M580 PACs

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Introduction

This chapter introduces you to the physical and functional characteristics of the M580 PACs.

Functional Characteristics of M580 PACs

Introduction

This section describes the functional characteristics of M580 PACs. Performance, electrical characteristics, and memory capacities of the different controllers are detailed.

Introduction

Role of the Controller in a Control System

In a modular PAC system, the controller controls and processes the application. The local backplane identifies the controller. In addition to the controller, the local backplane contains a power supply module and may contain communication processing modules and input/output (I/O) modules.

The controller is in charge of:

- configuring the modules and devices present in the controller configuration
- processing the application
- reading the inputs at the beginning of tasks and applying the outputs at the end of tasks
- managing explicit and implicit communications

Modules may reside in the local backplane with the controller or they may be installed in remote drops at a distance from the local backplane. The controller has built-in capabilities

to act as the RIO controller that manages communications between the controller and the Quantum and X80 EIO adapter modules that are installed in each remote drop.

Devices can be connected to the PAC network as either DIO clouds or DIO sub-rings.

For detailed information about the various architectures that the M580 network supports, refer to chapter *Planning and Designing a Typical M580 Network* (see Modicon M580 Standalone, System Planning Guide for Frequently Used Architectures). For a detailed description of the X80 EIO adapter modules and the options they provide for installing a remote drop, refer to Modicon M580, RIO Modules, Installation and Configuration Guide.

Functional Considerations

The controller solves control logic for the I/O modules and distributed equipment in the system. Choose a controller based on several operating characteristics:

- memory size
- processing power: the number of I/O points or channels that it can manage, page 27
- the speed at which the controller can execute the control logic, page 36
- communication capabilities: the types of Ethernet ports on the controller, page 74
- the number of local I/O modules and RIO drops that it can support, page 27
- the ability to function in harsh environments: (Three controllers are hardened to operate over extended temperature ranges and in dirty or corrosive environments.)
- network configuration (standalone or Hot Standby)

Standalone Controllers

This is a list of the available controllers. Some are available in both standard and industrially hardened modules. Industrially hardened modules have the letter H appended to the module name. The letter C at the end of the module name indicates a conformal coating for harsh environments:

- BMEP581020(1), BMEP581020H
- BMEP582020(1), BMEP582020H
- BMEP582040(1), BMEP582040H, BMEP582040S
- BMEP583020(1)
- BMEP583040(1)
- BMEP584020(1)
- BMEP584040, BMEP584040S
- BMEP585040, BMEP585040C

- BMEP586040, BMEP586040C, BMEP586040S

(1) These controllers support LL984 logic.

Controllers ending with “S” are safety-related. Refer to the Modicon M580 Safety System Planning Guide for a description of safety controllers.

Hot Standby Controllers

These controllers are compatible with M580 Hot Standby systems:

- BMEH582040, BMEH582040C, BMEH582040S
- BMEH584040, BMEH584040C, BMEH584040S
- BMEH586040, BMEH586040C, BMEH586040S

NOTE: For detailed information about M580 Hot Standby configurations, refer to the *Modicon M580 Hot Standby System Planning Guide for Frequently Used Architectures*.

Altitude Operating Conditions

The characteristics apply to the controller for use at altitude up to 2000 m (6560 ft). When the controller operates above 2000 m (6560 ft), apply additional derating.

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

Performance Characteristics

Introduction

M580 PACs have an embedded DIO scanner service to manage distributed equipment on the M580 device network. Some M580 PACs also have an embedded RIO scanner service to manage RIO drops.

To manage RIO drops on the device network, select one of these controllers with Ethernet I/O scanner service (both RIO and DIO scanner service):

- BMEP582040(H)
- BMEP583040
- BMEP584040
- BMEP585040(C)
- BMEP586040(C)

- BMEH582040(C)
- BMEH584040(C)
- BMEH586040(C)

Embedded Ethernet I/O scanner services are configured via the controller IP configuration, page 152.

NOTE: Some of this information applies to M580 Hot Standby configurations. For more information, refer to the *Modicon M580 Hot Standby System Planning Guide for Frequently Used Architectures* (see Modicon M580 Standalone, System Planning Guide for Frequently Used Architectures).

Controller Characteristics

These tables show the key characteristics of the M580 standalone and Hot Standby controllers. These characteristics represent the maximum values that a specific controller can manage in the M580 PAC system.

NOTE:

- The values in these tables may not be achieved depending on the I/O density and the number of available backplane slots.
- The following tables do not include safety controllers. Refer to the Modicon M580 Safety System Planning Guide (see Modicon M580, Safety System Planning Guide) for the performance characteristics of safety controllers.

Standalone Controllers:

Maximum number of ...	Reference (BMEP58 ...)								
	1020(H)	2020(H)	2040(H)	3020	3040	4020	4040	5040(C)	6040(C)
discrete I/O channels	1024	2048	2048	3072	3072	4096	4096	5120	6144
analog I/O channels	256	512	512	768	768	1024	1024	1280	1536
expert channels	36	72	72	108	108	144	144	180	216
distributed devices(4)	64	128	64	128	64	128	64	64	64
Ethernet communication modules (including BMENOC0301/ BMENOC0311) modules, but not the controller)	2	2	2	3	3	4	4	6(1)	6(1)

Maximum number of ...	Reference (BMEP58 ...)								
	1020(H)	2020(H)	2040(H)	3020	3040	4020	4040	5040(C)	6040(C)
high performance Ethernet communication module BMENOC0302(H)	2	2	2	3	3	4	4	6	6
local backplanes (main backplane + extended backplane)	4	4	4	8	8	8	8	8	8
RIO drops, page 29 (maximum of two backplanes per drop) (main backplane + extended backplane)	–	–	8(2)	–	16(2)	–	16(3)	31(3)	31(3)
Ethernet ports:									
• service	1	1	1	1	1	1	1	1	1
• RIO or distributed equipment	–	–	2	–	2	–	2	2	2
• distributed equipment	2	2	–	2	–	2	–	–	–

– (not available)
H (hardened)
C (coated version)
(1) Only four of these modules can be BMENOC0301/BMENOC0311 modules. All other are BMX Ethernet modules.

(2) Supports BM•CRA312•0 and BMECRA31310(H) adapter modules.

(3) Supports BM•CRA312•0, 140CRA31200 and BMECRA31310(H) adapter modules.

(4) Of these connections: 3 are reserved for local slaves; the remainder are available for scanning distributed equipment.

Hot Standby Controllers:

Maximum number of ...	Reference (BMEH58 ...)		
	2040(C)	4040(C)	6040(C)
distributed devices	64	64	64
Ethernet communication modules (including BMENOC0301/ BMENOC0311modules, but not the controller)	2	4	6(1)
high performance Ethernet communication module BMENOC0302(H)	2	4	6
local backplanes (main backplane + extended backplane)	1	1	1

Ethernet Ports

Introduction

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

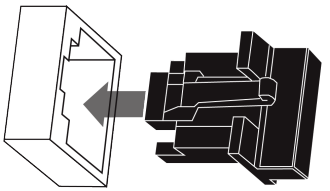
Common Characteristics

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

NOTE: The three Ethernet ports are connected to chassis ground, and the equipment requires an equipotential ground (see Modicon X80, Backplanes and Power Supplies, Hardware Reference Manual).

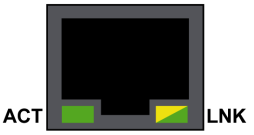
Dust Cover

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

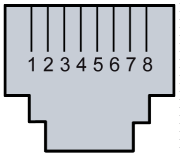


Ethernet Ports

Each RJ45 connector has a pair of LED indicators:



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

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

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

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

It is required to use one of these Ethernet cables to connect to the Ethernet ports:

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

The maximum length for a copper cable is 100 m. For distances greater than 100 m, use fiber optic cable. The controller does not have fiber ports. You may use dual ring switches (DRSs) or BMX NRP •••• fiber converter modules (see Modicon M580 Standalone, System Planning Guide for, Frequently Used Architectures) to handle the copper-fiber conversion.

Ethernet Ports on Standalone Controllers

On standalone controllers, the **ACTIVE** LED is green. The **LNK** LED is either green or yellow, depending on the status:

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

Service Port

The service port is the uppermost of the three Ethernet ports on the front panel of the controller. This port can be used:

- to provide an access point that other devices or systems can use to monitor or communicate with the M580 PAC
- as a standalone DIO port that can support a star, daisy chain, or mesh topology of distributed equipment
- to mirror the controller ports for Ethernet diagnostics. The service tool that views activity on the mirrored port may be a PC or an HMI device.

  NOTE: Do not used the service port to connect to the device network unless in some specific conditions described in *Modicon M580, Open Ethernet Network, System Planning Guide*.

The service port does not support the RSTP network protocol. Connecting the service port to the device network, either directly or through a switch/hub, can result in the creation of logical loops in the network, which can adversely affect network performance.

The service port does not support either VLANs or QoS tagging of Ethernet packets. The service port is inherently non-deterministic.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect together the service ports of the Hot Standby controllers.

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

Device Network Dual Ports

When a controller does not support RIO scanning, the two ports below the service port marked **Device Network** are DIO ports.

These controllers do not support RIO scanning:

- BMEP581020 and BMEP581020H
- BMEP582020 and BMEP582020H
- BMEP583020
- BMEP584020

You may use a **Device Network** port to support a star, daisy chain, or mesh topology of distributed equipment. You may use both **Device Network** ports to support a ring topology.

When a controller supports RIO scanning, the two ports below the service port marked **Device Network** are RIO ports. These controllers support RIO scanning:

- BMEP582040, BMEP582040H
- BMEP583040
- BMEP584040
- BMEP585040, BMEP585040C
- BMEP586040, BMEP586040C
- BMEH582040, BMEH582040C
- BMEH584040, BMEH584040C
- BMEH586040, BMEH586040C

When used as RIO ports, both ports connect the controller to the main ring in an Ethernet daisy-chain loop or ring.

For more information about RIO/DIO architectures, refer to the chapter *Modicon M580 System*.

Grounding Considerations

Follow all local and national safety codes and standards.

⚠⚠DANGER

ELECTRIC SHOCK

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

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