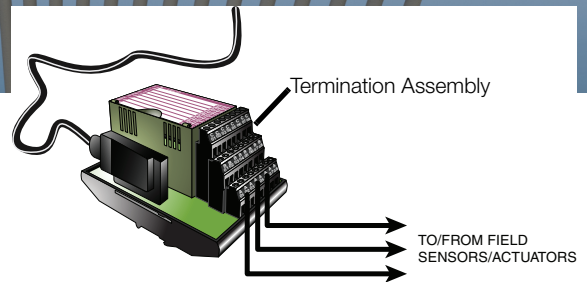
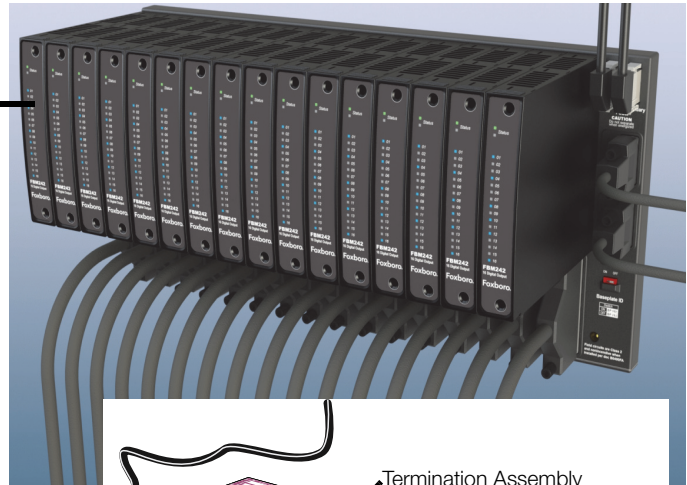


**Compact 200 Series I/O Subsystem Overview**



Compact 200 Series  
Fieldbus Modules

Compact 200 Series 16-Slot Horizontal Baseplate



The Foxboro Evo™ system's Compact 200 Series I/O subsystem is an environmentally rugged set of control electronics that can be distributed throughout your plant. This permits significant reduction in field cabling and associated raceway and conduit installation, thereby reducing the initial cost of the installation. The Compact 200 Series I/O subsystem is fully compatible with existing I/A Series® systems with 200 Series I/O equipment and/or legacy 100 Series I/O equipment.

**OVERVIEW**

The Compact 200 Series I/O subsystem provides innovative equipment packaging, together with the integrated use of Fast Ethernet networks for communication between equipment domains. This permits local or remote distribution of your process I/O points.

The Compact 200 Series I/O subsystem consists of a number of high performance Compact 200 Series Fieldbus Modules (FBMs) along with these integrally designed elements:

- ▶ Field Control Processor 280 (FCP280) and Field Control Processor 270 (FCP270) – A compact module that provides a control interface between the FBMs and the control network and allows you to locate the control processor in strategic plant areas.

- ▶ Z-Module Control Processor 270 (ZCP270) – In the Z-module form factor for use with 100 Series FBM racks, this control processor provides control operations for the 200 Series and 100 Series FBMs and allows you to locate the control processor in strategic plant areas. This CP uses Fieldbus Communications Modules (FCMs) to facilitate communications between the FBMs and the ZCP270 via the Foxboro Evo Control Network.
- ▶ FBI200 Fieldbus Isolator/Filter - These optional modules, among other functions, extend the Module Fieldbus between FCP280s/FCP270s and 200 Series FBMs up to 305 m (1000 ft) over twinaxial cable.
- ▶ Compact 200 Series Baseplate – This provides a communications backplane and a solid base for mounting the Compact 200 Series FBMs, allowing for horizontal DIN rail mounting configurations.
- ▶ Enclosures – Several basic types provide various levels of environmental protection and equipment grouping for the 200 Series equipment.

The Compact 200 Series FBMs provide support for analog measurement, digital sensing, and analog or discrete control capabilities. The Compact FBMs are rugged, high performance distributed process I/O modules designed for process control tasks. Operating in conjunction with the Foxboro control processor (FCP280, FCP270, or ZCP270), these FBMs provide for process management and control of continuous, batch and discrete control schemes.

## FEATURES

Key features for the Compact 200 Series I/O subsystem are:

- ▶ Allows you to locate control processor and field input/output modules in strategic plant areas
- ▶ High performance, reduced size Compact Fieldbus Modules (FBMs)
- ▶ Enclosures to provide various levels of environmental protection
- ▶ Compact 200 Series baseplate and Compact 200 Series FBMs reduce equipment footprint over the Standard 200 Series subsystem
- ▶ Use with standard 200 Series baseplates as described in this PSS
- ▶ Optional redundant power
- ▶ High performance, high accuracy, fast updates
- ▶ Reduced component count, for ultra-high reliability and quality
- ▶ Optional fault tolerant control processors
- ▶ Harsh (Class G3 - ISA S71.04) contamination protection
- ▶ Distributed local and/or remote I/O
- ▶ Power security and alarming
- ▶ Electrical isolation and field device power
- ▶ High-speed system communication.

## HIGH PERFORMANCE, HIGH ACCURACY, FAST UPDATES

The Compact 200 Series FBMs offer high resolution, high accuracy, and repeatable design. The Sigma-Delta, fast integrating analog-to-digital converter used on the analog inputs provides new readings as fast as every 25 ms, suitable for high-speed regulatory control applications. The analog inputs use a built-in configurable moving average filter that efficiently removes process electromagnetic noise.

### REDUCED COMPONENT COUNT FOR ULTRA-HIGH AVAILABILITY

The logic functions (I/O process, I/O specific logic, communication processor, and other inter-connecting logic functions) are integrated into a single Application Specific Integrated Circuit (ASIC).

The use of ASIC:

- ▶ Reduces the number of components in the module
- ▶ Reduces the size of the module
- ▶ Reduces the heat generated by the module
- ▶ Reduces the cost of the module
- ▶ Produces a module having ultra-high reliability and quality.

Most single modules have an expected availability of about 0.999974 [on the basis that the module resides in a baseplate with redundant power, and a mean time to repair (MTTR) of two hours].

The optionally redundant modules have an expected availability above 0.9999964 (on the basis that the module resides in a baseplate with redundant power, and a MTTR of two hours). The redundancy of the module pair, coupled with the high coverage of detected faults, provides a very high subsystem availability time.

### OPTIONAL REDUNDANCY

The Compact 200 Series I/O subsystem is optionally available with total redundancy, for high availability. Redundancy is available for –the power supplies, the Control network, the FCMs, the control processors, Modular Fieldbus cables between baseplates, and certain Compact 200 Series FBM I/O module types.

### REDUCED VOLUME

The Compact 200 Series baseplate and the Compact 200 Series FBMs have less volume than what is needed by the standard 200 Series modular baseplate and standard 200 Series FBMs. One Compact 200 Series baseplate (and its sixteen Compact 200 Series FBMs) needs less space than two standard 200 Series modular baseplates (and their sixteen standard FBMs).

### RUGGED, INNOVATIVE PACKAGING

The 200 Series Fieldbus Modules (Compact and Standard) are packaged as plug-in modular assemblies.

The Compact 200 Series FBMs have a molded plastic exterior. The maximum operating temperature for Compact 200 Series FBMs is up to 60°C (140°F). Refer to the specific Product Specification Sheet (see “Compact 200 Series Fieldbus Modules” on page 14) for each Compact 200 Series FBM for the specifications for that module.

The Compact 200 Series I/O subsystem has these product safety certifications:

- ▶ Underwriters Laboratories (UL) listing for both US (NRTL) and Canadian (UL-C) requirements for both ordinary and hazardous locations
- ▶ ATEX (DEMKO) certification for use in potentially explosive atmospheres
- ▶ CE Marked, compliant with the Low Voltage Directive, the EMC Directive, and the ATEX Directive.
- ▶ RoHS compliant

For additional information about the Compact 200 Series I/O subsystem certifications, refer to Reference 1 and Reference 2. (See Table 3, “Reference Documents,” on page 19)

### COMPACT BASEPLATE MODULE MOUNTING

The Compact 200 Series Fieldbus Modules mount on specially designed Compact 200 Series baseplates (Figure 1), which fasten to a structurally supported non-isolated horizontal DIN rail for mounting inside or outside an enclosure. (As an alternative to DIN rail mounting, a mounting plate can be used for horizontal mounting of the Compact 200 Series baseplate on a 19-inch rack). The Compact 200 Series baseplate provides increased overall system installation functionality by providing unit increments of 16 module positions with various operational functionality in combination with horizontal mounting. The Compact 200 Series baseplates can thus be mounted in small, distributed cabinets or in a variety of other mounting configurations.

The Compact 200 Series baseplates include:

- ▶ Primary and secondary 24 V dc power connections
- ▶ Two Module Fieldbus communications connections (for A and B Module Fieldbus daisy chain)
- ▶ Power connection and field I/O connection for each FBM

- ▶ DIP switch for baseplate identification
- ▶ A/B Module Fieldbus splitter/terminator connection
- ▶ Adding additional baseplates without removing the system from service (needs redundant HDLC module fieldbus).

Any Compact 200 Series FBM can be removed from their baseplate without removing or disturbing external field device wire terminations or internal cable terminations or connections.

Shielded twisted-pair Fieldbus cables for Compact 200 Series baseplate interconnections are available in various lengths of 0.12 m (4.75 in) up to 60 m (198 ft). The twisted-pair cable length interconnecting all baseplates is up to 60 m (198 ft). Before installing or removing 200 Series equipment, refer to *Standard and Compact 200 Series Subsystem User's Guide* (Reference 38).

Figure 1 shows the Compact 200 Series baseplate. It supports the Compact 200 Series FBMs only. Refer to *Compact 200 Series 16-Slot Horizontal Baseplate* (Reference 3) for additional information on this baseplate.



Figure 1. Compact 200 Series 16-Slot Horizontal Baseplate

## COMPACT 200 SERIES BASEPLATE CONFIGURATIONS

Acceptable example configurations are shown in Figure 2.

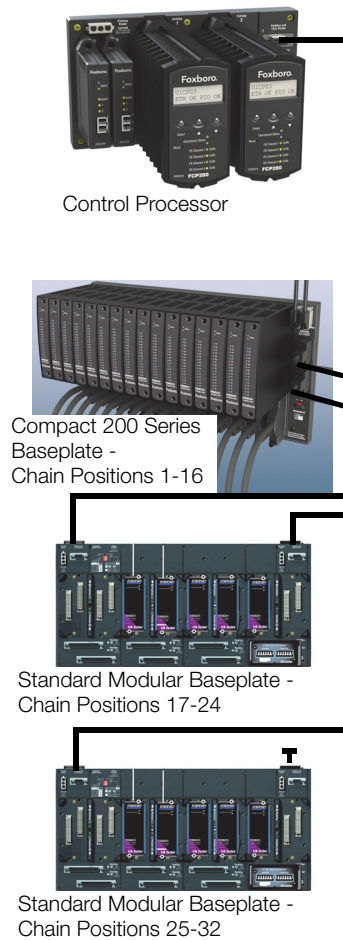
The Compact 200 Series I/O subsystem supports either:

- ▶ The use of Compact 200 Series baseplates exclusively, or
- ▶ A mix of standard 200 Series modular baseplates and Compact 200 Series baseplates.

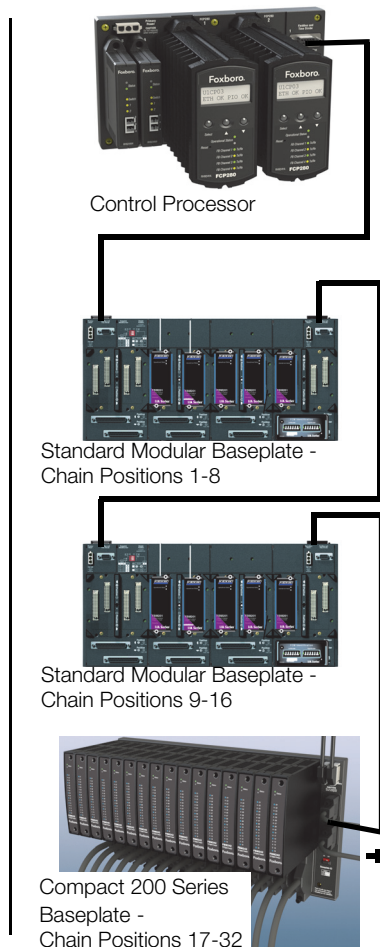
Example 1 -  
Compact 200 Series Baseplates Only



Example 2 -  
Mixed Baseplates - Compact First



Example 3 -  
Mixed Baseplates - Compact Last



NOTE: A 200 Series baseplate chain has up to 32 200 Series FBMs. The numbers assigned to these FBMs for addressing differ from those listed in this figure.

*Figure 2. Example Configurations with Compact and Standard 200 Series Baseplates*

## FIELD I/O TERMINATIONS

Field I/O signal connections are made at termination assemblies (TAs) mounted on DIN rails within or external to the enclosure. Termination assemblies are connected to the associated baseplate by dedicated cables, which can be 0.5 m (1.7 ft) up to 30 m (100 ft) in length. These various cable lengths allow the termination assemblies to be mounted in the same enclosure as the FBMs, or in an adjacent enclosure.

Analog and discrete I/O FBMs are used with specific termination assemblies to handle a variety of input/output signals. Termination assemblies (TAs) with built-in relays are available for switching high voltage and high current digital outputs. Some TAs readback the state of the contacts to confirm the state of the relay.

## ENCLOSURES

Enclosures extend the design of the 200 Series FBMs by providing a range of mounting options to match application requirements.

The G-Series enclosures are floor-standing units which accommodate baseplates for mounting FBMs, FEMs, FCMs, and FCP280s/FCP270s, and/or termination assemblies or terminal blocks for marshalling. The G-Series enclosures which support Compact 200 Series I/O subsystem equipment (G13 and G14) are available for use in ordinary (IP 43/54) rated environments.

Several product lines of metal enclosures are offered with the Compact 200 Series I/O subsystem:

- ▶ G-Series 800x800 Front and Rear Access Compact Enclosures (G13 system enclosure, G14 system and termination enclosure)
- ▶ G-Series 800x800 Front and Rear Access Enclosures (G11 termination enclosure)

- ▶ K-Series 800x800 Front and Rear Access Compact Enclosures (K13 system enclosure, K14 system and termination enclosure)
- ▶ K-Series 800x800 Front and Rear Access Enclosures (K11 termination enclosure)

Each of the enclosures includes DIN rails for mounting equipment, power supplies, and terminal blocks for connection of line power, utility power, and dc power distribution. For additional information regarding each enclosure, refer to *G-Series Enclosures Overview* (Reference 5) or *K-Series Enclosures Overview* (Reference 6).

## DISTRIBUTED LOCAL/REMOTE MOUNTING

Innovative design of the equipment packaging allows the Compact 200 Series Fieldbus Modules to be distributed closer to the process without special environmentally conditioned control or equipment rooms. Multiple control network configurations can be designed using the Ethernet fiber optic cables and switches. This allows construction of small-to-large size systems located within one or more mounting areas.

Figure 3, Figure 4, and Figure 5 show basic network configurations that can be implemented for the Compact 200 Series I/O subsystem. Both of these configurations offer connection to Ethernet switches, allowing the FBMs to be remotely mounted with the field control processor (FCP280 or FCP270) or remotely mounted from the Z-module control processor (ZCP270).

The Field Control Processor configuration (Figure 3 or Figure 4) can be used where:

- ▶ Groupings of FBMs are concentrated in a more localized area,
- ▶ Groupings of FBMs are located in the same enclosure as the FCP280 or FCP270.

This control network configuration thus allows distribution of the FBMs over a wide plant area. When used with the FBI200, the FCP270 can communicate with both the 100 Series and 200 Series FBMs (dual baud functionality). The FBI200 filters and isolates the 268 Kbps messages for the 100 Series FBMs, and helps ensure their proper operation is not interrupted by the 2 Mbps messages for 200 Series FBMs.

The FBI200 is used with FCP280 to extend the distance of a 2 Mbps or 268 Kbps HDLC fieldbus. It is not needed for filtering and isolation with the FCP280.

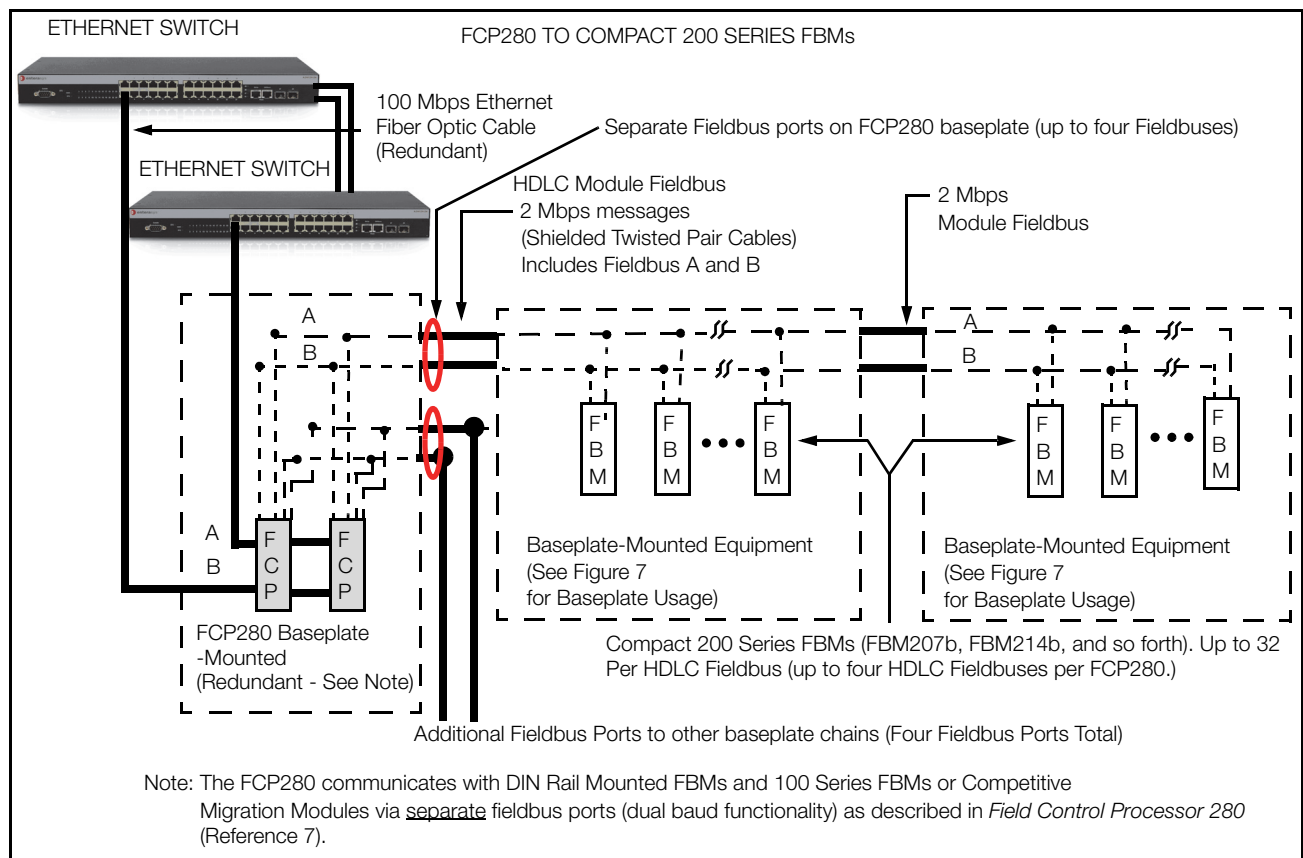


Figure 3. Compact 200 Series I/O Subsystem, Typical FCP280 Configuration (Conceptual)

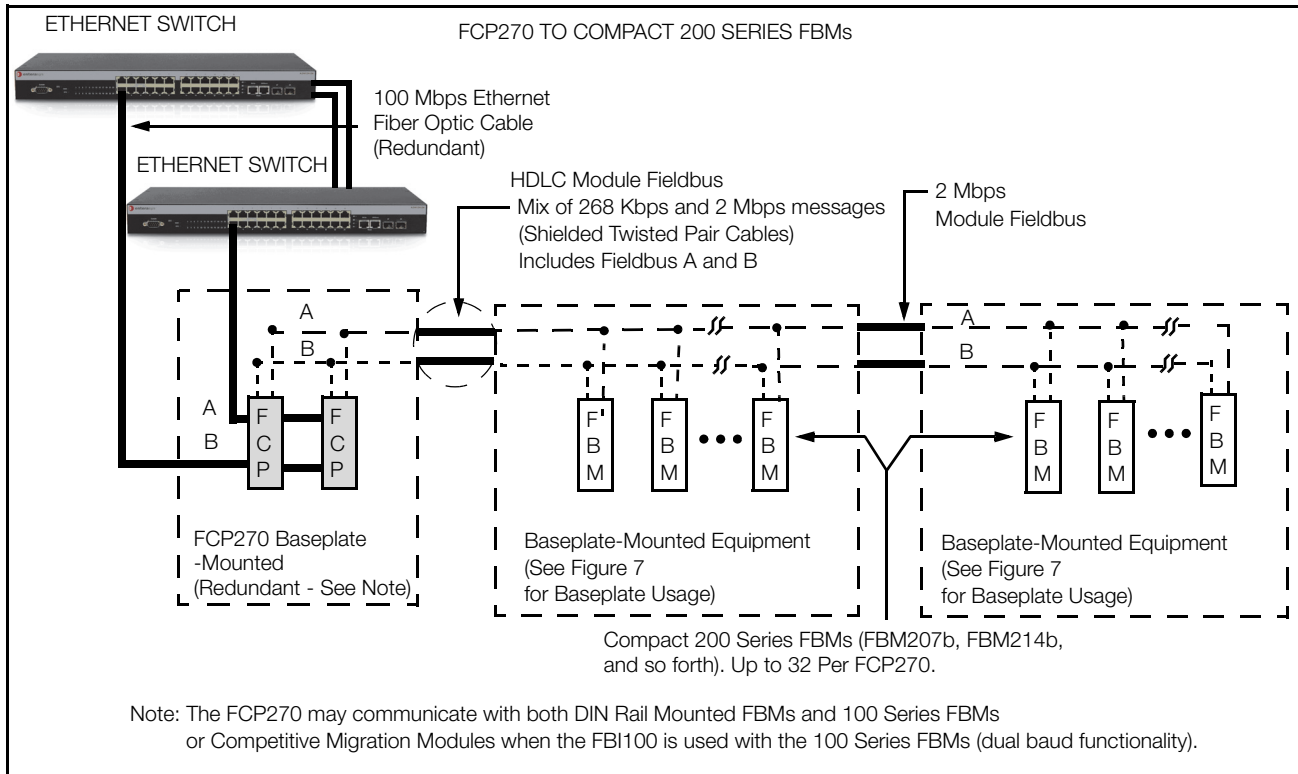


Figure 4. Compact 200 Series I/O Subsystem, Typical FCP270 Configuration (Conceptual)



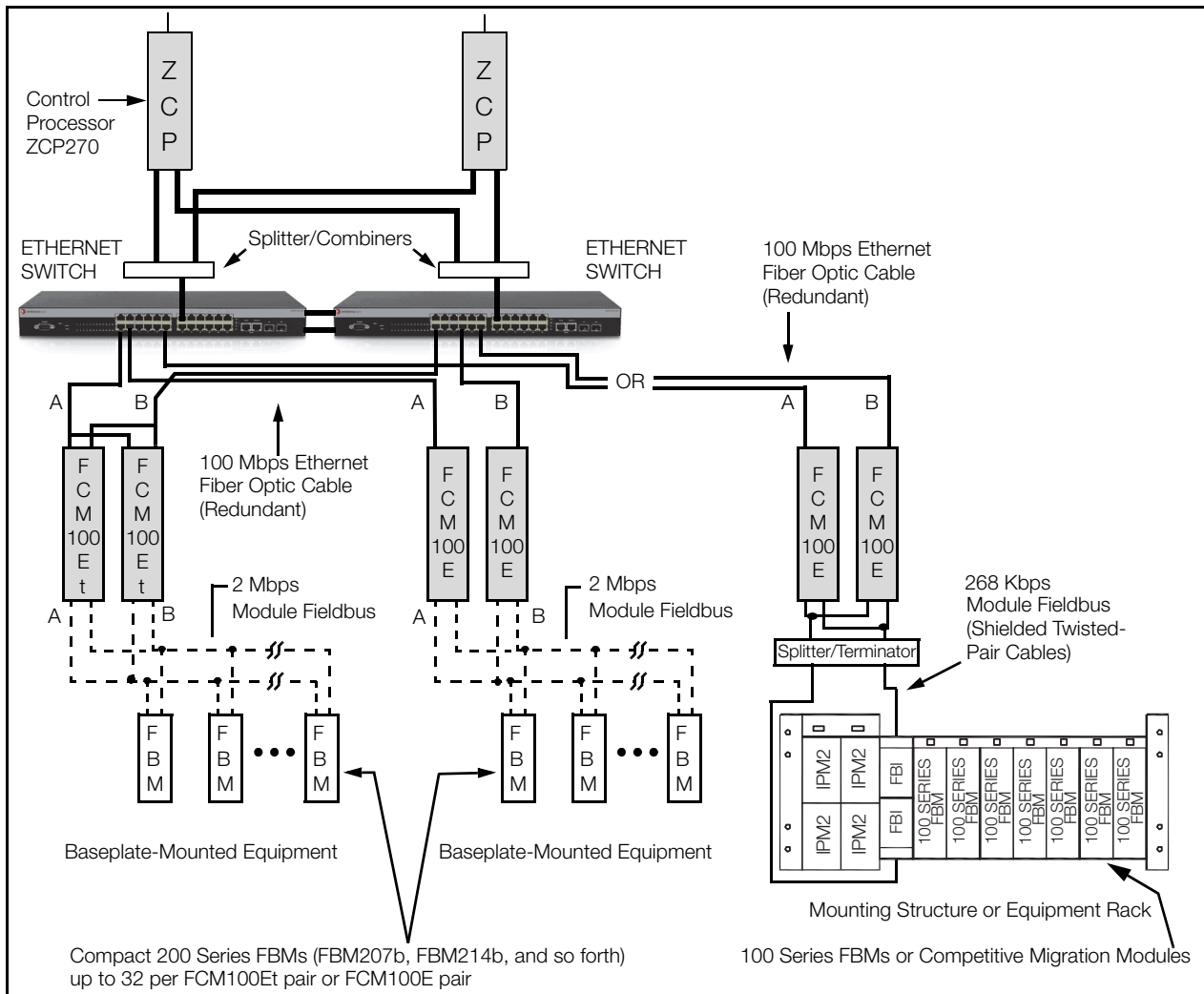


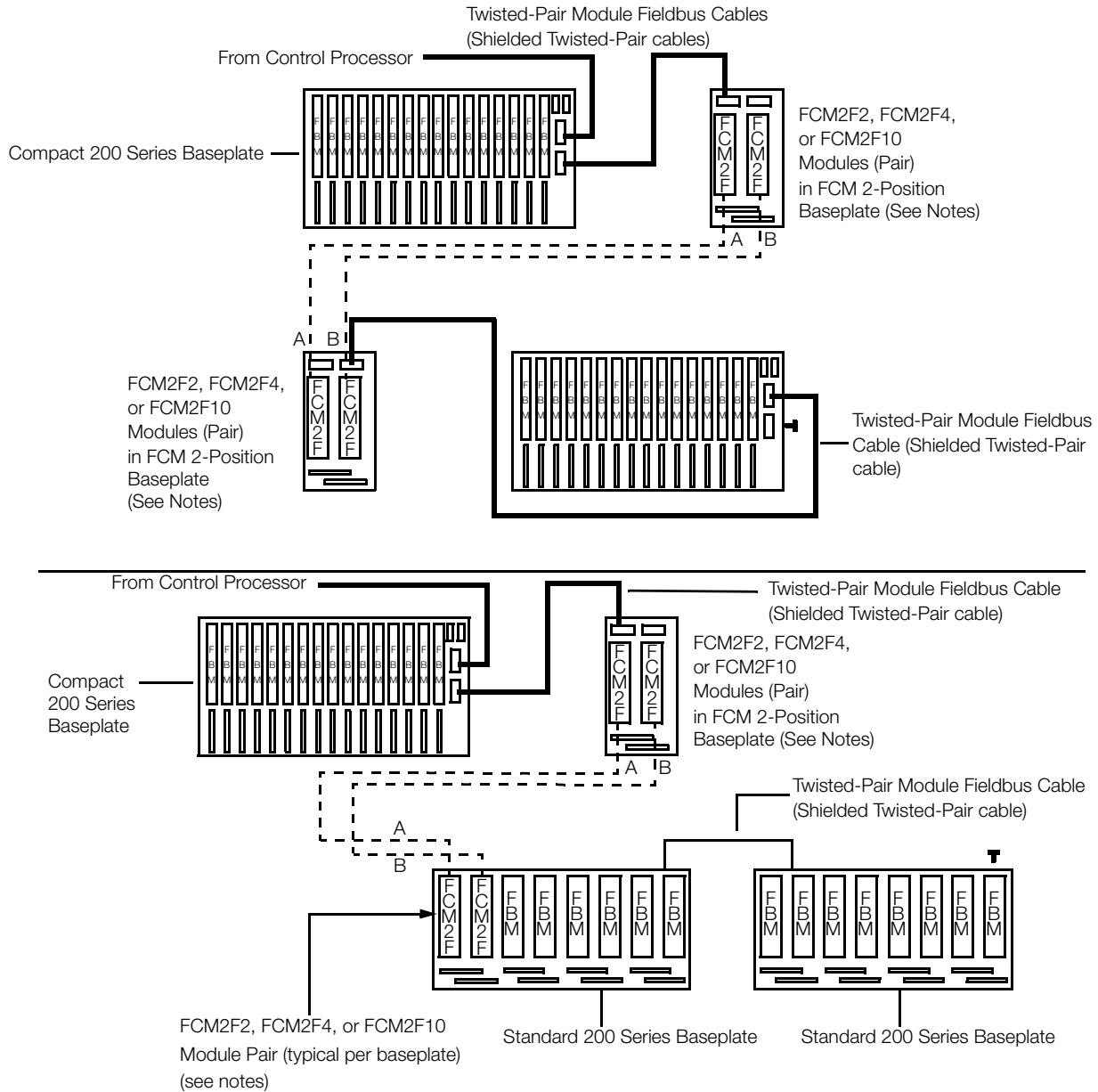
Figure 5. Compact 200 Series I/O Subsystem, Typical FCM Configuration

FCM2F Fieldbus Communications modules (see Figure 6) provide baseplate-to-baseplate fiber optic extension of the Module Fieldbus. This allows Compact 200 Series FBMs to be locally, or remotely distributed in multiple enclosures for cost-effective placement of input/output points.

The three versions of the FCM2Fs – FCM2F2, FCM2F4, and FCM2F10 – offer three different maximum baseplate-to-baseplate fiber optic cabling

distances: up to 2 km (1.24 mi), up to 4 km (2.48 mi), and up to 10 km (6.2 mi), respectively. FCM2F2 and FCM2F4 are used with multimode graded-index fiber cable, and FCM2F10 is used with single-mode fiber cable.

The FCM2Fs are mounted on the baseplates in pairs for redundancy, one each for the “A” and “B” cables of the Fieldbus. Non-redundant configurations need only a single FCM2F.



NOTES:

1. Redundant configuration is shown. Non-redundant configuration uses one FCM2F per baseplate, connected to either Fieldbus "A" or "B". Up to two pairs of FCM2Fs are allowed in series; two sets of two FCM2F10s allow up to 20 km (12.4 mi) total distance for the Fieldbus. (The number of FCM100E/Ets are not included when determining how many FCM2Fs are permissible in the baseplate chain.)
2. Three versions of the FCM2F provide three different fiber optic cabling distances:  
FCM2F2 = 2 km (1.24 mi); FCM2F4 = 4 km (2.48 mi); FCM2F10 = 10 km (6.2 mi).

Figure 6. Compact and Standard 200 Series Baseplate Interconnections Using Fiber Optic Cable

## COMPACT 200 SERIES BASEPLATE IMPLEMENTATION

The Compact 200 Series baseplate mounting of the Compact FBMs provides added versatility in applications. These baseplates are interconnected by shielded module Fieldbus cables. Figure 7 shows basic baseplate configuration using shielded twisted-pair connections. Optional redundant cables for the Module Fieldbus can be used by connecting the cables to A/B Module Fieldbus splitter/terminators.

Figure 7 shows a basic baseplate configuration using shielded twisted-pair connections. This configuration is used when the Compact 200 Series baseplates are mounted within an enclosure or enclosures in the same location (for example, in multiple enclosures in the same area). Shielded twisted-pair cables (for interconnecting the Compact 200 Series baseplates) are available in lengths of 0.12 to 60 meters.

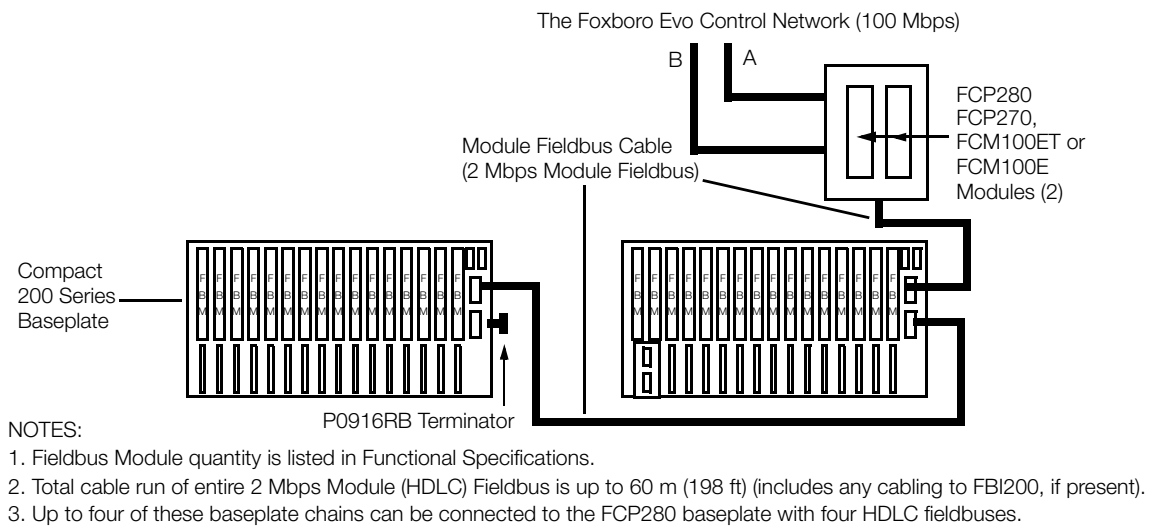


Figure 7. Compact 200 Series Baseplate Implementation Example

## **STANDARD 200 SERIES SUBSYSTEM UPGRADE**

Existing standard 200 Series subsystems can be updated to use the equipment in the Compact 200 Series I/O subsystem.

Standard horizontal 200 Series baseplates can be removed and replaced with Compact 200 Series horizontal baseplates. See *Standard 200 Series Baseplates* (Reference 4) for the dimensions of the standard 200 Series baseplates, and to *Compact 200 Series 16-Slot Horizontal Baseplate* (Reference 3) for the dimension of the Compact 200 Series baseplates. When planning this upgrade verify that:

- ▶ There are sufficient horizontal DIN rails available in the desired mounting location to support the Compact 200 Series baseplates.
- ▶ Sufficient power is provided for the Compact 200 Series baseplates. These baseplates support power from the FPS480-24, FPS400-24, FPS240-24, or FPS120-24 power supplies. For custom enclosures, select the appropriate power supplies based upon the power budget within your enclosure.
- ▶ There are sufficient cooling systems in the enclosure for the Compact 200 Series baseplates. One fan tray is needed for every two *adjacent* Compact 200 Series baseplates. “Adjacent” means that there is one Compact 200 Series baseplate located directly above the lower Compact 200 Series baseplate.<sup>(1)</sup>

As well, the standard termination cables for the standard 200 Series FBMs need to be replaced with the cables listed in the “Cable Types and Part Numbers” tables in the equivalent Compact 200 Series FBMs’ Product Specification Sheets listed in Table 1 on page 14.

The control processors and other support hardware or the Compact 200 Series equipment need to fulfill the requirements listed in “SUBSYSTEM SPECIFICATIONS” on page 22.

## **POWER SUPPLY AND GROUNDING**

### **Grounding**

Grounding practices for enclosures and the subsystem need to meet the grounding practices and requirements of:

- ▶ IEC 61000-5-1 General Considerations, and
- ▶ IEC 61000-5-2 Earthing and Cabling (or local equivalents).

The 24 V dc power supplies (FPS480-24, FPS400-24, FPS240-24, or FPS120-24) are agency certified for use in Class I, Division 2 applications.

For each FBM enclosure, you can select single or redundant power distribution. A single power distribution configuration consists of a single power supply and single power distribution to the Compact 200 Series baseplates.

A redundant power distribution configuration consists of redundant power supplies and redundant power distribution to the 200 Series baseplates. This helps provide power security upon detected power module failure for process loops where continued operation is necessary. The dual power feed distribution network helps protect against any detected single-point power failures, and helps protect all modules against detected power main failures and internal short circuits.

The power supplies need to be grounded.

---

(1) If the Compact 200 Series baseplates are distributed throughout the enclosure, then one (1) fan tray is needed per Compact 200 Series baseplate.

## Power Alarming

Failure of a single or redundant 24 V dc power supply is detected by each Compact FBM. If a power supply failure is detected:

- ▶ The color of the module's icon on the equipment displays in SMDH is changed
- ▶ Power status messages are displayed on the System Monitor display
- ▶ A system message is printed.

Since the host loses communication with the module(s), the color of the host module's icon in SMDH is changed. All of the changes occur when these failures are detected:

- ▶ A single power supply system
- ▶ A single power supply in a redundant system, if configured for alarming
- ▶ Both power supplies in a redundant system.

## ELECTRICAL ISOLATION AND FIELD DEVICE POWER

Electrical isolation and field device power are functions of the individual FBM types. The various FBM types provide, on an individual basis, channel isolated analog inputs and outputs, differential analog inputs, channel isolated digital inputs and outputs, and group isolated digital inputs. The FBMs also provide the necessary field device power for analog transmitters, current to pneumatic (I/P) converters, contact sensing, and solid state switch or relays.

The three levels of isolation available with specific FBMs are:

- ▶ Channel Isolated – Each channel is galvanically isolated from the other channels, ground and module logic. Isolated inputs and outputs use a per point isolated power supply, built into the FBM, for each channel.
- ▶ Differential Isolated – Each channel has a differential input to allow voltage differences between channels without introducing detected errors. The channels are galvanically isolated from ground and module logic. They are not isolated from other channels. Differential group isolated inputs and outputs use the FBM subsystem power supply for field power.
- ▶ Group Isolated – Input channels are isolated as a group from ground and module logic circuitry. Group isolated inputs use the subsystem power supply for field circuit power. For certain FBMs with group isolation, specific Termination Assemblies provide channel isolation to the FBMs' inputs.

## COMPACT FIELDBUS MODULES

Each Compact FBM is configurable for operation with the applicable field sensors and/or actuators. This is effected through execution of appropriate application programs, and in conjunction with configurable program options. The Compact FBMs and their executable programs and software functions are identified in Table 1. Also listed are the Product Specification Sheets (PSSs) for the individual FBMs.

Table 1. Compact 200 Series Fieldbus Modules

Compact Module	Function(s)	Application Program	Software Function(s) <sup>(a)</sup>	PSS
FBM201	8-Channel 0 to 20 mA Input, Channel Isolated	Analog Input	Conversion Time, Rate of Change Limits	Reference 9
FBM202	8-Channel Thermocouple/Millivolt Input, Channel Isolated	Analog Input	Conversion Time, Rate of Change Limits	Reference 10
FBM203	8-Channel RTD Input (platinum or nickel), Channel Isolated, 2- or 3-wire RTD sensor input, 0 to 320 ohm	Analog Input	Conversion Time, Rate of Change Limits	Reference 11
FBM203c	8-Channel RTD Input (copper), Channel Isolated, 2- or 3-wire RTD sensor input, 0 to 30 ohm	Analog Input	Conversion Time, Rate of Change Limits	Reference 11
FBM203d	8-Channel RTD Input (platinum or nickel), Channel Isolated, 4-wire RTD sensor input, 0 to 320 ohm	Analog Input	Conversion Time, Rate of Change Limits	Reference 11
FBM204	8-Channel 0 to 20 mA I/O (4 Input, 4 Output), Channel Isolated	Analog I/O or DPIDA	Conversion Time, Output Fail-Safe Configuration (Hold/Fall-back on a per channel basis)	Reference 12
FBM207	Redundant Ready 16-Channel dc Voltage Monitor, Channel Isolated	Discrete Input or Ladder Logic	Input Filter Time	Reference 13
FBM207b	Redundant Ready 16-Channel 24 V dc Contact Sense, Channel Isolated	Discrete Input or Ladder Logic	Input Filter Time	Reference 13
FBM207c	Redundant Ready 16-Channel 48 V dc Contact Sense, Channel Isolated	Discrete Input or Ladder Logic	Input Filter Time	Reference 13

Table 1. Compact 200 Series Fieldbus Modules (Continued)

Compact Module	Function(s)	Application Program	Software Function(s) <sup>(a)</sup>	PSS
FBM208	Redundant with Readback, 0 to 20 mA Input/Output (4 Input and 4 Output), Channel Isolated	Analog I/O	Conversion Time, Output Fail-Safe Configuration (Fall-back to "0" on a per channel basis)	Reference 14
FBM211	16-Channel Differential Analog Input, 0 to 20 mA, Differential Isolated	Analog Input	Conversion Time, Rate of Change Limits	Reference 15
FBM212	14-Channel Differential Analog Input, Thermocouple, Differential Isolated	Analog Input	Conversion Time, Rate of Change Limits	Reference 16
FBM214b	8-Channel 4 to 20 mA, HART <sup>®</sup> Input, Channel-Isolated	Analog Input and HART Input	Conversion Time, Rate of Change Limits	Reference 17
FBM215	8-Channel 4 to 20 mA, HART <sup>®</sup> Output, Channel-Isolated	Analog Output and HART Output	Output Fail-Safe Configuration (Hold/Fall-back on a per channel basis)	Reference 18
FBM216b	Redundant 8-Channel 4 to 20 mA, HART <sup>®</sup> Input Channel-Isolated	Analog Input and HART Input	Conversion Time, Rate of Change Limits	Reference 19
FBM217	Redundant Ready 32-Channel Discrete Input, Group Isolated <sup>(b)</sup>	Discrete I/O, or Ladder Logic	Input Filter Time	Reference 20
FBM218	Redundant 8-Channel 4 to 20 mA, HART <sup>®</sup> Output, Channel-Isolated	Analog Output and HART Output	Output Fail-Safe Configuration (Fail-Safe is configured on a per channel basis)	Reference 21
FBM219	24-Channel Discrete Input, Plus 8-Channel Discrete Output, External Source, Group Isolated <sup>(c)</sup>	Discrete I/O or Ladder Logic	Input Filter Time, Fail-Safe Configuration, Fail-Safe Fall-back, and Sustained or Momentary Outputs. If the Momentary Output configuration is selected, then Pulse Output Interval is also configurable.	Reference 22

Table 1. Compact 200 Series Fieldbus Modules (Continued)

Compact Module	Function(s)	Application Program	Software Function(s) <sup>(a)</sup>	PSS
FBM227	4-Channel 0 to 10 V dc Input, 2-Channel 0 to 10 V dc Output 4-Channel Discrete Input, 4-Channel Discrete Output; Discrete channels are isolated in channel pairs	Analog I/O, Discrete I/O, (Both) MDACT or DPIDA Control Support	(Analog) Conversion Time, Output Fail-Safe Configuration, (Discrete) Input Filter Time	Reference 23
FBM237	Redundant Ready 8-Channel 0 to 20 mA Output, Redundant, Channel Isolated	Analog Output	Output Fail-Safe Configuration (When Non-Redundant, Hold/Fallback on a per channel basis; When Redundant, Fallback to "0" on a per channel basis)	Reference 24
FBM238	24-Channel Discrete Input, Plus 8-Channel Discrete Output, External Source, Group Isolated	Discrete I/O or Ladder Logic	Input Filter Time	Reference 25
FBM239	16-Channel Discrete Input, Plus 16-Channel Discrete Output, External Source, Group Isolated	Discrete I/O or Ladder Logic	Input Filter Time	Reference 26
FBM240	Redundant Ready 8-Channel Externally Sourced Discrete Output with Readback, Channel Isolated	Discrete Output	Output Fail-Safe Configuration (When Redundant, Fallback to "0" on a per channel basis)	Reference 27
FBM241	8-Channel Voltage Monitor, Plus 8-Channel Discrete Output, External Source, Channel Isolated	Discrete I/O or Ladder Logic	Input Filter Time, Fail-Safe Configuration, Fail-Safe Fall-back, and Sustained or Momentary Outputs. If the Momentary Output configuration is selected, then Pulse Output Interval is also configurable.	Reference 28



Table 1. Compact 200 Series Fieldbus Modules (Continued)

Compact Module	Function(s)	Application Program	Software Function(s) <sup>(a)</sup>	PSS
FBM241c	8-Channel Contact Sense, Plus 8-Channel Discrete Output, External Source, Channel Isolated	Discrete I/O or Ladder Logic	Input Filter Time, Fail-Safe Configuration, Fail-Safe Fall-back, and Sustained or Momentary Outputs. If the Momentary Output configuration is selected, then Pulse Output Interval is also configurable.	Reference 28
FBM241d	8-Channel Contact Sense, Plus 8-Channel Discrete Output, Internal Source, Channel Isolated	Discrete I/O or Ladder Logic	Input Filter Time, Fail-Safe Configuration, Fail-Safe Fall-back, and Sustained or Momentary Outputs. If the Momentary Output configuration is selected, then Pulse Output Interval is also configurable.	Reference 28
FBM242	16-Channel Externally Sourced Discrete Output, Channel Isolated	Discrete Output or Ladder Logic	Fail-Safe Configuration	Reference 29
FBM247	8-Channel Current/Voltage Analog/Digital/Pulse I/O Configurable Channel Interface Module (with HART® Support on All Channels) - Includes support for additional communication types	Analog I/O and Discrete I/O	Discrete Input, Pulse Count, Sequence of Events and Transient Data Recording with support for Sustained and Momentary Digital Outputs	Reference 30
FBM248	8-Channel Current/Voltage Analog/Digital/Pulse I/O Configurable Channel Interface Module (with HART® Support on All Channels), Redundant - Includes support for additional communication types	Analog I/O and Discrete I/O	Discrete Input, Pulse Count, Sequence of Events and Transient Data Recording with support for Sustained and Momentary Digital Outputs	Reference 31

(a) Software functions for inputs are exercised on a per module basis; those for outputs are exercised on a per channel basis.

- (b) The Termination Assembly for this FBM provides channel isolation for the FBM's inputs as well. Details are provided in the FBM's PSS.
- (c) The Termination Assemblies for this FBM provides channel isolation for either the FBM's inputs or outputs as well. Details are provided in the FBM's PSS.

### **FIELDBUS COMMUNICATIONS MODULES**

Fieldbus Communications Modules used in conjunction with the Fieldbus Modules are listed in Table 2 on page 19.

### **REDUNDANT FIELDBUS MODULES**

Redundant fieldbus modules, such as the Compact FBM216b, need to be installed in pairs along with a redundancy adapter. Two single modules are combined at the associated baseplate with the field signals wired to one common termination assembly. Compact FBM216b and FBM218 use RIN and ROUT blocks to interface to their inputs and outputs.

Only the Master Compact FBM writes to the outputs among redundant HART output modules. The Tracker Compact FBM is 1 mA below the Master by default.

### **REDUNDANT READY COMPACT FIELDBUS MODULES**

Redundant ready Compact FBMs, such as the Compact FBM207b, may be used in either non-redundant mode by installing a single module or in redundant mode by installing two modules along with a redundancy adapter. In either configuration, the modules are identical. In the redundant configuration, two single modules are combined at the associated baseplate, with the field output signals wired to one common termination assembly. The input current for redundant modules is doubled. A redundant digital input block in the Foxboro Evo software validates each input in conjunction with information to/from the module, and selects the input with the highest quality for processing in the control strategy.

### **CALIBRATION**

The analog Fieldbus Modules are calibrated at the factory prior to shipment and cannot be calibrated in the field. In addition, discrete input/output Fieldbus Modules do not need field adjustments. Therefore, the Fieldbus Modules do not contain local (that is, module-mounted) manual controls or jumpers.

Table 2. Fieldbus Communications Modules

Module Type	Function	PSS
FCM100Et	Converts 100 Mbps fiber optic signals to 2 Mbps signals used by the 200 Series FBMs (used in pairs for redundancy).	Reference 32
FCM100E	Converts 100 Mbps fiber optic signals to 2 Mbps signals used by the 200 Series FBMs (used in pairs for redundancy), or to the 268 Kbps Fieldbus used by the 100 Series FBMs.	Reference 33
FCM2F	Available in three models: FCM2F2, FCM2F4, and FCM2F10 (for 2, 4, and 10 km cabling, respectively). Used to extend the Module Fieldbus, allowing greater distance between 200 Series baseplates (used in pairs for redundancy).	Reference 34

## RELATED PRODUCT DOCUMENTS

Table 3. Reference Documents

Reference	Document Number	Description
1	PSS 31H-2CERTS	Standard and Compact 200 Series I/O - Agency Certifications
2	PSS 31H-2W12 B3	DIN Rail Mounted High Density I/O Equipment, Agency Certifications
3	PSS 31H-2C200	Compact 200 Series 16-Slot Horizontal Baseplate
4	PSS 31H-2SBASPLT	Standard 200 Series Baseplates
5	PSS 31H-2GOV	G-Series Enclosures Overview
6	PSS 31H-2KOV	K-Series Enclosures Overview
7	PSS 31H-2FBI200	FBI200 Fieldbus Isolator/Filter
8	PSS 31H-1FCP280	Field Control Processor 280 (FCP280)
9	PSS 31H-2C201	Compact FBM201 Analog Input 0 to 20 mA Module
10	PSS 31H-2C202	Compact FBM202, Thermocouple/mV Input Module
11	PSS 31H-2C203	Compact FBM203/c/d Platinum/Nickel/Copper RTD Input Module
12	PSS 31H-2C204	Compact FBM204, 0 to 20 mA I/O Module
13	PSS 31H-2C207	Compact FBM207/b/c Voltage Monitor/Contact Sense Input Interface Modules
14	PSS 31H-2C208	Compact FBM208, Redundant with Readback, 0 to 20 mA I/O Module

**Table 3. Reference Documents (Continued)**

<b>Reference</b>	<b>Document Number</b>	<b>Description</b>
15	PSS 31H-2C211	Compact FBM211, 0 to 20 mA Input Module
16	PSS 31H-2C212	Compact FBM212 Thermocouple/mV Differential Input Module
17	PSS 31H-2C214	Compact FBM214b, HART® Communication Input Interface Module
18	PSS 31H-2C215	Compact FBM215 HART® Communication Output Interface Module
19	PSS 31H-2C216	Compact FBM216b, HART® Communication Redundant Input Interface Module
20	PSS 31H-2C217	Compact FBM217 Discrete Input Interface Module
21	PSS 31H-2C218	Compact FBM218 HART® Communication Redundant Output Interface Module
22	PSS 31H-2C219	Compact FBM219 Discrete I/O Interface Module
23	PSS 31H-2C227	Compact FBM227, 0 to 10 V dc, Contact/dc I/O Module with DPIDA and MDACT Support
24	PSS 31H-2C237	Compact FBM237, 0 to 20 mA Output Module (Redundant Ready)
25	PSS 31H-2C238	Compact FBM238, Digital 24DI/8DO Module
26	PSS 31H-2C239	Compact FBM239, Digital 16DI/16DO Module
27	PSS 31H-2C240	Compact FBM240 Redundant with Readback, Discrete Output Module
28	PSS 31H-2C241	Compact FBM241/c/d Discrete I/O Modules
29	PSS 31H-2C242	Compact FBM242, Externally Sourced, Discrete Output Interface Module
30	PSS 31H-2C247	Compact FBM247, Current/Voltage Analog/Digital/Pulse I/O Configurable Module
31	PSS 31H-2C248	Compact FBM248, Current/Voltage Analog/Digital/Pulse I/O Configurable Module, Redundant
32	PSS 21H-2Y10 B4	FCM100Et Redundant Fieldbus Communications Module
33	PSS 21H-2Y11 B4	FCM100E Redundant Fieldbus Communications Module
34	PSS 31H-2FCM	Fieldbus Communications Module, FCM2F2/FCM2F4/FCM2F10
35	B0700FY	Field Control Processor 280 (FCP280) Sizing Guidelines and Excel Workbook

**Table 3. Reference Documents (Continued)**

Reference	Document Number	Description
36	B0700AV	Field Control Processor 270 (FCP270) Sizing Guidelines and Excel Workbook
37	B0700AW	Z-Module Control Processor 270 (ZCP270) Sizing Guidelines and Excel Workbook
38	B0400FA	Standard and Compact 200 Series Subsystem User's Guide

For reference purposes, Table 3 and Table 4 list the Product Specification Sheets (PSSs) for additional hardware and software elements in the Compact 200 Series I/O subsystem. Table 3 and Table 5 list the Product Specification Sheets (PSSs) for additional hardware and software elements in the standard 200 Series subsystem. The ZCP270 is mounted in a 1x8 Mounting Structure, but is listed herein for its relationship to DIN rail mounted equipment.

**Table 4. Other Related Product Specification Sheets - for Compact 200 Series I/O Equipment**

PSS Number	Title
PSS 31H-2C480 B4	Compact Power Supply - FPS480-24
PSS 31H-2G13	G13 System Enclosure
PSS 31H-2G14	G14 System and Termination Enclosure
PSS 31H-2K13	K13 System Enclosure
PSS 31H-2K14	K14 System and Termination Enclosure

**Table 5. Other Related Product Specification Sheets - for Standard 200 Series I/O Equipment**

PSS Number	Title
PSS 31H-2SOV	Standard 200 Series Subsystem Overview
PSS 31H-2W100	100 Series Fieldbus Module Upgrade Subsystem Overview
PSS 31H-2FPS400	Standard 200 Series Power Supply
PSS 31H-2FPS	200 Series Power Supplies - FPS240-24 and FPS120-24
PSS 31H-2FEM100	FEM100 Fieldbus Expansion Module
PSS 21H-1B9	Field Control Processor 270 (FCP270)
PSS 21H-1B10	Z-Module Control Processor 270 (ZCP270)

## SUBSYSTEM SPECIFICATIONS

### Software Requirements

I/A Series software v8.8 or Foxboro Evo Control Core Services v9.0 or higher

### Compatible Foxboro Control Processor

Control Processor FCP280, FCP270 or ZCP270

### Equipment Quantities

#### **FBMS HOSTED BY FCP280<sup>(2)</sup>**

100 Series FBMs - up to 64  
200 Series FBMs - up to 128  
200 Series FBMs, or up to 128 of a combination of 100 Series and 200 Series FBMs (with no more than 64 100 Series FBMs in this configuration)

#### **FBMS HOSTED BY FCP270<sup>(3)</sup>**

100 Series FBMs - up to 64  
200 Series FBMs - up to 32 (without FEM100) or up to 128 (with FEM100)

#### **FBMS HOSTED BY ZCP270<sup>(4)</sup>**

Up to 128 100 Series or 200 Series FBMs per ZCP270 with FCM100E (dependent upon the number of FCM100Es implemented)

#### **FCM100E PAIRS PER ZCP270**

Up to 32

#### **FBMS HOSTED BY FCM100E<sup>(4)</sup>**

Up to 32

#### **FBMS HOSTED BY FCM100E<sup>(4)</sup>**

100 Series FBMs - up to 64  
200 Series FBMs - up to 32

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(2) Depending on control processor sizing constraints [Refer to *Field Control Processor 280 (FCP280) Sizing Guidelines and Excel Workbook* (Reference 35).]

(3) Depending on control processor sizing constraints [Refer to *Field Control Processor 270 (FCP270) Sizing Guidelines and Excel Workbook* (Reference 36).]

(4) Depending on control processor sizing constraints [Refer to *Z-Module Control Processor 270 (ZCP270) Sizing Guidelines and Excel Workbook* (Reference 37).]



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