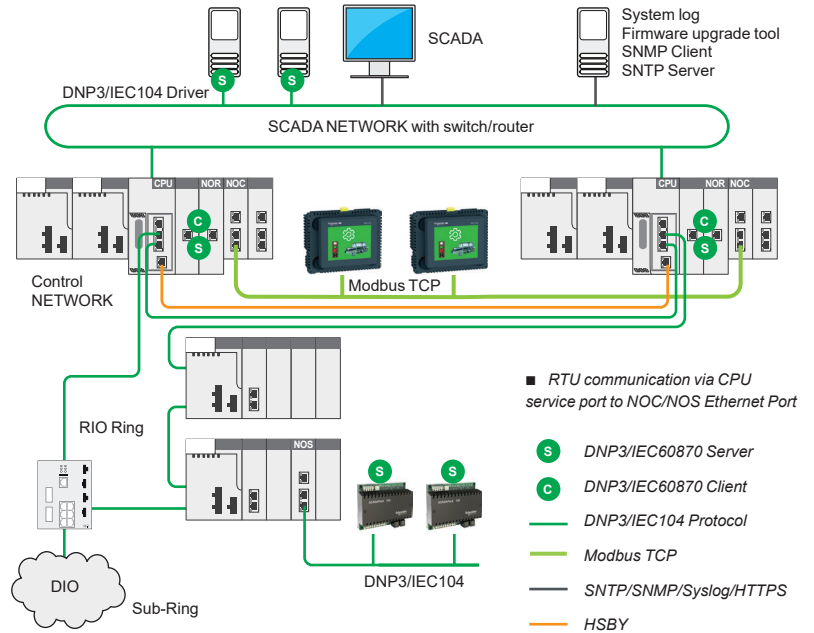
The back panel of the **BMENOR2200H** module features:

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

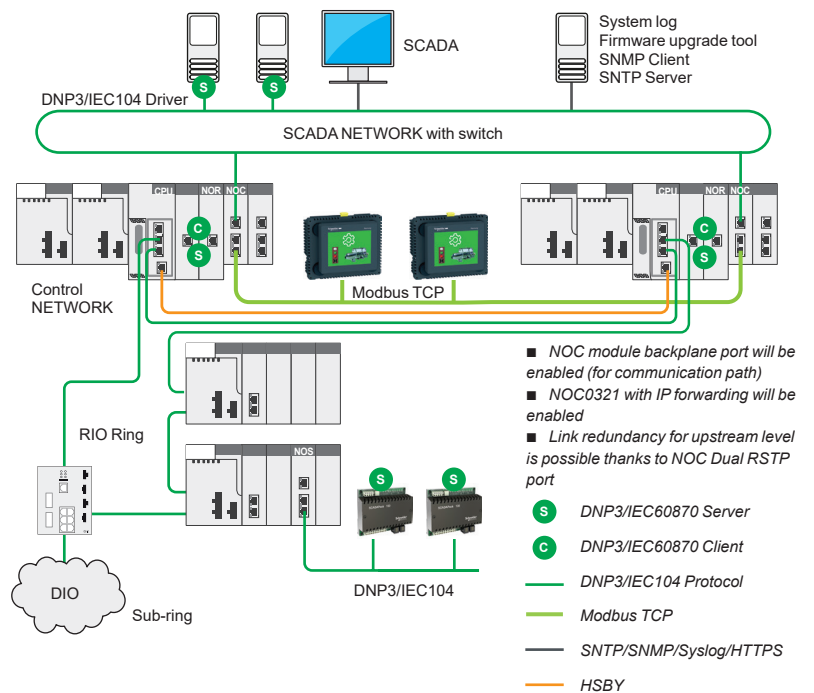
(1) Dust cover is provided.

Architecture

Example of architecture: Unified network



Example of architecture: Isolated network



References

Description	Communication port	Protocol	Reference	Weight kg/lb
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	0.380/ 0.837
SD flash memory card, 4 Go, for processor (2)			BMXRMS004GPF	0.002/ 0.004

(1) See ruggedized module characteristics, page 6/2.

(2) Only for data logging service

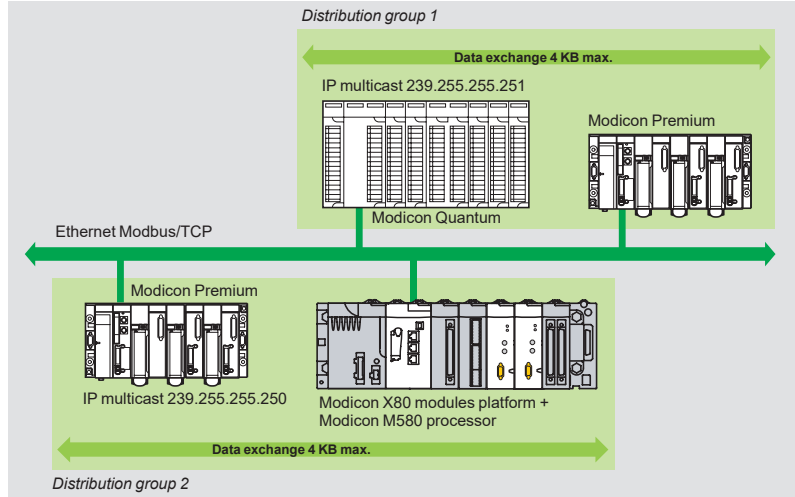
Modicon M580 automation platform

M580 Communication modules
Ethernet Global Data module

4

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 1024-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.

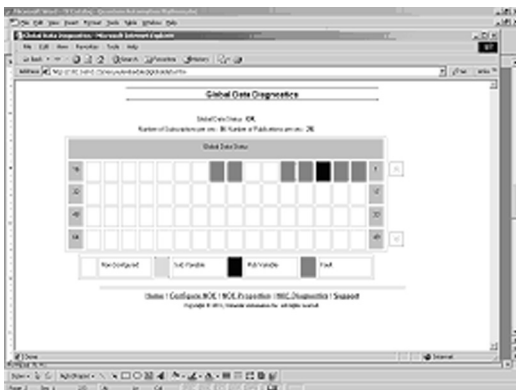
Global Data service diagnostics

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:

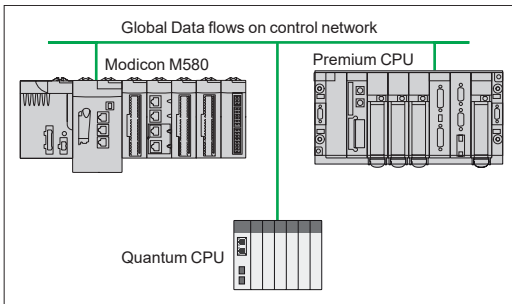
- Via the application program from a specific PLC data zone
- From the setup software debug screen
- From the PLC system diagnostic function displayed by means of a Web browser on a PC station
- Using standard SNMP manager software



Global Data diagnostics

Modicon M580 automation platform

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.

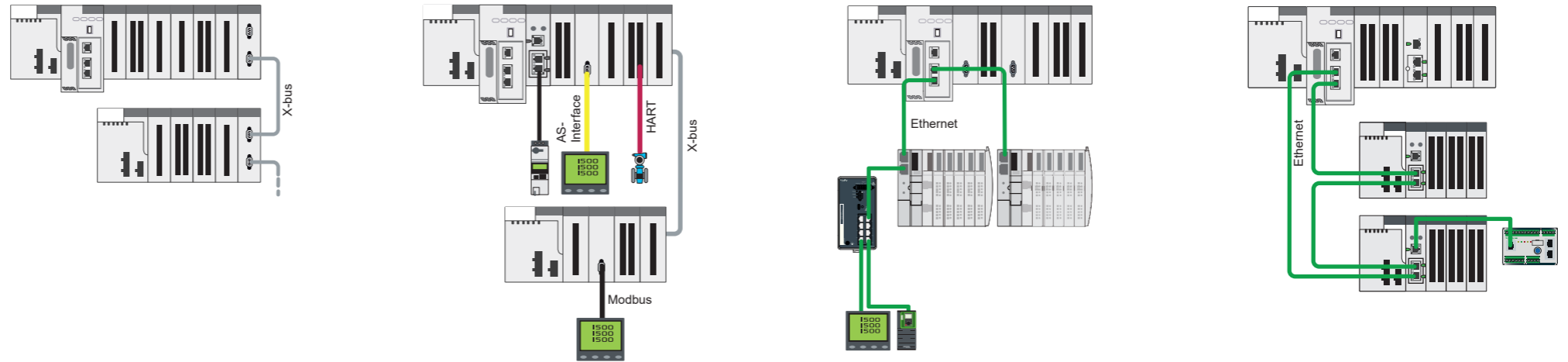
References

Description	Use	Reference	Weight kg/lb
X80 Ethernet Global Data module supplied 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

- [Comparison table of I/O architectures](#) page 5/2
- [Presentation](#) page 5/8
- [Local I/O architecture](#) page 5/9
- [Integrated fieldbus architecture](#) page 5/10
- [Distributed I/O architecture](#) page 5/11
- [Remote I/O architecture](#) page 5/12
- Standard architectures**
- [Example of a complex standard architecture](#) page 5/13
- [References and requirements](#) page 5/14
- High-availability architectures**
- [Presentation](#) page 5/18
- [Example of a complex high-availability architecture](#) page 5/20
- [References](#) page 5/21
- Safety architectures**
- [Presentation](#) page 5/22
- [Example of a complex Safety architecture](#) page 5/23
- [References](#) page 5/24

Modicon M580 architecture type <i>Note: These architectures can be combined with each other</i>

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

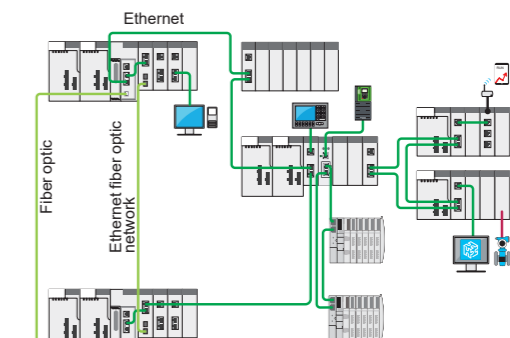
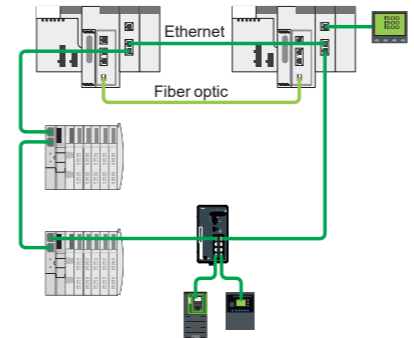
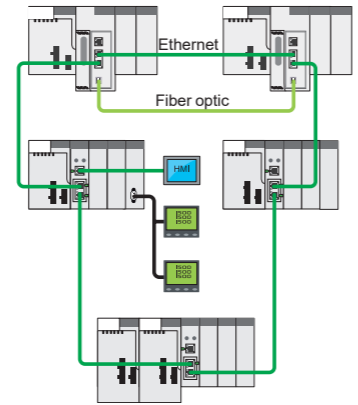


Expansion rack (with X-bus rack expansion module)		
Backplane compatibility	BMEXBP●●00 Ethernet + X-bus racks BMXXBP●●00 X-bus racks PV02 (or later)	
Compatible CPU types		
CPU Ethernet ports	SERVICE port Dual port	
RIO drops	-	
Communication	AS-Interface module	BMXEIA0100
	Serial link module	BMXNOM0200
	RTU modules	BMXNOR0200H BMENOR2200H
	IEC 61850 module	BMENOP0300
	OPC UA module	BMENUA0100
	Ethernet communication modules	BMENOC03●1
	CANopen module	BMECXM0100
	PROFIBUS DP Master module	PMEPXM0100
Expert functions	PTO (pulse train output) module	BMXMSP0200
	Other expert modules: counter, SSI encoder, etc.	
Time stamping	1 ms max. between modules in the same rack as ERT time stamping module	BMXERT1604T
	10 ms with CRA I/O drop adapter combined with discrete I/O modules in the RIO drop	BMECRA31210
Pages	5/9	5/10

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)	
Compatible for main racks (local or remote)			
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			
All standalone processors are compatible (1)			
One SERVICE port for HMI, EcoStruxure Control Expert (2), control network, variable speed drive, etc.		BMEP58●●40 CPUs are required to manage RIO	
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)
-			
Yes			A maximum of 16 RIO drops can be supported in an M580 network
Yes			Yes, in a local rack or RIO drop
Yes			Yes, in a local rack or RIO drop
Yes			Yes, only in a local rack
Yes			Yes, only in a local rack
Yes			Yes, only in a local rack
Yes			No
Yes			Yes, only in a local rack
Yes			Yes, in a local rack or RIO drop
Yes			Yes, only in a local rack
Yes			Yes, in a local rack or RIO drop
Yes			Yes, in a local rack or RIO drop
-			Yes, only in the RIO drop, system mode with OFS (3)
5/9	5/10	5/11	5/12

(1) **BMEP58●●40** CPUs are not mandatory.
 (2) Unity Pro software in earlier versions.
 (3) **BMXCRA31210** modules are also compatible

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)
	Remote over Ethernet	Distributed over Ethernet	Distributed and remote over Ethernet
	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
	Remote I/O architecture	Distributed I/O architecture	Mixed RIO/DIO architecture

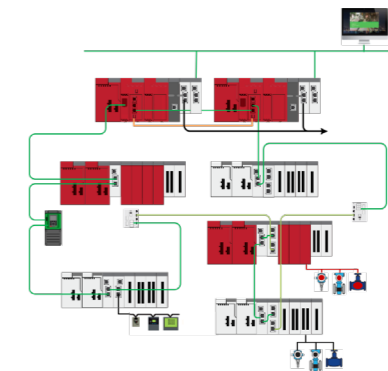
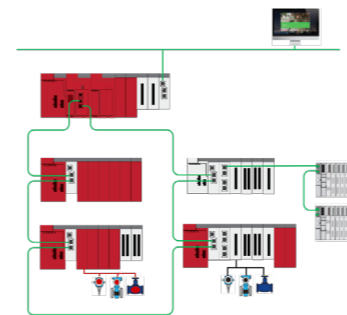
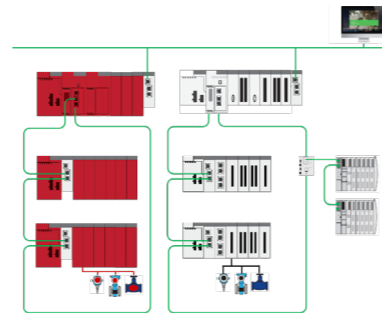


Expanded rack (with X-bus rack expansion module)		
Backplane compatibility	BMEXBP●●00 Ethernet + X-bus racks BMXXBP●●00 X-bus racks PV02 (or later)	
Compatible CPU types		
CPU Ethernet ports	SERVICE port Dual port	
RIO drops		
Communication	AS-Interface module	BMXEIA0100
	Serial link module	BMXNOM0200
	RTU module	BMENOR2200H
	IEC 61850 module	BMENOP0300
	OPC UA module	BMENUA0100
	Ethernet communication modules	BMENOC03●1
	CANopen module	BMECXM0100
	PROFIBUS DP Master module	PMEPXM0100
Expert functions	PTO (pulse train output) module	BMXMSP0200
	Other expert modules: counter, SSI encoder, etc.	
Time stamping	1 ms max. between modules in the same rack as ERT time stamping module	BMXERT1604T
	10 ms with CRA I/O drop adapter combined with discrete I/O modules in the RIO drop	BMECRA31210
Pages	5/18	

No local I/O on high-availability architecture		
Compatible for main racks (remote only)		
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		
All redundant processors are compatible		
One SERVICE port for HMI, EcoStruxure Control Expert (1), control network, variable speed drive, etc.		
Dual ports are used for remote equipment	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 (2)
A maximum of 31 RIO drops can be supported in an M580 network	–	A maximum of 31 RIO drops can be supported in an M580 network
Yes		Yes, in a local rack or RIO drop
Yes		Yes, in a local rack or RIO drop
Yes, only in local rack		
Yes		Yes, only in a local rack
Yes, only in local rack		
Yes		Yes, only in a local rack
No		
Yes, only in local rack		
No		
Yes, in an RIO drop	No	Yes, in an RIO drop
Yes, in an RIO drop	Yes	Yes, in an RIO drop
Yes, only in the RIO drop, system mode with OFS (2)	–	Yes, only in the RIO drop, system mode with OFS (2)
5/18	5/18	5/18

(1) Unity Pro software in earlier versions.
(2) **BMECRA31210** modules are also compatible.

Modicon M580 architecture type	Integrated Safety architecture	Common Safety architecture	Safety high-availability 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)	
Backplane compatibility	BMEXBP●●00 Ethernet + X-bus racks BMXXBP●●00 X-bus racks PV02 (or later)
Compatible CPU types	
CPU Ethernet ports	SERVICE port Dual port
RIO drops	
Communication	AS-Interface module BMXEIA0100 Serial link module BMXNOM0200 RTU module BMENOR2200H IEC 61850 module BMENOP0300 OPC UA module BMENUA0100 Ethernet communication modules BMENOC03●1 CANopen module BMECXM0100 PROFIBUS DP Master module PMEPM0100
Expert functions	PTO (pulse train output) module BMXMSP0200 Other expert modules: counter, SSI encoder, etc.
Time stamping	1 ms max. between modules in the same rack as ERT time stamping module BMXERT1604T 10 ms with CRA I/O drop adapter combined with discrete I/O modules in the RIO drop BMECRA31210
Pages	

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
Compatible for main racks (local or remote)	Compatible for main racks (remote only)
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	
All Safety standalone processors are compatible	All Safety redundant processors are compatible
One SERVICE port for HMI, EcoStruxure Control Expert (1), control network, variable speed drive, etc.	
Dual ports are used for remote equipment (RIO scanner), BMECRA31210 Ethernet drop adapter is mandatory in RIO drop (2)	
A maximum of 31 RIO drops can be supported in an M580 network	
Yes, in a local rack or RIO drop	
Yes, in a local rack or RIO drop	
Yes, only in a local rack	
Yes, only in a local rack	
Yes, only in a local rack	
Yes, only in a local rack	
No	
Yes	Yes, only in local rack
Yes, only in a local rack	No
Yes, in a local rack or RIO drop	Yes, in RIO drop
Yes, in a local rack or RIO drop	Yes, in RIO drop
Yes, only in the RIO drop, system mode with OFS (2)	
5/22	5/22
	5/22

(1) Unity Pro software in earlier versions.
(2) **BMECRA31210** 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 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 3 CRA Ethernet drop adapters (standard or high-performance) in each Modicon X80 RIO drop
- 2 fiber optic repeaters, for single-mode or multimode optical fiber, on Modicon X80 RIO drop
- A choice of three types of managed dual ring switches (DRS) 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 4 different types of architecture.

This solution also includes numerous options and functions as standard, providing:

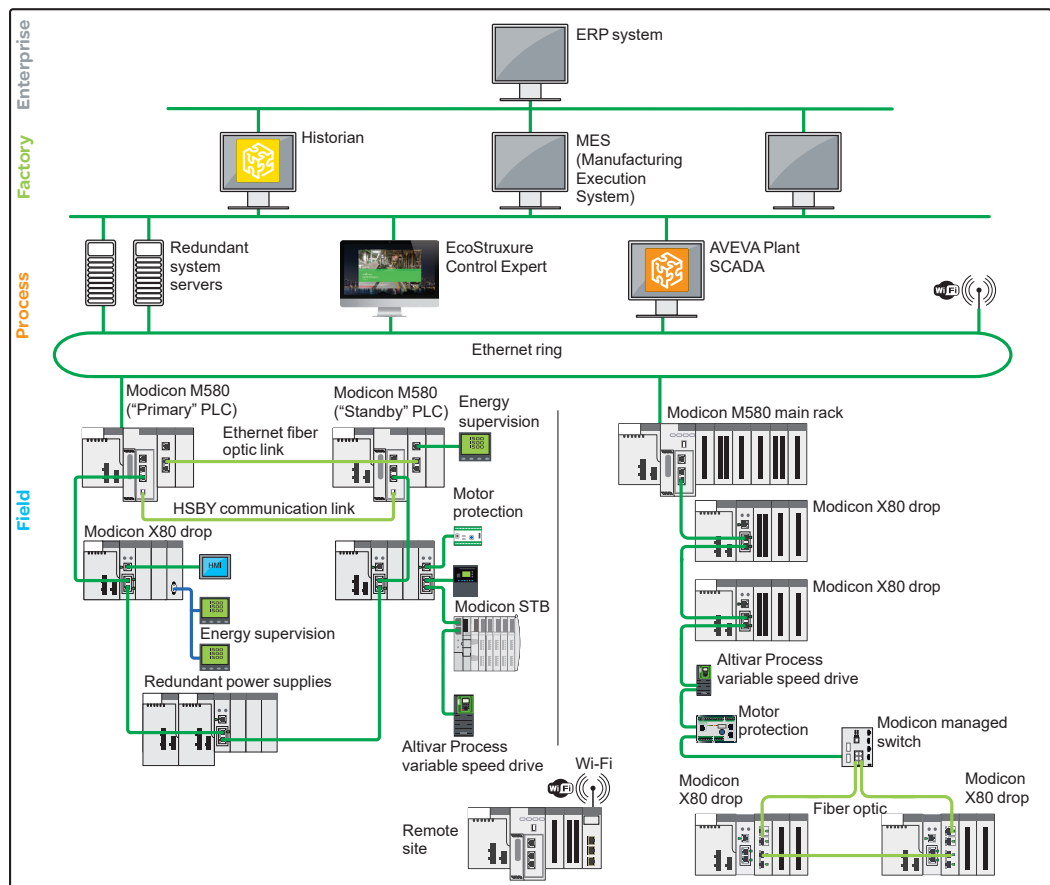
- High process availability, with the option of connecting Ethernet RIO and Ethernet DIO in a daisy chain loop
- Deterministic data exchanges between the PLC and the Ethernet RIO
- Remote service, with a SERVICE port available on the M580 CPU or Modicon X80 CRA Ethernet drop adapters

Note

■ The validated and tested architectures are shown in the technical documentation available on our website www.se.com.

■ The use of switches other than those detailed in these architecture I/O pages (pages 5/8 to 5/17) is not supported (2).

5



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.

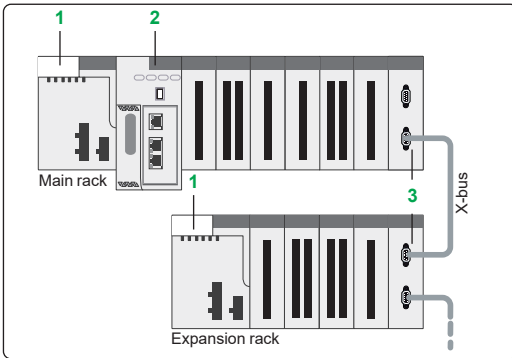
(2) Supported Modicon switches: TCSESM083F23F1/063F2CU1/063F2CS1 (see page 5/14).

(3) This typical architecture representation is a conceptual network diagram and does not represent the actual wiring specifications.

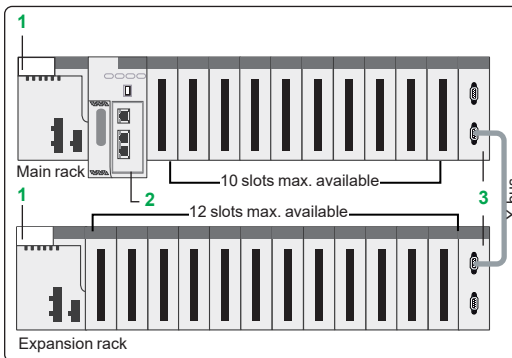
Modicon M580 automation platform

Architectures

Local I/O architecture



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



For rack accessory references, see Modicon X80 modules platform catalog, chapter 2



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 M580 platform provides interrupt services for this type of application.

Up to 94 slots are possible for I/O modules in a configuration comprising a main rack and 7 expansion racks, connected by **BMXXBE000** 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 module **2** and the power supply module **1**.

These local I/O can be extended on an expansion rack by using a **BMXXBE000** 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: 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 8 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 94 available slots (with eight 12-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 on-line Modicon PLC Configurator or EcoStruxure Control Expert (1) software.

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

Module addressing

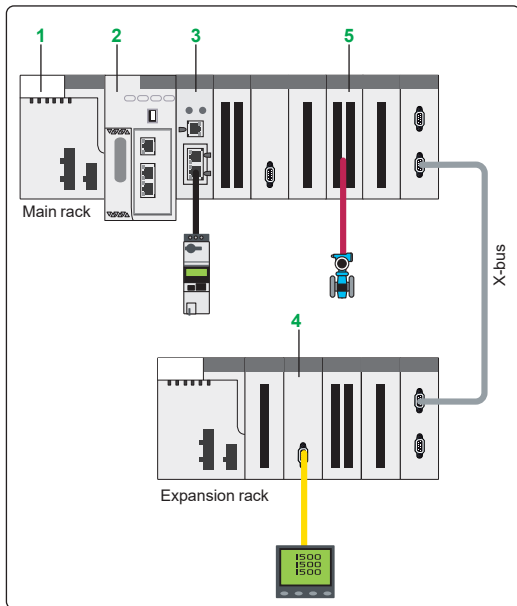
With EcoStruxure Control Expert (1), the I/O addressing is unlimited (physical limitation: 94 slots).

(1) Unity Pro software in earlier versions.

Modicon M580 automation platform

Architectures

Integrated fieldbus architecture



Integrated fieldbus architecture: devices distributed over fieldbuses

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, 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 94 slots are possible for I/O and communication modules in a configuration comprising a main rack and 7 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: 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 8 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 94 available slots (with eight 12-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 on-line 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: 94 slots).

(1) Unity Pro software in earlier versions.

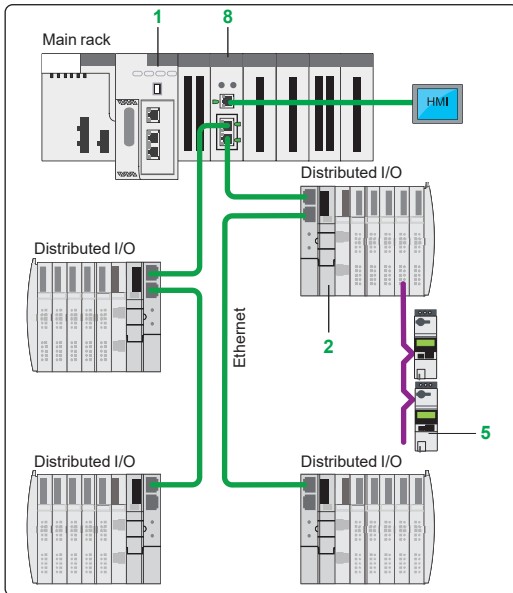


Use Modicon PLC Configurator for power consumption calculation

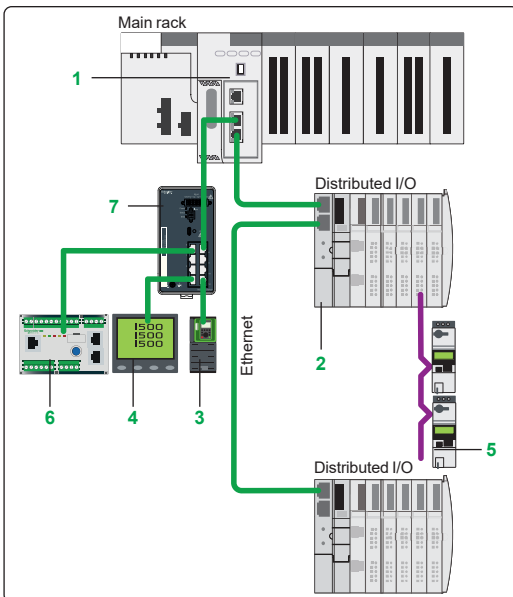
Modicon M580 automation platform

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 STB distributed I/O **2**
- Altivar Process variable speed drive **3**
- Energy supervision **4** and HMI
- Tesys U **5** connected via CANopen to a Modicon STB I/O Island 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

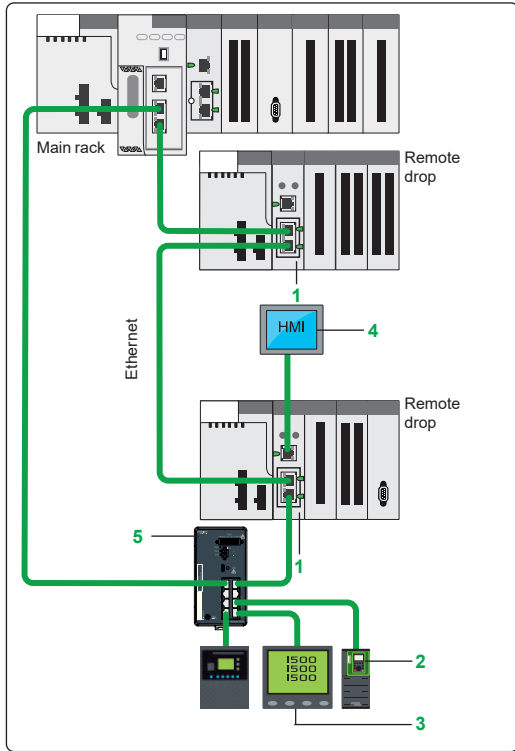
The advantages of this architecture are:

- 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: TCSESM083F23F1, TCSESM063F2CU1, and TCSESM063F2CS1.



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

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 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 DRs **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:

- 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 DRs, 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: TCSESM083F23F1, TCSESM063F2CU1, and TCSESM063F2CS1.



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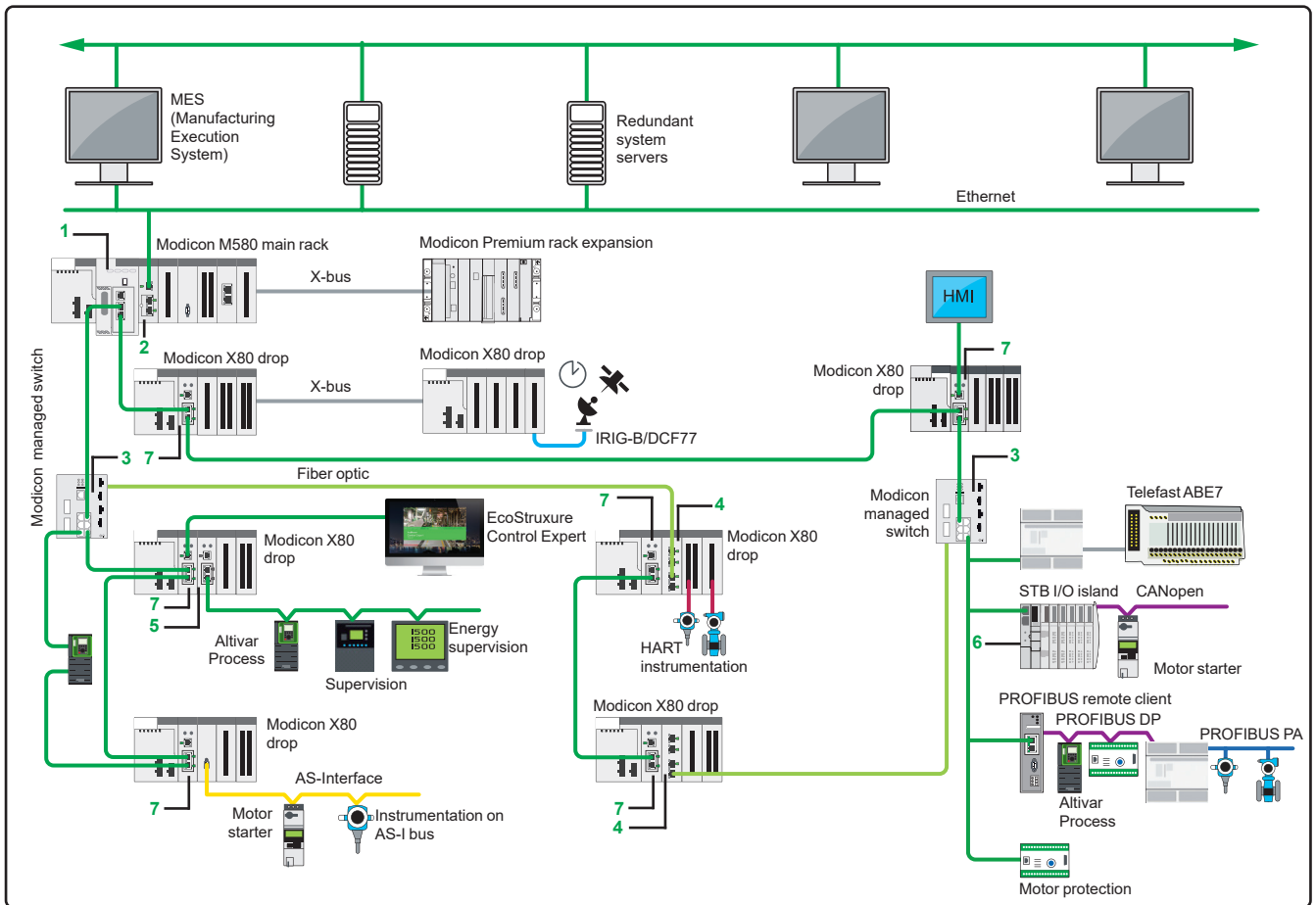


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Example of a complex standard architecture

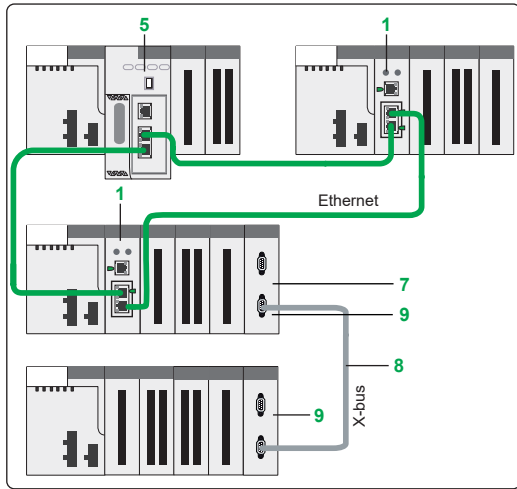
The complex architecture below illustrates the extensive possibilities of the Modicon M580 offer:

- A choice between 9 **BMEP58000** CPUs **1**
- Easy integration of the I/O network with supervisors in the control network, due to the **BMENOC0301** 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**

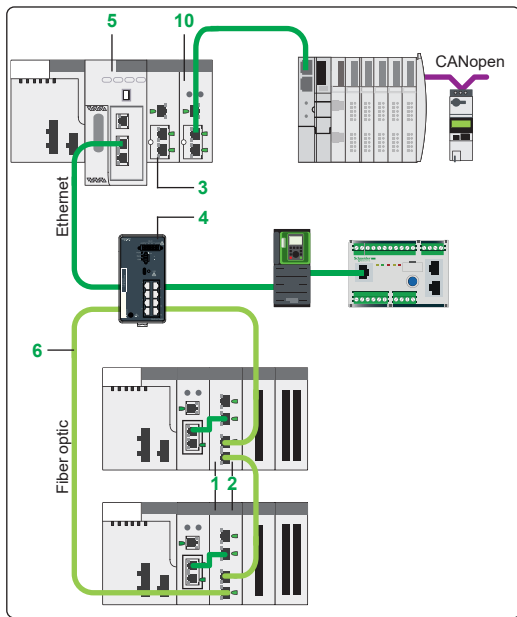


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Example of a complex architecture



Local I/O architecture + Remote I/O architecture



Distributed I/O architecture + Remote I/O architecture (with BMENOS 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	–	1	BMXCRA31200	0.200/ 0.441
Provide 1 module per Modicon X80 EIO drop	1	1	BMXCRA31210 (4)	0.234/ 0.516
		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

Description	Standard version	UL version	Reference	Weight
Ethernet Interlink cables Length 1 m/3.28 ft	–	–	TCSECN3M3M1S4	–
			TCSECN3M3M1S4U	–

Ethernet communication modules and cordsets (2)

Description	Item (3)	Reference	Weight kg/lb
EtherNet/IP, Modbus/TCP network module	3	BMENOC0301	0.200/ 0.441
FactoryCast network module	3	BMENOC0311	0.200/ 0.441
Embedded router network module	3	BMENOC0321	0.200/ 0.441

Ethernet switch

Description	SERVICE port	Device network port (Ethernet)	Item	Reference	Weight kg/lb
X80 Ethernet switch module	1	2	10	BMENOS0300	–

Dedicated Modicon managed switches (5)

Copper port	Multimode fiber optic port	Single-mode fiber optic port	Item (3)	Reference (4)	Weight kg/lb
RJ45 shielded connectors Duplex SC connectors					
8 x 10/100 BASE-TX ports	–	–	–	TCSESM083F23F1	1.000/ 2.205
6 x 10/100 BASE-TX ports	2 x 10/100 BASE-FX ports	–	4	TCSESM063F2CU1	1.000/ 2.205
–	–	2 x 10/100 BASE-FX ports	4	TCSESM063F2CS1	1.000/ 2.205

(1) For additional characteristics, see our website www.se.com.

(2) Requires EcoStruxure Control Expert or Unity Pro Extra Large software ≥ V8.0 (see [page 5/17](#)).

(3) For items 5 to 9, see [page 5/13](#).

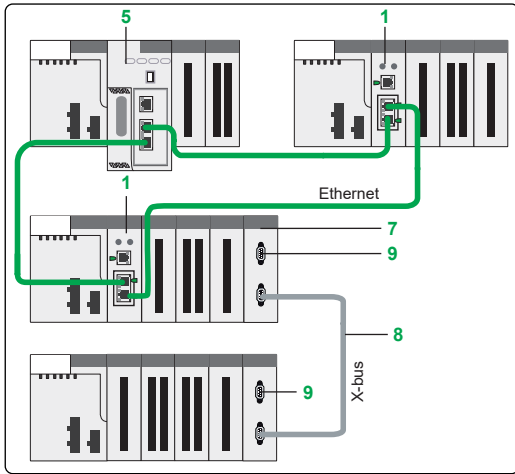
(4) Conformal coating version for harsh environments. In this case, add the letter "C" to the end of the reference.

(5) Modicon managed switches validated for Modicon M580 architectures.

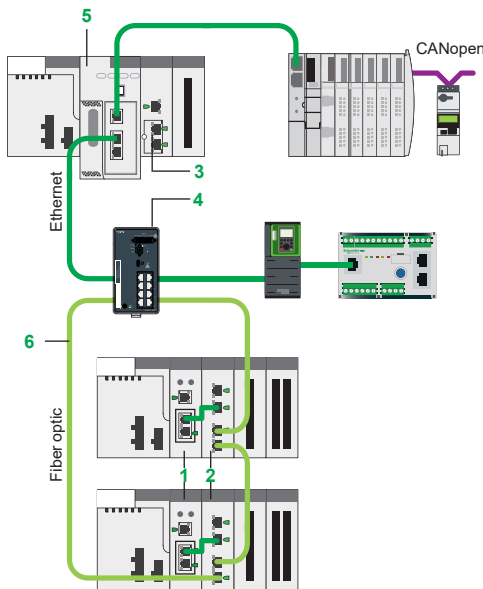
Modicon M580 automation platform

Architectures

Standard architectures



Local I/O architecture + Remote I/O architecture



Distributed I/O architecture + Remote I/O architecture

References (continued) (1)

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 24 application-specific channels 4 MB integrated (memory program)	2 DIO	1	5	BMEP581020	-
2,048 discrete I/O 512 analog I/O 32 application-specific channels 8 MB integrated (memory program)	2 DIO	1	5	BMEP582020	-
3,072 discrete I/O 768 analog I/O 64 application-specific channels 12 MB integrated (memory program)	2 DIO	1	5	BMEP583020	-
4,096 discrete I/O 1,024 analog I/O 64 application-specific channels 16 MB integrated (memory program)	2 DIO	1	5	BMEP584020	-
	2 RIO	1	5	BMEP583040	-
	2 RIO	1	5	BMEP584040	-

Fiber optic cable

Description	Length m/ft	Item (2)	Reference	Weight kg/lb
62.5/125 µm multimode fiber optic cables equipped with MT-RJ connectors	3/9.84	6	490NOR00003	-
For interconnection of the Ethernet port on the CPU or BMCRCA adapter 1	5/16.40	6	490NOR00005	-

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 2 racks max.	7	BMXXBE1000	0.178/ 0.392
Modicon X80 rack expansion kit Complete kit for 2-rack configuration comprising: - 2 BMXXBE1000 rack expansion modules - 1 BMXXBC008K extension cordset, length 0.8 m/2.63 ft - 1 TSXTLYEX line terminator (pack of 2)	7 8 9	BMXXBE2005	0.700/ 1.543

(1) For additional characteristics, see our website www.se.com.

(2) For items 1 to 4, see [page 5/14](#)

References (continued) (1)

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	8	BMXXBC008K	0.165/ 0.364
		1.5/4.92	8	BMXXBC015K	0.250/ 0.551
		3/9.84	8	BMXXBC030K	0.420/ 0.926
		5/16.4	8	BMXXBC050K	0.650/ 1.433
		12/39	8	BMXXBC120K	1.440/ 3.175
	Straight	1/3.28	8	TSXCBY010K	0.160/ 0.353
		3/9.84	8	TSXCBY030K	0.260/ 0.573
		5/16.4	8	TSXCBY050K	0.360/ 0.794
		12/39	8	TSXCBY120K	1,260/ 2.778
		18/59	8	TSXCBY180K	1,860/ 4.101
		28/92	8	TSXCBY280KT (3)	2,860/ 6.305

Description	Use	Length m/ft	Item (2)	Reference	Weight kg/lb
Cable on reel Cable with free ends, 2 line testers	To be equipped with 2 TSXCBYK9 connectors	100/328	–	TSXCBY1000	12,320/ 27.161

Description	Use	Sold in lots of	Item (2)	Reference	Weight kg/lb
Line terminator 2 x 9-way SUB-D connectors marked A/ and /B	Required on the 2 BM●XBP●●●0 modules located at either end of the daisy chain	2	9	TSXTLYEX	0.050/ 0.110
X-bus straight connectors 2 x 9-way SUB-D connectors	For TSXCBY1000 cable ends	2	–	TSXCBYK9	0.080/ 0.176
Connector installation kit 2 crimping pliers, 1 pen (4)	For fixing TSXCBYK9 connectors	–	–	TSXCBYACC10	–

(1) For additional characteristics, see our website www.se.com.

(2) For items 1 to 4, see [page 5/14](#) and for items 5 to 7, see [page 5/15](#)

(3) Cable supplied with a set of 2 TSXTVSY100 electrical transient suppressors.

(4) Installation of connectors on the cable also requires a wire stripper, a pair of scissors, and a digital ohmmeter.

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.

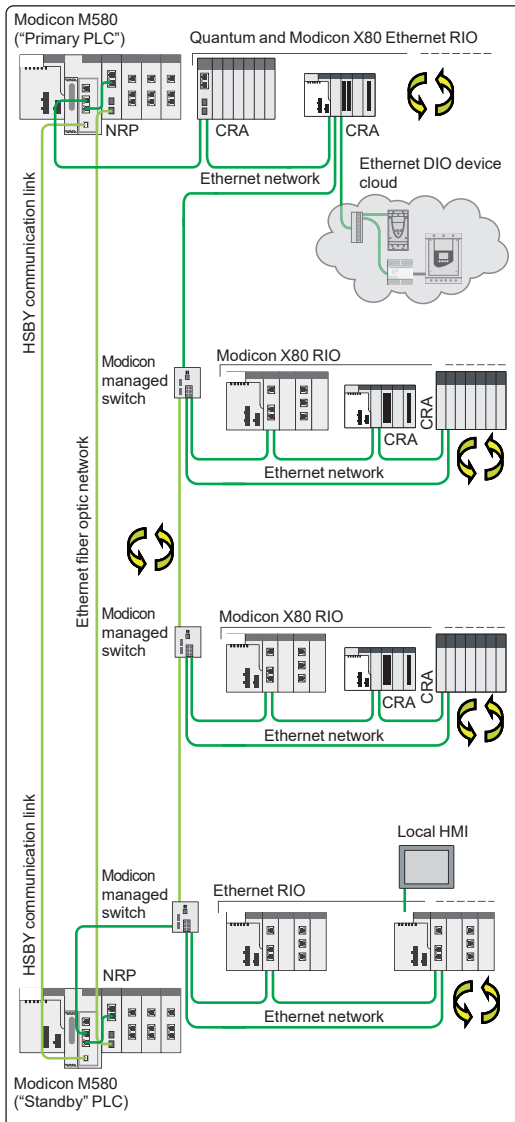
Description of the hardware or software required	Reference	Version	Item (2)
Unity Pro Extra Large software	UNISPUF●CD80	≥ 8.0	–
Modicon X80 Remote I/O drop adapter	BMECRA31210	≥ 2.0	1
	BMXCRA31200	≥ 2.0	1
	BMXCRA31210	≥ 2.0	1
Modicon X80 Fiber converter modules	BMXNRP0200	–	2
	BMXNRP0201	–	2
Modicon managed switches	TCSESM083F23F1	Firmware ≥ 6.0	4
	TCSESM063F2CU1	Firmware ≥ 6.0	4
	TCSESM063F2CS1	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 www.se.com.

Modicon M580 automation platform

Architectures

High-availability architectures



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

Components of an high-availability system (1)

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.

An 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 purpose:

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

M580 Redundant processors

At the heart of an 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/Os located in X80 drops (redundant processors do not support local I/Os.)
- 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.

Redundant power supplies and compatible backplanes

For high-availability applications, two **BMXCPS●●02** redundant power supplies can be used on a same rack to increase the security of power supply. They are supported by 6-slot **BMEXPB0602** backplane and 10-slot **BMEXPB1002** backplane equipped with dual slots marked CPS1 and CPS2. On CPS1 slot, the power supply is initially set as Primary (or Master) and on CPS2 slot, as Standby (or Slave). When power stops being supplied in accordance with expected rate, they switch roles so that power can be continuously delivered.

See X80 module platform catalog for more details.

Redundant network equipment

Redundant CPUs feature a specific slot on the front panel for a SFP socket supporting the HSBY communication link between them. Depending on the distance between 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).

M580 Communication modules

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

- **BMENOC0301/11** Ethernet communication module
 - to connect 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

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

Modicon M580 automation platform

Architectures

High-availability architectures

Components of an high-availability system (continued)

M580 Communication modules (continued)

- **BMENOP0300** communication module for supporting EC 61850 communication
- **BMENOR2200H** communication module (in Primary and Standby racks) for supporting IEC60870-5-101/IEC60870-5-104 or DNP communication
- **BMENUA0100** communication module to implement OPC UA communication protocol for:
 - Primary PLC to Standby PLC communication
 - SCADA to PLC communication flow
 - PLC to device communication

X80 Communication modules

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

- **BMENOS0300** network option switch
 - to connect 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 Primary and Standby PLCs to each other and create the redundant Ethernet link through fiber optic cabling (for long-haul system)
- **BMXNOE0100** module for Ethernet Modbus TCP (requires **BMXPRA0100** adapter)

I/O expansion modules

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

- connecting distributed devices (via SERVICE port) to a X80 RIO drop
- forwarding messages to the CPUs, including Modbus messages received by **BMXNOM0200** module
- Time stamping at the source of any discrete I/O signal located in the drop with a resolution of 10 ms (NTP protocol); for higher time stamping performances (1 ms), **BMXERT1604T** 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)

Modicon Switches

Switches are used to isolate dual networks one from the other and to expand the system including 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.

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

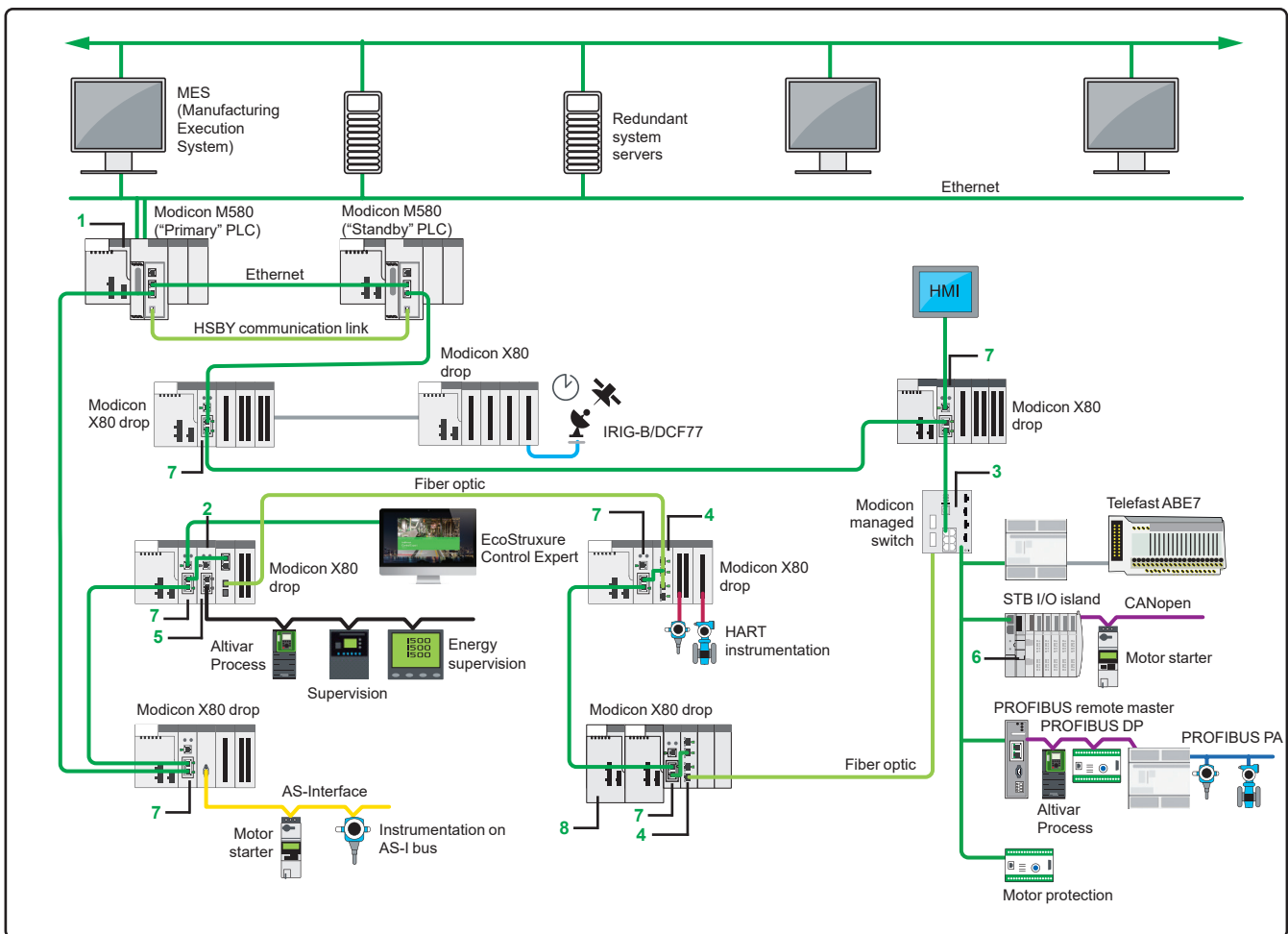
(1) Requires EcoStruxure Control Expert or Unity Pro Extra Large software ≥ V11.0.

(2) 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).

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 3 **BMEH58040** M580 redundant CPUs **1**
- Easy integration of the I/O network with supervisors in the control network, due to the **BMENOC0301** 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**
- The redundant power supplies are compatible with both single power supply racks for standard applications and dual power supply racks compatible with high-availability applications **8**

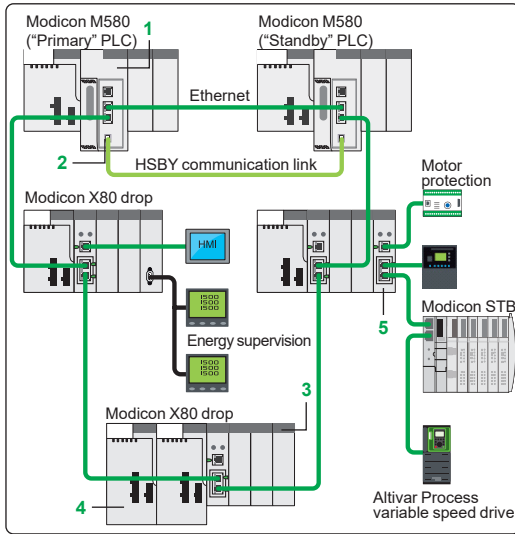


Example of a complex architecture

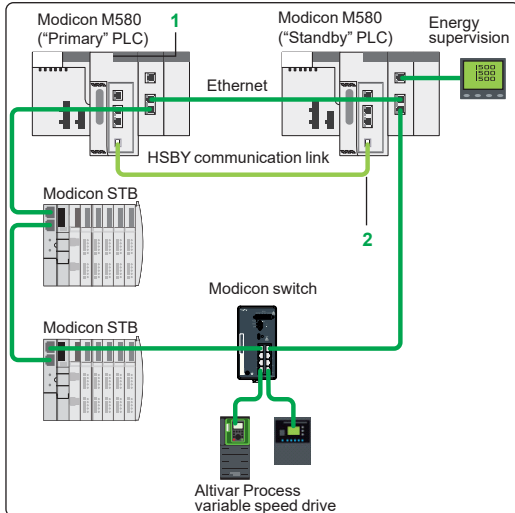
Modicon M580 automation platform

Architectures

High-availability architectures



Remote I/O architecture



Distributed I/O architecture



BMEH58040K Hot Standby kits

References (1)

Modicon M580 redundant processors (2)

Memory capacity	Device ports	SERVICE port	Item	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

Accessories

Description	Use	Cable medium	Item	Reference	Weight kg/lb
HSBY link SFP socket (one reference for one socket)	To be inserted in pair in 2 redundant processors for short distance	RJ45 copper	2	490NAC0100	-
	To be inserted in pair in 2 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 consumption	Item	Reference	Weight kg/lb
6-slot Ethernet + X-bus dual power supply backplane	BMXCPS4002● redundant power supply, BMEP58/BMEH58 processor, I/O modules, communication	4	6	3.9 W	3	BMEXP0602	1.377/3.036
10-slot Ethernet + X-bus dual power supply backplane	modules, and application-specific modules (counter, motion control, and serial)	8	10	3.9 W	3	BMEXP1002	1.377/3.036

Redundancy power supply modules

Line supply	Available power		Nominal current	Item	Reference	Weight kg/lb	
	3.3 V ~ (3)	24 V ~ (3)					Total
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

Ethernet switch module

Description	SERVICE port	Device network port (Ethernet)	Item	Reference	Weight kg/lb
Ethernet switch module	1	2	5	BMENOS0300	-

Hot Standby kits

Description	Composition	Reference	Weight kg/lb
M580 Hot Standby kit	- 2 Modicon M580 redundant processors - 2 RJ45 SFP sockets	BMEH582020 490NAC0100	BMEH582040K
	- 2 Modicon M580 redundant processors - 2 RJ45 SFP sockets	BMEH584020 490NAC0100	BMEH584040K

(1) For additional characteristics, see our website www.se.com.

(2) For additional characteristics, refer to our Redundant processors selection guide [page 2/4](#).

(3) 3.3 V ~ and 24 V ~ rack voltages for powering modules in the Modicon X80 I/O rack.

Modicon M580 automation platform

Safety architectures

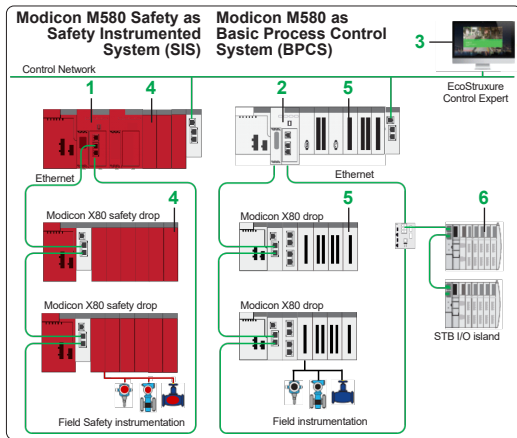
Types of M580 Safety architecture

Integrated Safety

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

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

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



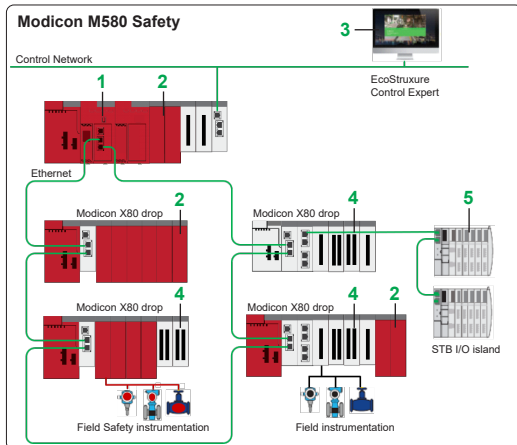
Integrated Safety architecture

Common Safety

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

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 is 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 X80 I/O modules as the DIO islands are classified as non-interfering with Safety.



Common Safety architecture

High-availability Safety

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

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

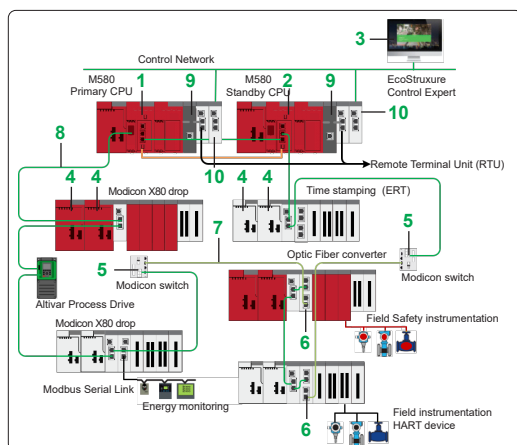
To increase availability, the Modicon PAC allows to use in a simple way:

- Redundant processors, named "Primary CPU" **1** and "Standby CPU" **2**
- Redundant Power Supply **4**
- Ethernet ring network topology **8**

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

Primary and Standby CPU racks do not support X80 I/O but only communication modules as for example **9** with Remote Terminal Unit (**BMENOR2200H**) and **10** with the control network (**BMENOC03•1**).

Other types of communication may be used for OPC UA (**BMENUA0100**), IEC61850 (**BMENOP0300**), PROFIBUS DP (**PMEPXM0100**) communication.



High-availability Safety architecture

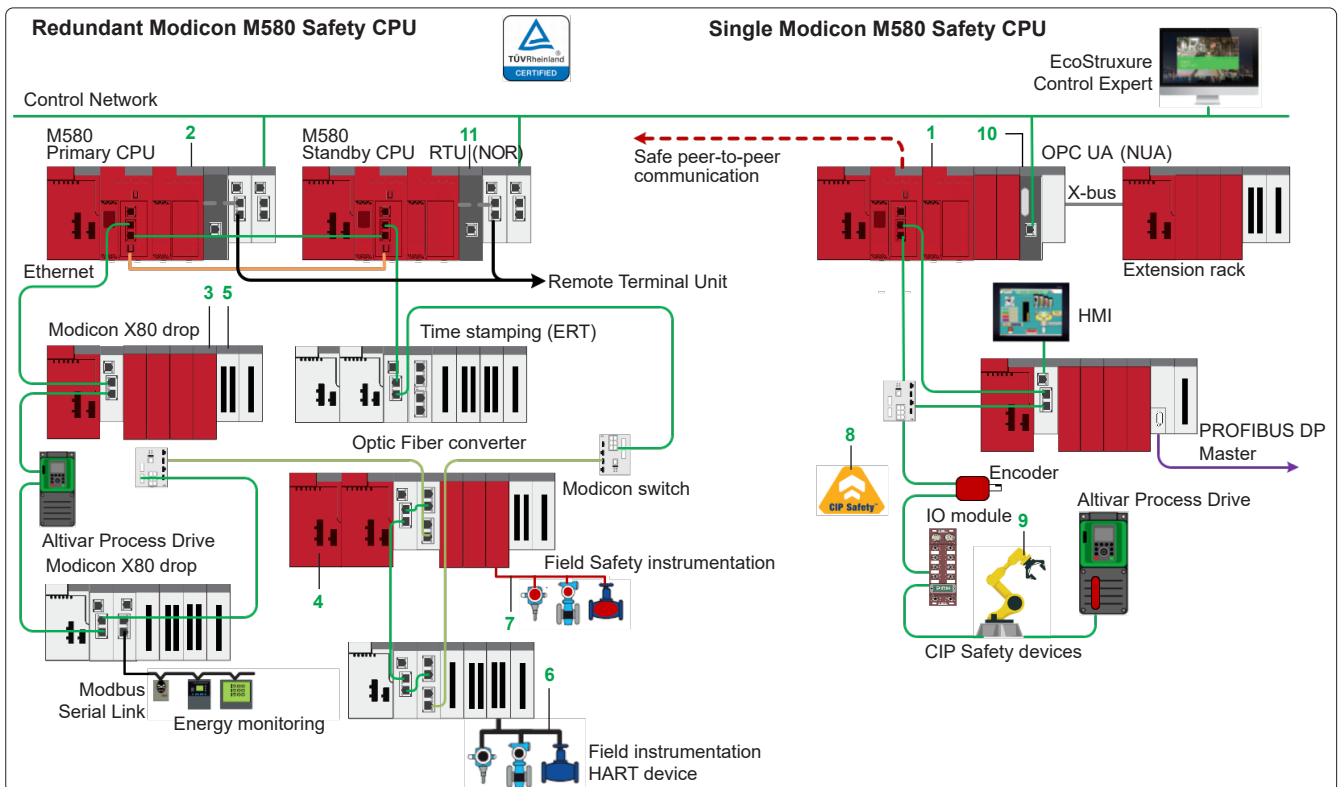
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Example of a complex Safety architecture

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

- A choice between **BMEP58●040S** Standalone M580 Safety CPU **1** and **BMEH58●040S** Redundant M580 Safety CPU **2**.
- The possibility to integrate in the same architecture Modicon M580 and Modicon M580 Safety PAC 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 with using standard, non-safety related, X80 I/O **5** connected to non-safety related Safety instrumentation **6** and the Safety part of the application with using Safety I/O **3**, connected to Safety instrumentation **7**.
- Standalone CPU can be using 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 Remote Terminal Unit **11**

A Modicon M580 Safety architecture inherits all Modicon M580 features in term of architecture and performance. Hence, all previous architecture descriptions can apply to Safety CPU with the restriction about usage of non-interfering X80 IO modules. The simple rule is 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 module 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 [TÜV website](#) for more details.



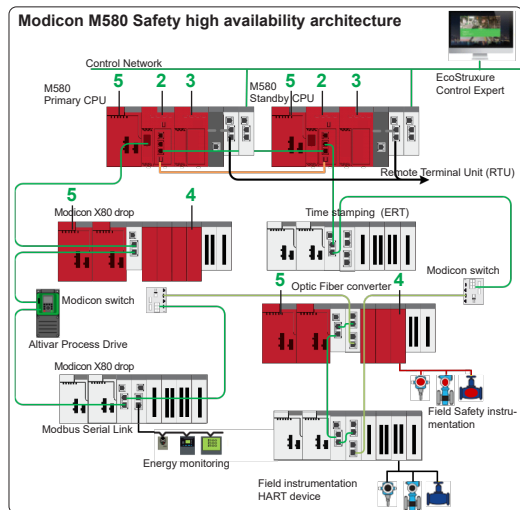
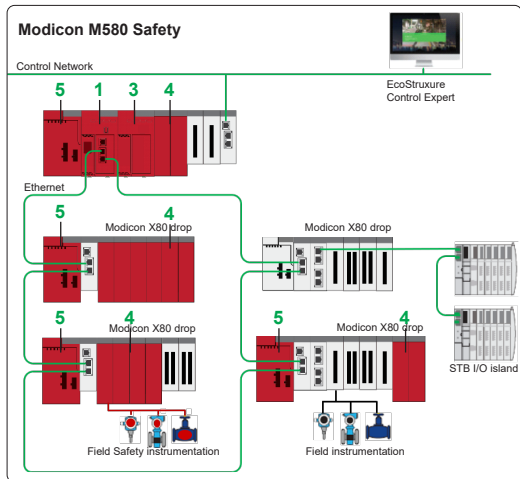
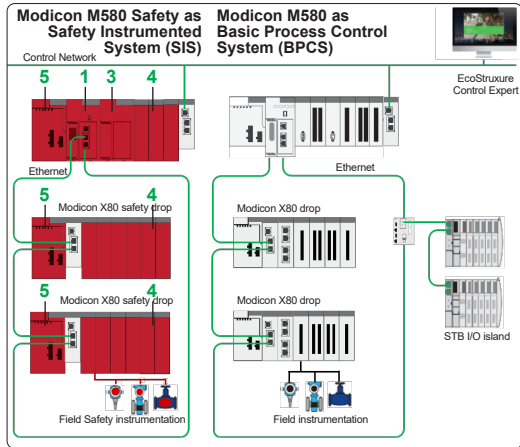
Complex Safety architecture



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	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	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	Weight kg/lb
BMEP58CPROS3	3	0.849/1.872

(1) For additional characteristics, see our website www.se.com.

Modicon M580 automation platform

Safety architectures

Example of a complex Safety architecture

References (continued) (1)

Safety input et output modules (3)

Description	Type of current	Input voltage	IEC/EN 61131-2 conformity	Number of channels (common)	Item Reference (4)	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 24 V $\overline{\text{---}}$ rack	Item Reference (4)	Weight kg/lb
	3.3 V $\overline{\text{---}}$ (2)	24 V $\overline{\text{---}}$ (2)	Total			
100...240 V \sim	18 W	40 W	40 W	1.67 A	5 BMXCPS4002S	0.510/1.124
20...48 V $\overline{\text{---}}$	18 W	40 W	40 W	1.67 A	5 BMXCPS4022S	0.810/1.786
100...150 V $\overline{\text{---}}$	18 W	40 W	40 W	1.67 A	5 BMXCPS3522S	0.610/1.345



BMXCPS4002S power supply

(1) For additional characteristics, see our website www.se.com.

(2) 3.3 V $\overline{\text{---}}$ and 24 V $\overline{\text{---}}$ rack voltages for powering modules in the Modicon X80 I/O rack.

(3) Connection via 20-way caged, screw clamp, or spring-type removable terminal block

(4) See item in diagrams [page 5/24](#)

6 - Dedicated parts for severe environments

Treatment for severe environments

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Dedicated parts for severe environments

- **M580 Processors for severe environments**
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- **M580 Communication modules for severe environments**
- M580 Ethernet communication modules [page 6/5](#)
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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 °C to +70 °C/-13 °F 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 °C to +70 °C/-13 °F 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, removal 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): H₂S: 9,900/SO₂: 4,800/Cl₂: 200
- **ISA S71.04 classes G1, G2, G3, Gx:**
 - 14 days; 25 °C/77 °F relative humidity 75%
 - Concentrations (ppb): H₂S: 60/SO₂: 350/Cl₂: 1,450/NO₂: 12
- **IEC/EN 60068-2-52 salt mist, Kb test severity level 2:**
 - 3 x 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% from -25 °C/-13 °F to +60 °C/140 °F
- Formation of ice
- 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 °C to +60 °C/-13 °F 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).*



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 $-25...+60\text{ }^{\circ}\text{C}$ / $-13...140\text{ }^{\circ}\text{F}$
- corrosive environments using common H components

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

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

M580 offer composition for severe environments

To order ruggedized or conformal coated processors and modules, see the reference tables from [page 6/4](#) to [page 6/5](#) :

- 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 www.se.com.

In this chapter, note that only M580 products are described.

- For X80 or M340 products, please refer to related catalog:



DIA6ED2131203EN



DIA6ED2110104EN

- For additional accessories, please refer to:
 - Standard accessories for standalone processors, [page 2/10](#)
 - Standard accessories for redundant processors, [page 2/11](#)

Modicon M580 automation platform

Dedicated parts for severe environments
M580 Processors for severe environments



BMEP58●●●●H

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 24 application-specific channels 4 MB integrated (memory program)	2 Ethernet networks	2 DIO	1	BMEP581020H	–
2,048 discrete I/O, 512 analog I/O 32 application-specific channels 8 MB integrated (memory program)	2 Ethernet networks	2 DIO	1	BMEP582020H	–
		2 RIO/DIO	1	BMEP582040H	–

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	–

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	–

Modicon M580 automation platform

Dedicated parts for severe environments

M580 Communication modules for severe environments



BMENOC0321C

Communication

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



BMENUA0100H

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

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

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 IP (client or server)	1 Ethernet port 10BASE-T/ 100BASE-TX	BMXNOR0200H	0.205/ 0.452
	IEC 60870-5-101 or DNP3 serial (client or server)	1 non-isolated RS 232/485 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)	1 Ethernet port 100BASE-TX (1)	BMENOR2200H	0.380/ 0.837
	IEC 60870-5-101 or DNP3 serial (client or server)	1 isolated RS 232/485 serial link port		

(1) On backplane port.

Technical appendices

- Standards, certifications, and environmental conditions [page 7/2](#)
- Per region [page 7/2](#)
- Per application [page 7/2](#)
- Functional safety [page 7/3](#)
- Environmental characteristics..... [page 7/4](#)
- Protective treatment of Modicon M580 automation platform [page 7/4](#)
- Installation restrictions and recommendations [page 7/4](#)
- Environment tests..... [page 7/5](#)
- Certifications and EC regulations for Modicon automation products [page 7/10](#)



Standards and certifications

Per region

The Modicon M580 automation and 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 www.se.com)
 - ATEX: 2014/34/EU (check EU DoC on our website www.se.com)
- Requirements specific to programmable controllers (functional characteristics, immunity, resistance, 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 7/10](#).

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 15A for North America and 16A for the rest of the world.

Per application

Power generation

- IEC/EN 61000-6-5 for interfaces type 1 and 2
- IEC/EN 61850-3 for locations G

Merchant navy

Merchant navy requirements of the major international organizations are unified in IACS (International Association of Classification Societies) IACS E10 rules: BV, DNV, ABS, LR, RINA (refer to [page 7/10](#)).

Railway

- EN 50155/IEC 60571: Railway applications - Rolling stock - Electronic equipment
- 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)



Standards and certifications (continued)

Functional safety

All 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	%	+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 Ed.4.0 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 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.

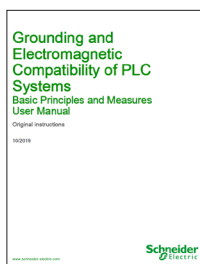
The Modicon M580 and M580 Safety platforms offer **protection to IP20 level and protection against access to terminals** (enclosed equipment) (1). They can therefore be installed without an enclosure in reserved-access areas that do not exceed **pollution level 2** (control room with no dust-producing 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 “Modicon M580, M340, X80 I/O Platforms, Standards and Certifications” and “Modicon M580 Safety, Standards and Certifications” manuals.

Download manuals for further details:



33002439KO1000



EIO0000002726



EIO0000002750

(1) In cases where a slot is not occupied by a module, a BMXXEM010 protective cover must be installed (see Modicon X80 module platform catalog).

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

Environment tests

The table below (pages 7/5 to 7/9) 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 7/4).

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: <ul style="list-style-type: none"> ■ 1 ms for --- PS1/10 ms for ~ PS2 (20 ms DS criteria), 85% Un ■ Check operating mode for longer interruptions up to 5s, 85% Un
	IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-11	For ~ PS2: <ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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; IEC 61000-4-10	Power frequency: 50/60 Hz, 100 A/m continuous ...1000 A/m; t = 3 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	Oscillatory: 100 kHz...1 MHz, 100 A/m; t = 9 s; 3 axes
		For remote systems: <ul style="list-style-type: none"> ■ 50/60 Hz and ---, 300 V, t = 1 s ■ 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 7/4).

(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 7/4).

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

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	80MHz...1GHz: 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: ■ 2 kV in common mode/2 kV in differential 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 7/4).

(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 7/4).

(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 7/4](#)).

(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 Hz ... 150 Hz, ± 3.5 mm/0.14 in. amplitude (5 Hz ... 8.4 Hz), 1 g (8.4 Hz ... 150 Hz) Specific profile: 5 Hz ... 150 Hz, ± 10.4 mm/0.41 in. amplitude (5 Hz ... 8.4 Hz), 3 g (8.4 Hz ... 150 Hz) For basic and specific: endurance: 10 sweep cycles for each axis
	IEC 60870-2-2; IEC 60068-2-6 (Class Cm)	2 Hz ... 500 Hz, 7 mm/0.28 in. amplitude (2 Hz ... 9 Hz), 2 g (9 Hz ... 200 Hz), 1.5 g (200 Hz ... 500 Hz) endurance: 10 sweep cycles for each axis
	IEC 60068-2-6	Seismic analysis: 3 Hz ... 35 Hz, 22.5 mm/0.89 in. amplitude (3 Hz ... 8.1 Hz), 6 g (8.1 Hz ... 35 Hz)
Shock	IEC/EN 61131-2; IEC 60068-2-27 (Ea)	30 g, 11 ms; 3 shocks/direction/axis (2) For 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 7/4).

(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".

(Cc): Tests required by European Cc 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: $2 U_n + 1000 \text{ V}$; $t = 1 \text{ min}$ Insulation: $U_n \leq 50 \text{ V}$: $10 \text{ M}\Omega$, $50 \text{ V} \leq U_n \leq 250 \text{ V}$: $100 \text{ M}\Omega$
Ground continuity	IEC/EN 61131-2; IEC 61010-2-201; UL; CSA	30 A , $R \leq 0,1 \Omega$; $t = 2 \text{ min}$
Leakage current	IEC/EN 61131-2; IEC 61010-2-201; UL; CSA	$\leq 0,5 \text{ mA}$ in normal condition $\leq 3,5 \text{ mA}$ in single fault condition
Protection offered by enclosures	IEC/EN 61131-2; IEC 61010-2-201	IP20 and protection against standardized pins
Impact withstand	IEC/EN 61131-2; IEC 61010-2-201; UL; CSA	Sphere of 500 g , fall from $1.3 \text{ m}/4.27 \text{ ft}$ (energy 6.8 J minimum)
Overload	IEC/EN 61131-2; IEC 61010-2-201; UL; CSA	50 cycles, U_n , $1,5 I_n$; $t = 1 \text{ s ON} + 9 \text{ s OFF}$
Endurance	IEC/EN 61131-2; IEC 61010-2-201; UL; CSA	I_n , U_n ; $6,000$ cycles: $t = 1 \text{ s ON} + 9 \text{ s OFF}$
Temperature rise	IEC/EN 61131-2; UL; CSA; ATEX; IECEx	Ambient temperature $60 \text{ }^\circ\text{C}/140 \text{ }^\circ\text{F}$ [for ruggedized range: $70 \text{ }^\circ\text{C}/158 \text{ }^\circ\text{F}$] (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 7/4).

(2) When using fast actuators (response time $\leq 5 \text{ ms}$) driven by relay outputs: 15 g , 11 ms ; 3 shocks/direction/axis.

(3) When using fast actuators (response time $\leq 15 \text{ ms}$) 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.

Technical appendices

Modicon automation product certifications and EC regulations

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 June 2022, 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 www.se.com.

Product certifications

	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 at www.se.com.

(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 Safety function:

- up to SIL2 or SIL3 regarding IEC61508/61511 for Process,
- up to SILCL3 regarding IEC62061 and up to Cat.4/PLe regarding ISO13849 for Machine,
- up to SIL4 regarding EN50126/50128/50129 for Railway.

Technical appendices

Modicon automation product certifications and EC regulations

Merchant navy certifications

Certification status	Shipping classification societies									
										
	ABS	BV	DNV	LR	RINA	RMRS	RRR	CCS	KRS	Class NK
	USA	France	Norway/ Germany	Great Britain	Italy	Russia	Russia	China	Korea	Japan
Certified										
Certification pending										
Only part of range certified										
Modicon STB										
Modicon Telefast ABE 7										
Modicon Switch		(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 www.se.com (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 Modicon Networking catalog for more details.

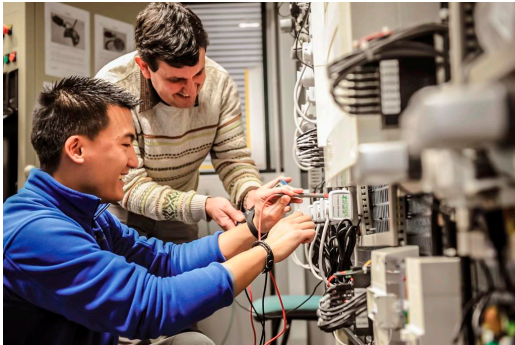
Dedicated service offers for your installed base

- Maintenance and support services [page 8/2](#)
- Consultancy services [page 8/3](#)
- Modernization solutions [page 8/3](#)
- Customization services [page 8/3](#)

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- Product reference index [page 8/4](#)

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

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

Consultancy services

M2C (Maintenance and Modernization Consultancy)

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

Modernization solutions

Migration 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



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 M580/M340/X80 platform						
Solution		Solution type			Tools	Solution services		
		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	Premium	☑	☑	☑	☑	☑	☑	☑
	TSX47 to TSX107		☑	☑	☑	☑	☑	☑
	Quantum	☑	☑	☑	☑	☑	☑	☑
	Modicon 984 & 800 Series I/O	☑	☑	☑	☑	☑	☑	☑
	Modicon Compact		☑	☑	☑	☑	☑	☑
	Symax	☑	(1)	☑	☑	☑	☑	☑
	April Series 1000		(2)	☑	☑	☑	☑	☑
	April SMC			☑	☑	☑	☑	☑
	Merlin Gerin PB			☑		☑	☑	☑
	AEG		(1)	☑		☑	☑	☑
	Rockwell SLC500		☑	☑	☑	☑	☑	☑
	Rockwell PLC 5	☑	☑	☑	☑	☑	☑	☑
	Siemens S5 and S7			☑	☑	☑	☑	☑

☑ 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

Customization services

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

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

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



#			
490NAC0100	2/11 5/21	BMEP584040	2/10 5/15 5/17
490NAC0201	2/11 5/21	BMEP584040S	3/11 5/24
490NOR00003	5/15	BMEP585040	2/10 5/17
490NOR00005	5/15	BMEP585040C	6/4
B		BMEP586040	2/10 5/17
BMECRA31210	5/14	BMEP586040C	6/4
BMEH582040	2/11 5/21	BMEP586040S	3/11 5/24
BMEH582040C	6/4	BMEXBP0602	5/21
BMEH582040K	2/11 5/21	BMEXBP1002	5/21
BMEH582040S	3/13 5/24	BMXCPS3522S	5/25
BMEH584040	2/11 5/21	BMXCPS4002	5/21
BMEH584040C	6/4	BMXCPS4002H	5/21
BMEH584040K	2/11 5/21	BMXCPS4002S	5/25
BMEH584040S	3/13 5/24	BMXCPS4022S	5/25
BMEH586040	2/11 5/21	BMXCRA31200	5/14
BMEH586040C	6/4	BMXCRA31210	5/14
BMEH586040S	3/13 5/24	BMXNGD0100	4/31
BMENOC0301	4/17 5/14	BMXNOR0200H	6/5 4/27
BMENOC0301C	6/5	BMXNRP0200	5/14
BMENOC0311	4/17 5/14	BMXNRP0201	5/14
BMENOC0311C	6/5	BMXRMS004GPF	2/10 4/29
BMENOC0321	4/17 5/14	BMXRWS128MWF	4/27
BMENOC0321C	6/5	BMXRWSC016M	4/31
BMENOP0300	4/23	BMXSAI0410	5/25
BMENOP0300C	6/5	BMXSDI1602	5/25
BMENOR2200H	4/29 6/5	BMXSDO0802	5/25
BMENOS0300	5/14 5/21	BMXSRA0405	5/25
BMENUA0100	4/18	BMXXBC008K	5/16
BMENUA0100H	6/5	BMXXBC015K	5/16
BMEP58CPROS3	3/11 5/24	BMXXBC030K	5/16
BMEP581020	2/10 5/15 5/17	BMXXBC050K	5/16
BMEP581020H	6/4	BMXXBC120K	5/16
BMEP582020	2/10 5/15 5/17	BMXXBE1000	5/15
BMEP582020H	6/4	BMXXBE2005	5/15
BMEP582040	2/10 5/15 5/17	BMXXCAUSBH018	2/10
BMEP582040H	6/4	BMXXCAUSBH045	2/10
BMEP582040S	3/11 5/24	T	
BMEP583020	2/10 5/15 5/17	TCSECN3M3M1S4	5/14
BMEP583040	2/10 5/15 5/17	TCSECN3M3M1S4U	5/14
BMEP584020	2/10 5/15 5/17	TCSESM063F2CS1	5/14
		TCSESM063F2CU1	5/14
		TCSESM083F23F1	5/14
		TSXCBY010K	5/16
		TSXCBY030K	5/16
		TSXCBY050K	5/16
		TSXCBY120K	5/16
		TSXCBY180K	5/16
		TSXCBY280KT	5/16
		TSXCBY1000	5/16
		TSXCBYACC10	5/16
		TSXCBYK9	5/16
		TSXTLYEX	5/16

Life Is On



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Schneider Electric Industries SAS

Head Office
35, rue Joseph Monier - CS 30323
F-92500 Rueil-Malmaison Cedex
France

DIA6ED2151012EN
June 2022 - V9.0