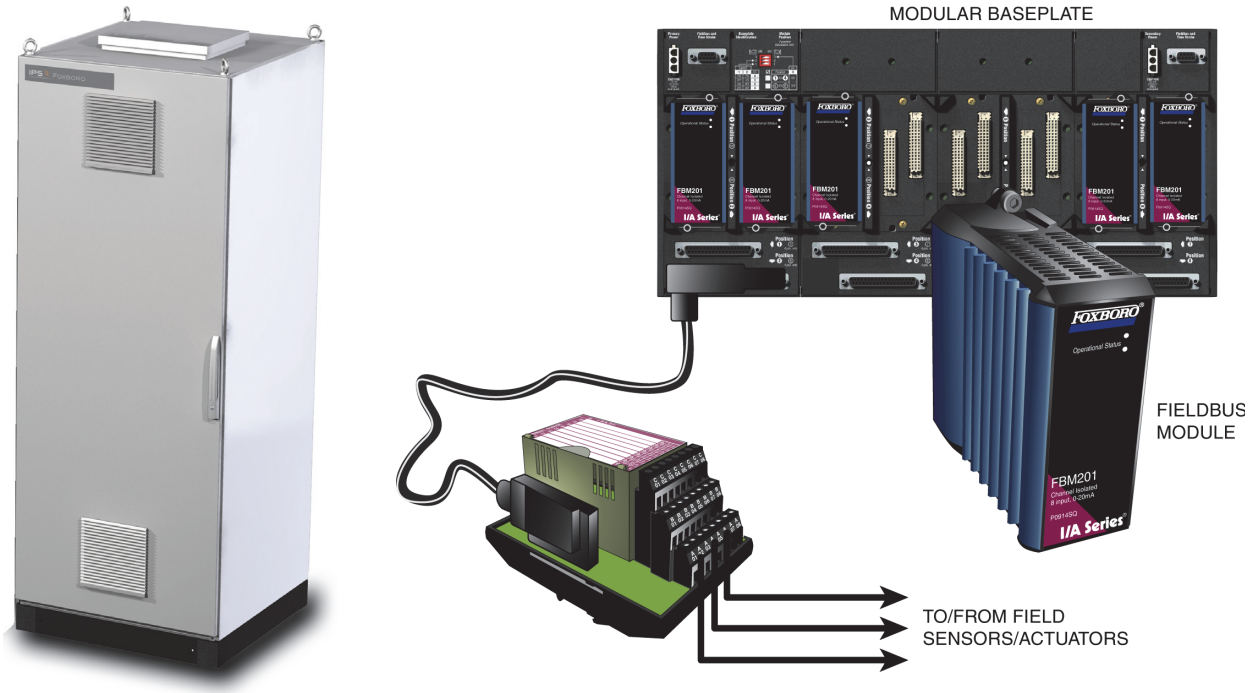
I/A Series® HARDWARE
Product Specifications

invensys
Foxboro®

PSS 21H-2W1 B3

DIN Rail Mounted Subsystem Overview



The I/A Series® system DIN rail mounted subsystem allows you to distribute process input/output modules to strategic points within your plant.

FEATURES

Key features for the DIN rail mounted subsystem are:

- Allows you to locate control processor and field input/output modules in strategic plant areas
- High performance Fieldbus Modules (FBMs)
- Enclosures to provide various levels of environmental protection
- Optional redundant power
- Variety of modular mounting configurations
- High performance, high accuracy, fast updates
- Optional Intrinsically Safe baseplates for FBMs
- Reduced component count, for ultra-high reliability and quality
- Optional redundancy
- 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.

OVERVIEW

The I/A Series system DIN rail mounted subsystem innovative equipment packaging, together with the integrated use of Fast Ethernet networks with fiber optic cable for communication between equipment domains, permits local or remote distribution of your process I/O points.

The DIN rail mounted subsystem consists of a full line of high performance Fieldbus Modules (FBMs), along with the following integrally designed elements:

- Field Control Processor 280 (FCP280) and Field Control Processor 270 (FCP270) – Similar in size to the FBMs, this compact control processor 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 compact control processor provides control operations for the FBMs and allows you to locate the control processor in strategic plant areas.
- Fieldbus Communications Modules (FCMs) – Similar in size to the FBMs, these compact modules provide a communication interface between the FBMs and the ZCP270 via The Mesh control network.
- FBI200 Fieldbus Isolator/Filter - Similar in size to the FBMs, these compact, optional modules, among other functions, extend the 268 kbps Module Fieldbus between FCP280s/FCP270s and 100 Series FBMs up to 1830 m (6000 ft) over twinaxial cable.
- Modular Baseplates – These provide a communications backplane and a solid base for mounting the FBMs, FCMs, or FCP280s allowing for a variety of remote equipment mounting configurations.
- Intrinsically Safe Baseplates (ISTA-BPs) – Compatible with standard modular baseplates, the ISTA-BPs were co-developed with Pepperl and Fuchs and provide an Intrinsic Safe solution for I/A Series 200 Series FBM applications.
- Enclosures – Several basic types provide various levels of environmental protection and equipment grouping for the DIN rail mounted equipment.

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

HIGH PERFORMANCE, HIGH ACCURACY, FAST UPDATES

The DIN rail mounted FBMs offer high resolution, high accuracy, and repeatable design. The Sigma-Delta, fast integrating 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 noise and power line frequencies.

REDUCED COMPONENT COUNT FOR ULTRA-HIGH RELIABILITY AND QUALITY

All 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.

A single module has an expected availability above 0.999974. [This assumes that the module resides in a baseplate with redundant power, and a mean time to repair (MTTR) of two hours.]

An optionally redundant module has an expected availability above 0.9999964. (This assumes 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 faults, provides a very high subsystem availability time.

OPTIONAL REDUNDANCY

The DIN rail mounted subsystem is optionally available with total redundancy, for high reliability and availability. Redundancy is available for; the power supplies, The Mesh control network, the FCMs, the FEMs(1)), the FCP280, Modular Fieldbus cables between baseplates and certain FBM I/O module types.

RUGGED, INNOVATIVE PACKAGING

The DIN rail mounted Fieldbus Modules are packaged as structurally identical plug-in modular assemblies. To permit mounting in harsh environments, each module has a rugged, extruded aluminum exterior, without open vent holes, for physical protection of the circuits. Heat generated within the module is conducted from the module via the aluminum finned cover. This approach to protection prevents contaminants in the plant environment from reaching the control components, greatly extending the life of the equipment. The operating temperature for a module is rated at either 50°C, 60°C, or 70°C depending on the module and termination assembly type. The specific Product Specification Sheet (see “Fieldbus Modules” on page 14) for each module lists the specific operating temperature for the module.

The standard DIN rail mounted subsystem has the following product safety certifications:

- Underwriters Laboratories (UL) listing for both US (NRTL) and Canadian (UL-C) requirements for both ordinary and hazardous locations
- CENELEC (DEMKO) certification for use in potentially explosive atmospheres
- CE approved.

For additional information about certifications, refer to PSS 31H-2W2 B3.

Light-emitting diodes (LEDs) incorporated into the front of each module provide visual status indications of the Fieldbus Module functions.

The small size of these FBMs allows ample room in an enclosure to terminate field wiring near the FBM.

MODULAR BASEPLATE MODULE MOUNTING

The DIN rail mounted Fieldbus Modules mount on specially designed Modular Baseplates (Figure 1, only vertical baseplates shown). The Modular Baseplates fasten to a structurally supported non isolated 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 Modular Baseplate on a 19-inch rack). The Modular Baseplate provides increased overall system installation functionality by providing unit increments of 2, 4 and 8 module positions with various operational functionality in combination with vertical and horizontal mounting. The Modular Baseplates can thus be mounted in small, distributed cabinets or in a variety of other mounting configurations.

The Modular Baseplates are backwards compatible with existing DIN I/O subsystems allowing for future expansion without additional interface hardware and includes the following:

- Primary and secondary 24 V dc power connections

(1) FEM100 modules are not used with the FCP280.

- Two Module Fieldbus connections (for A/B Module Fieldbus daisy chain)
- Power/communication connection and field I/O connection for each FBM
- DIP switch for baseplate identification
- A/B Module Fieldbus and optional time strobe splitter/terminator connection
- Adding additional baseplates without removing the system from service (requires redundant Module Fieldbus).

Any FBM (except FBM232/233) can be removed from the Modular Baseplate without removing or disturbing external field device wire terminations or internal cable terminations or connections.

FCPs, and FCMs require removal of wiring to the control network.

Shielded twisted-pair cables for Modular Baseplate interconnections are available in various lengths of 0.25 m (10 in) up to 60 m (198 ft). The maximum twisted-pair cable length interconnecting all baseplates is 60 m (198 ft).

Figure 1 shows selected vertical DIN rail mounted Modular Baseplates. Horizontal DIN rail mounted Modular Baseplates are available in similar styles as the vertical mounted baseplates, but equivalents for each style are not all available. Refer to PSS 21H-2W6 B4 for additional information on the remaining DIN rail mounted Modular Baseplates.

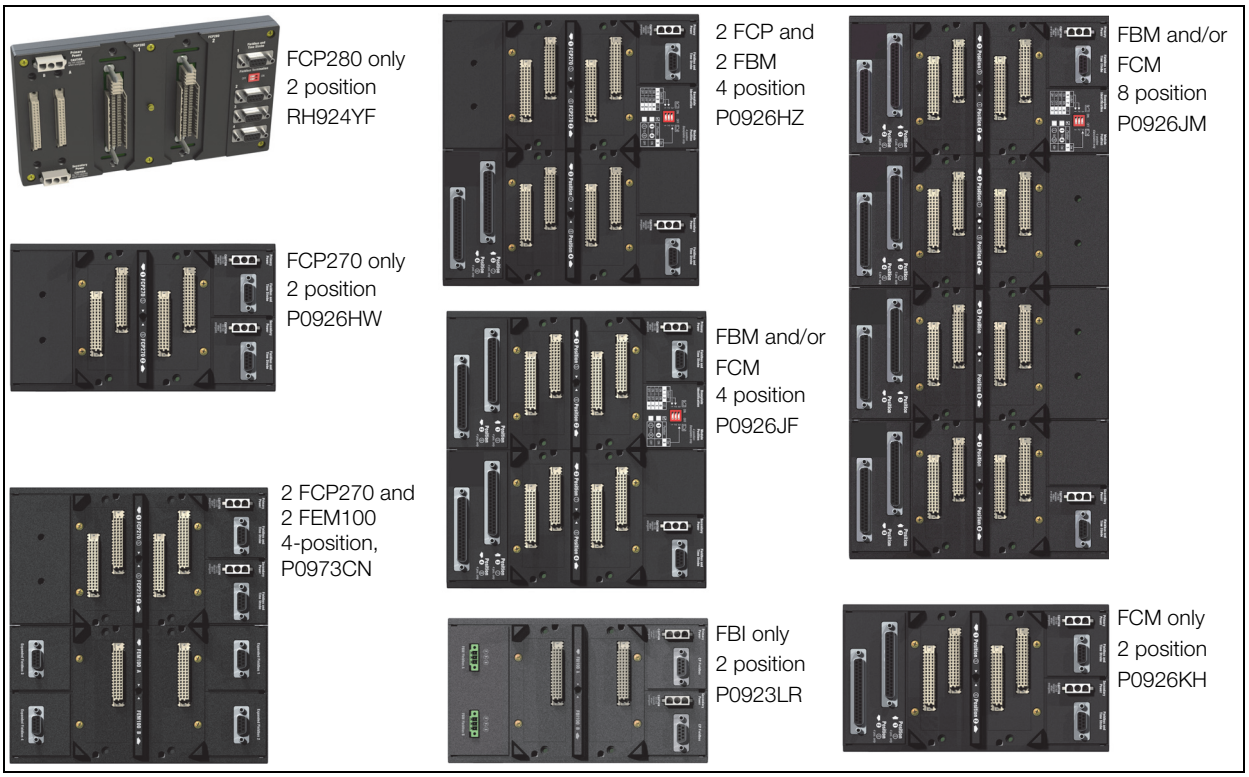


Figure 1. Vertical Mounted DIN Rail Modular Baseplates (Selected Models)

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. When used in high voltage applications, discrete I/O termination assemblies adapt the module to 120 V ac, 125 V dc, or 240 V ac inputs.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.

INTRINSICALLY SAFE TERMINATION ASSEMBLY – BASEPLATE (ISTA-*BP*)

The ISTA-*BP* is a combination of a baseplate with integrated terminals fitted with one or two Fieldbus modules (FBMs) and eight galvanic isolators. This solution consists of a printed circuit board and therefore does not require any additional wiring on the board, offering a reliable interface between the control processor and field I/O sensors and actuators. As a result this compact packaging offers a noticeable space saving in the interface cabinet. This is a joint Foxboro / Pepperl+Fuchs product. For details, refer to PSS 21H-2Y12 B4.

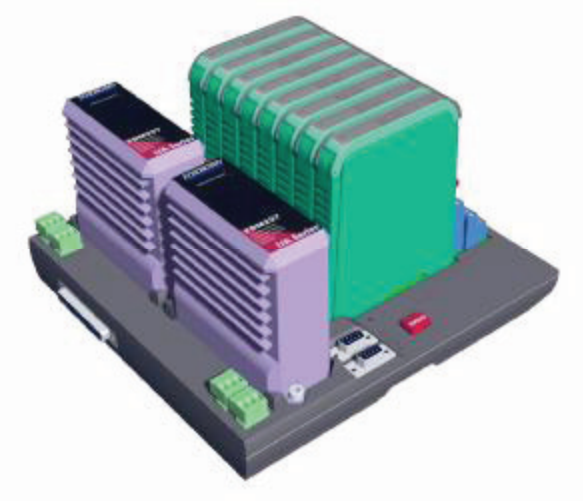


*Figure 2. Dual or Redundant ISTA-*BP**

ENCLOSURES

Enclosures extend the design of the DIN rail mounted FBMs by providing a range of mounting options to match application requirements.

The G-Series enclosures are floor-standing units which accommodate Modular Baseplates for mounting FBMs, FEMs, FCMs, and FCP280s, and/or termination assemblies or terminal blocks for marshalling. Most are available for use in ordinary (IP 43/54) or harsh (IP 55/65) rated environments.

Several product lines of metal enclosures are offered with the DIN rail mounted subsystem:

- G-Series 800x800 Front and Rear Access Enclosures (G10 system enclosure, G11 termination enclosure, G12 system and termination enclosure)
- G-Series 800x600 Front and Rear Access Enclosures (G20 system enclosure, G21 termination enclosure, G22 system and termination enclosure)

- G-Series 800x800 Front-Only Access Enclosures (G15 system enclosure, G16 termination enclosure, G17 system and termination enclosure)
- G-Series 800x800 19-Inch Rack Enclosures (G40 front and rear access enclosure, G45 front-only access enclosure - provide DIN rails, racks and power supplies for other equipment.)
- G-Series 600x1000 19-Inch Server Enclosure (G50 server enclosure)

Also, the G06 Enclosure is available. It is a wall-mounted unit which accommodates Modular Baseplates, for mounting FBMs, FEMs, FCMs and FCPs. It is available with two levels of environmental protection, NEMA 4 or NEMA 4X, allowing it to be used in a variety of locations: indoors, outdoors, and sheltered.

Each of the enclosures includes DIN rails for mounting DIN rail mounted equipment, power supplies, and terminal blocks for connection of line power. For additional information regarding each enclosure, refer to *G-Series Enclosures Overview* (PSS 21H-2X8 B3).

COMMUNICATION

Communication between redundant instances of The Mesh control network is routed via the redundant Fieldbus Communications Modules or the Field Control Processor (FCP280) to the Fieldbus Modules. The control network is a redundant serial data communication bus that employs asynchronous protocol and conforms to the general requirements of Ethernet communication with a fiber optic interface.

The plug-in FCMs provide the potential to support emerging communication standards. Various other Fieldbus Communications Module types (other than Ethernet) can be offered to support other standards. The 10 Mbps and The Mesh (100 Mbps) control networks have been selected as the first standards.

In the future, you will be able to easily upgrade to other protocols just by plugging in a new communications module and adding, if needed, the required software.

The Mesh control network is a high performance Ethernet protocol designed for reliable communication. The DIN rail mounted subsystem uses a master-slave polling technique, ensuring that The Mesh control network is busy only in response to a request. The Mesh control network offers a high degree of security by providing complete protection against single-bit, double-bit, and odd-bit number errors, and a high degree of protection against burst errors. The Module Fieldbus is immune to FBM failures to the extent that no single failure in any one module can cause both segments of the redundant Module Fieldbus to become inoperable.

DISTRIBUTED LOCAL/REMOTE MOUNTING

Innovative design of the equipment packaging allows the DIN rail mounted 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 DIN rail mounted subsystem. Both of these configurations offer connection to an Ethernet switch(es), allowing the FBMs to be remotely mounted with the I/A Series control processor (FCP280 or FCP270) or remotely mounted from the I/A Series 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, or where groupings of FBMs are located in the same enclosure or Modular Baseplate as the FCP280 or FCP270. This control network configuration thus allows distribution of the FBMs over a wide 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, ensuring 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 required for filtering and isolation with the FCP280.

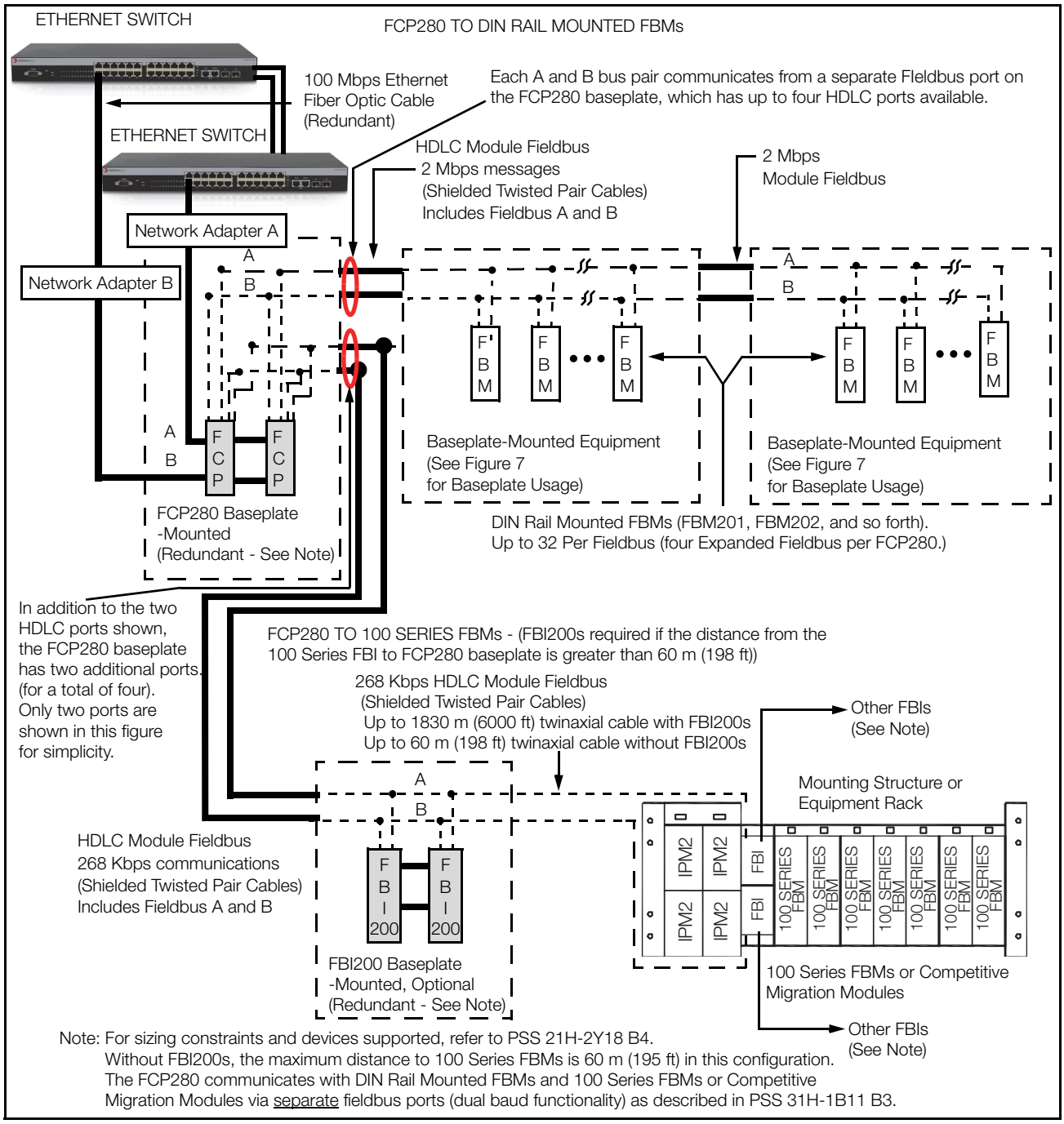


Figure 3. DIN Rail Mounted Subsystem, Typical FCP280 Configuration (Conceptual)

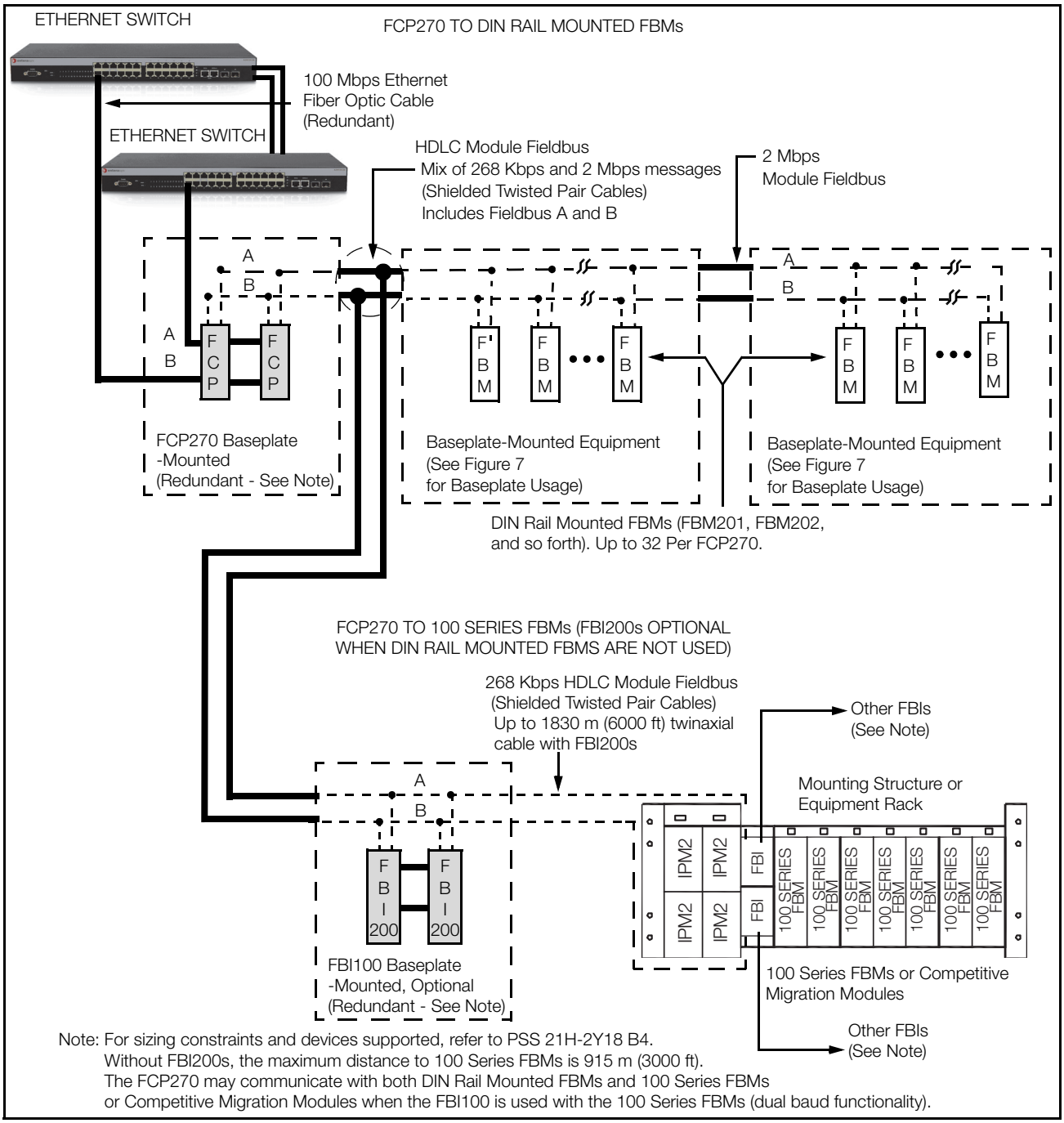


Figure 4. DIN Rail Mounted Subsystem, Typical FCP270 Configuration (Conceptual)

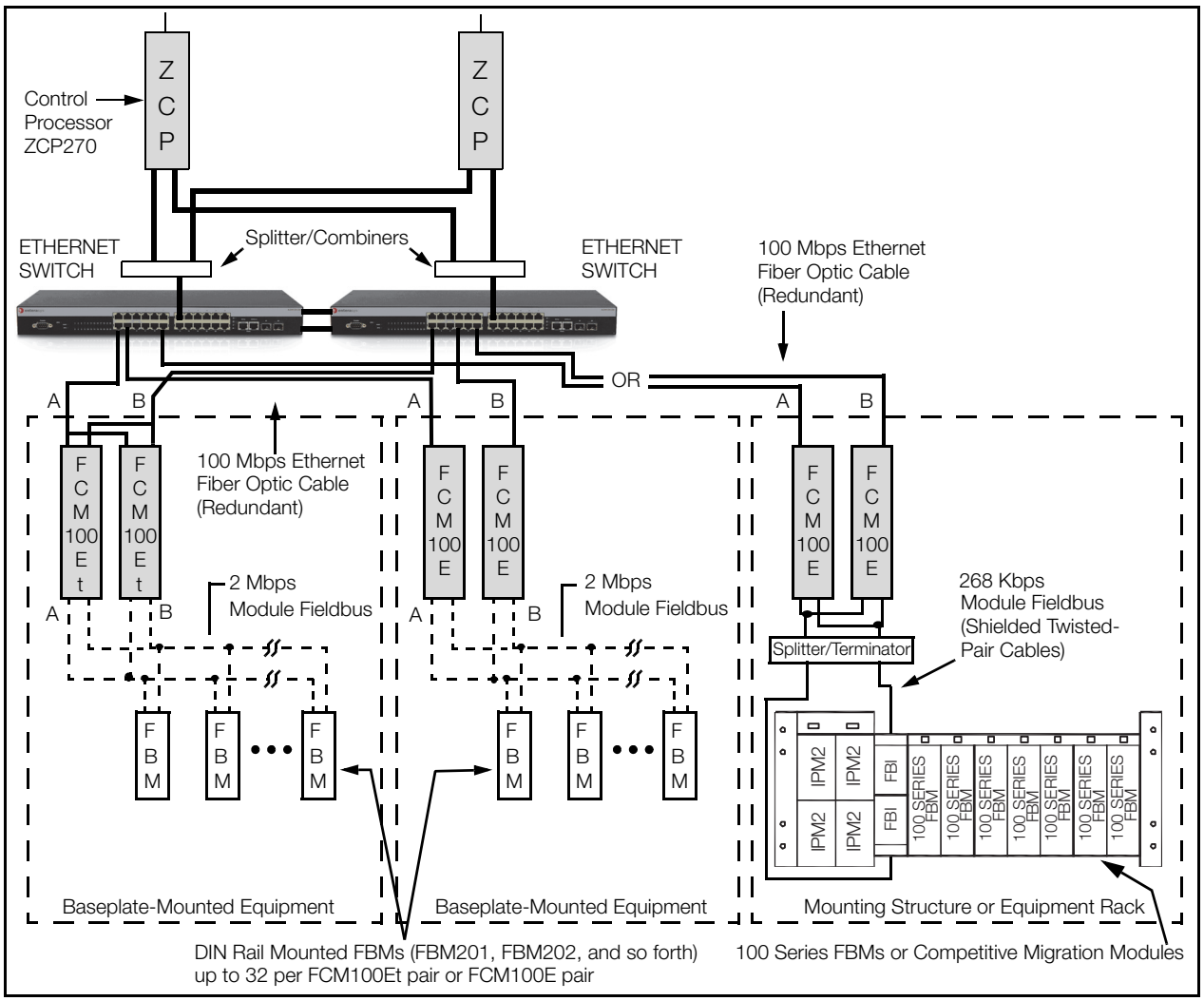
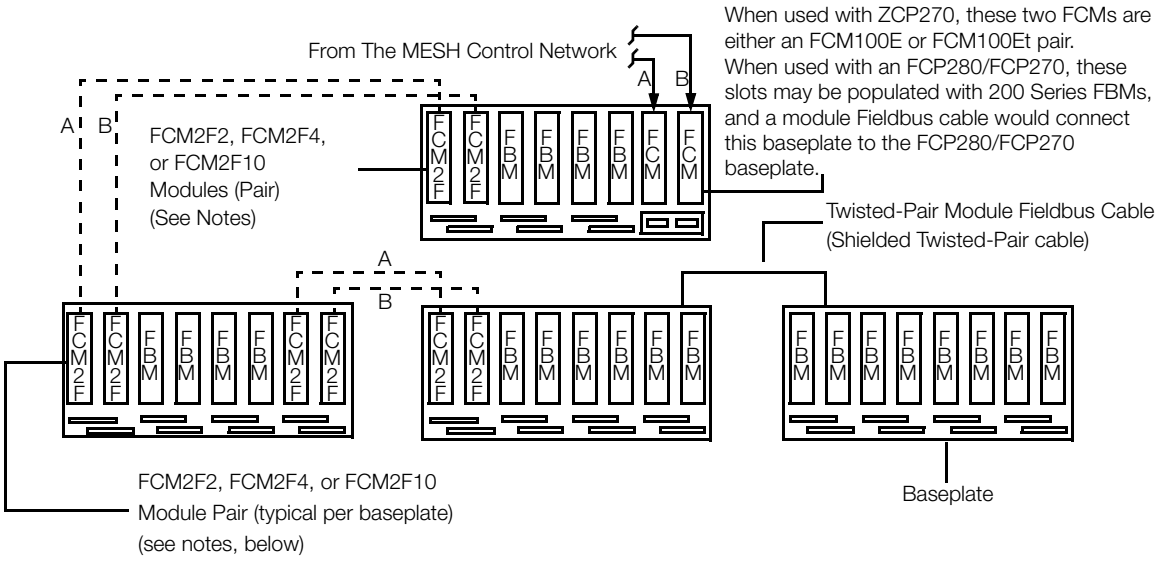


Figure 5. DIN Rail Mounted Subsystem, Typical FCM Configuration

FCM2F Fieldbus Communications modules (see Figure 6) provide baseplate-to-baseplate fiber optic extension of the Module Fieldbus. This allows DIN rail mounted Fieldbus Modules (FBMs) to be locally, or remotely distributed in multiple enclosures for strategic 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 require 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 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. Modular Baseplate Interconnection Using Fiber Optic Cable

MODULAR BASEPLATE IMPLEMENTATION

Modular Baseplate mounting of the FBMs and associated FCMs provides added versatility in application of the DIN rail mounted equipment. The Modular Baseplates, which provide for convenient physical grouping of the modules are interconnected by coaxial cable. 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 Modular 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 Modular Baseplates) are available in lengths of 0.25 to 60 meters.

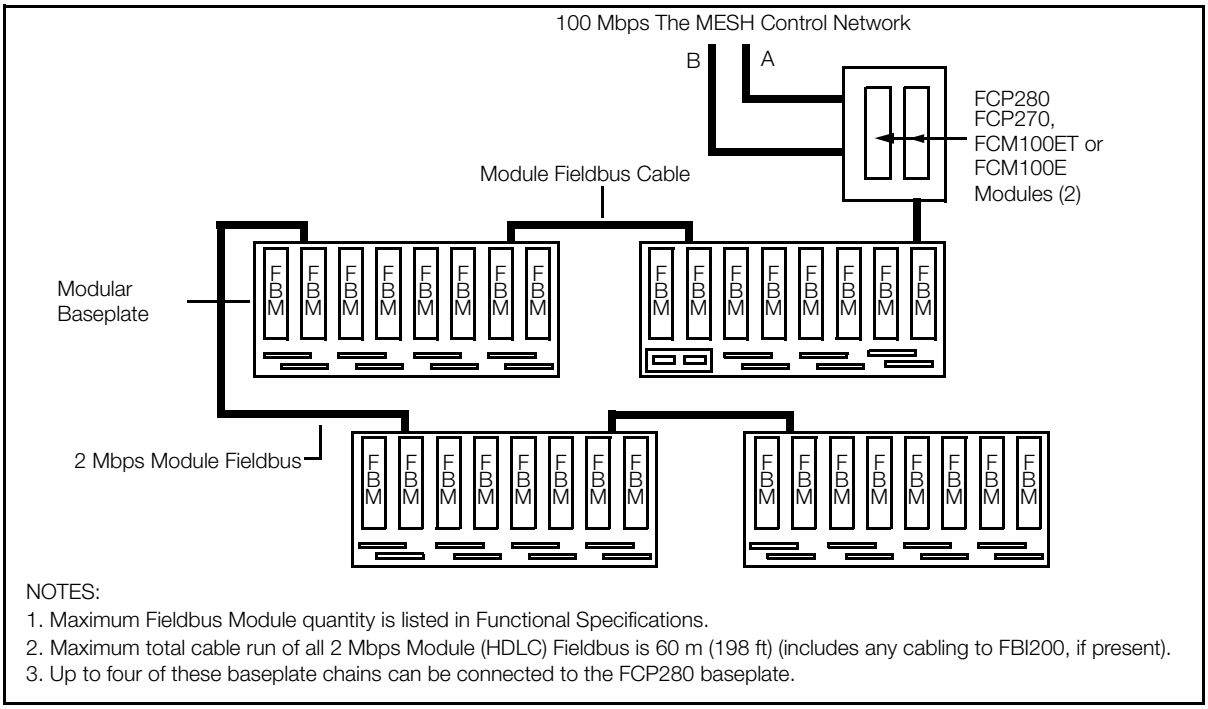


Figure 7. Modular Baseplate Implementation Example

POWER SECURITY

Power Distribution

Earthing practices for all enclosures and the subsystem meet the earthing practices and requirements of:

- IEC 61000-5-1 General Considerations, and
- IEC 61000-5-2 Earthing and Cabling.

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

For each DIN rail mounted 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 Modular Baseplates.

A redundant power distribution configuration consists of redundant power supplies and redundant power distribution to the Modular Baseplates. This provides power security on power module failure for process loops where continued operation is necessary. The dual power feed distribution network protects against any single-point power failures, and protects all modules against power main failures and internal short circuits.

Module software is downloaded to and retained in flash memory by the FCP280, FCP270, or ZCP270 for faster reboot after power outages.

Power Alarming

Failure of a single or redundant 24 V dc power supply is detected by each module in a Modular Baseplate(s). If the power supply fails, the following occurs:

- 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. The above occurs for the following failures:

- 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 pressure (I/P) converters, contact sensing, and solid state switch or relay drive.

The three levels of isolation available with specific FBMs are described as follows:

- Channel Isolated – Each channel is galvanically isolated from all other channels, earth (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 errors. The channels are not galvanically isolated from each other, but are galvanically isolated from earth (ground) and module logic. 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 earth (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.

FIELDBUS MODULES

Each Fieldbus Module 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 Fieldbus Modules 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. Fieldbus Modules

Module	Function(s)	Application Program	Software Function(s)[a]	PSS Number
FBM201	8-Channel 0 to 20 mA Input, Channel Isolated	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z1 B4
FBM201b	8-Channel 0 to 100 mV dc Input, Channel Isolated	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z1 B4
FBM201c	8-Channel 0 to 5 V dc Input, Channel Isolated	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z1 B4
FBM201d	8-Channel 0 to 10 V dc Input, Channel Isolated	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z1 B4
FBM202	8-Channel Thermocouple/Millivolt Input, Channel Isolated	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z2 B4
FBM203	8-Channel RTD Input (platinum or nickel), Channel Isolated, 0 to 320 ohm	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z3 B4
FBM203b	8-Channel RTD Input (platinum or nickel), Channel Isolated, 0 to 640 ohm	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z3 B4
FBM203c	8-Channel RTD Input (copper), Channel Isolated, 0 to 30 ohm	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z3 B4
FBM203d	8-Channel 4-wire RTD Input (Pt, Ni, Cu), Channel Isolated, 0 to 320 ohm	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z3 B4
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)	PSS 21H-2Z4 B4
FBM205	Redundant 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)	PSS 21H-2Z5 B4

Table 1. Fieldbus Modules (Continued)

Module	Function(s)	Application Program	Software Function(s)[a]	PSS Number
FBM206	8-Channel Pulse Input, Channel Isolated	Pulse Input	Pulse Rate Input Totalization and Resolution, Meter Scaling Factor	PSS 21H-2Z6 B4
FBM206b [b]	4-Channel Pulse Input, 4-Channel 0 to 20 mA Output, Channel Isolated	Pulse Input and Analog Output	(Input) Pulse Rate Input Totalization and Resolution, Meter Scaling Factor (Output) Output Fail-Safe Configuration	PSS 21H-2Z6 B4
FBM207	Redundant Ready 6-Channel Voltage Monitoring, Channel Isolated	Discrete Input or Ladder Logic	Input Filter Time	PSS 21H-2Z7 B4
FBM207b	Redundant Ready 16-Channel 24 V dc Contact Sense, Channel Isolated	Discrete Input or Ladder Logic	Input Filter Time	PSS 21H-2Z7 B4
FBM207c	Redundant Ready 16-Channel 48 V dc Contact Sense, Channel Isolated	Discrete Input or Ladder Logic	Input Filter Time	PSS 21H-2Z7 B4
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)	PSS 21H-2Z8 B4
FBM208b	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)	PSS 21H-2Z8 B4
FBM211	16-Channel Differential Analog Input, 0 to 20 mA, Differential Isolated	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z11 B4

Table 1. Fieldbus Modules (Continued)

Module	Function(s)	Application Program	Software Function(s)[a]	PSS Number
FBM212	14-Channel Differential Analog Input, Thermocouple, Differential Isolated	Analog Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z12 B4
FBM214	8-Channel 0 to 20 mA, HART® Input	Analog Input and HART Input	Rate of Change Limits	PSS 21H-2Z14 B4
FBM214b	8-Channel 0 to 20 mA, HART® Input, Channel-Isolated,	Analog Input and HART Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z14 B5
FBM215	8-Channel 0 to 20 mA, HART Output	Analog Output and HART Output	Output Fail-Safe Configuration (Hold/Fall-back on a per channel basis)	PSS 21H-2Z15 B4
FBM216	Redundant 8-Channel 0 to 20 mA, HART Input	Analog Input and HART Input	Rate of Change Limits	PSS 21H-2Z16 B4
FBM216b	Redundant 8-Channel 0 to 20 mA, HART Input Channel-Isolated,	Analog Input and HART Input	Conversion Time, Rate of Change Limits	PSS 21H-2Z16 B5
FBM217	Redundant Ready 32-Channel Discrete Input, Group Isolated[c]	Discrete I/O, or Ladder Logic	Input Filter Time	PSS 21H-2Z17 B4
FBM218	Redundant 8-Channel 0 to 20 mA, HART Output	Analog Output and HART 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)	PSS 21H-2Z18 B4
FBM219	24-Channel Voltage Monitor, Plus 8-Channel Discrete Output, External Source, Group Isolated[d]	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.	PSS 21H-2Z19 B4

Table 1. Fieldbus Modules (Continued)

Module	Function(s)	Application Program	Software Function(s)[(a)]	PSS Number
FBM220	1-Channel Interface to H1 FOUNDATION™ fieldbus	Intelligent Device Interface	Input/output engineering units, device tag information and automatic Link Active Scheduling (LAS)	PSS 21H-2Z20 B4
FBM221	4-Channel Interface to H1 **Foundation** fieldbus	Intelligent Device Interface	Input/output engineering units, device tag information and automatic Link Active Scheduling (LAS)	PSS 21H-2Z20 B4
FBM222	Redundant Ready 2-Channel Interface to Redundant PROFIBUS-DP™	Field Network Interface	PROFIBUS-DP Master and Slave	PSS 21H-2Z22 B4
FBM223	2-Channel Interface to PROFIBUS-DP™	Field Network Interface	PROFIBUS-DP Master	PSS 21H-2Z23 B4
FBM224	4-Port RS-232, RS-422 and/or RS-485 Interface to Modbus® Devices	Field Network Interface	Modbus Master	PSS 21H-2Z24 B4
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	PSS 21H-2Z27 B4
FBM228	Redundant Ready 4-Channel Interface to H1 **Foundation** fieldbus	Intelligent Device Interface	Input/output engineering units, device tag information and automatic Link Active Scheduling (LAS); optionally redundant	PSS 21H-2Z28 B4
FBM229	1-Channel Interface to DeviceNet Devices	Intelligent Device Interface	Master/scanner node on the DeviceNet bus, supporting all I/O modes - polled, cyclic, bit strobe and change-of-state	PSS 21H-2Z29 B4

Table 1. Fieldbus Modules (Continued)

Module	Function(s)	Application Program	Software Function(s)[(a)]	PSS Number
FBM230	RS-232, RS-422 and/or RS-485 Interface	Field Network Interface	Field Device System Integrator, protocol configurable by loading specific software driver	PSS 21H-2Z30 B4
FBM231	Redundant RS-232, RS-422 and/or RS-48	Field Network Interface	Field Device System Integrator, protocol configurable by loading specific software driver	PSS 21H-2Z31 B4
FBM232	Ethernet Interface	Field Network Interface	Field Device System Integrator, protocol configurable by loading specific software driver	PSS 21H-2Z32 B4
FBM233	Redundant Ethernet Interface	Field Network Interface	Field Device System Integrator, protocol configurable by loading specific software driver	PSS 21H-2Z33 B4
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)	PSS 21H-2Z37 B4
FBM238	24-Channel Voltage Monitor, Plus 8-Channel Discrete Output, External Source, Group Isolated	Discrete I/O or Ladder Logic	Input Filter Time	PSS 21H-2Z38 B4
FBM239	16-Channel Voltage Monitor, Plus 16-Channel Discrete Output, External Source, Group Isolated	Discrete I/O or Ladder Logic	Input Filter Time	PSS 21H-2Z39 B4
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)	PSS 21H-2Z40 B4

Table 1. Fieldbus Modules (Continued)

Module	Function(s)	Application Program	Software Function(s)[a]	PSS Number
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.	PSS 21H-2Z41 B4
FBM241b	8-Channel Voltage Monitor, 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.	PSS 21H-2Z41 B4
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.	PSS 21H-2Z41 B4
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.	PSS 21H-2Z41 B4
FBM242	16-Channel Externally Sourced Discrete Output, Channel Isolated	Discrete Output or Ladder Logic	Fail-Safe Configuration	PSS 21H-2Z42 B4

Table 1. Fieldbus Modules (Continued)

Module	Function(s)	Application Program	Software Function(s)[a]	PSS Number
FBM243	8-Channel Bi-directional FoxCom™ Dual Baud Rate Intelligent Device Interface Communication	Intelligent Device Interface	Output in Engineering Units, Fail-Safe information, Tag Number name and location, Device name (letterbug), last calibration date; two levels of upload/download capabilities	PSS 21H-2Z43 B4
FBM243b	4-Channel Bi-directional FoxCom™ Dual Baud Rate Intelligent Device Interface Communication, Plus 4-Channel 0 to 20 mA, Output	Intelligent Device Interface and Analog Output	Output in Engineering Units, Fail-Safe information, Tag Number name and location, Device name (letterbug), last calibration date; two levels of upload/download capabilities and Output Fail-Safe Configuration	PSS 21H-2Z43 B4
FBM244	4-Channel 0 to 20 mA Input and 4-Channel 0 to 20 mA Output (with HART® Support on All Channels)	Analog I/O and HART I/O	(Input) Conversion Time, Rate of Change Limits, (Output) Output Fail-Safe Configuration	PSS 21H-2Z44 B4
FBM245	Redundant 4-Channel 0 to 20 mA Input and 4-Channel 0 to 20 mA Output (with HART® Support on All Channels)	Analog I/O and HART I/O	(Input) Conversion Time, Rate of Change Limits, (Output) Output Fail-Safe Configuration	PSS 21H-2Z45 B4
FBM246	Redundant, 8-Channel Bi-directional FoxCom Dual Baud Rate Intelligent Device Interface Communication	Intelligent Device Interface	Output in Engineering Units, Fail-Safe information, Tag Number name and location, Device name (letterbug), last calibration date; two levels of upload/download capabilities	PSS 21H-2Z46 B4

Table 1. Fieldbus Modules (Continued)

Module	Function(s)	Application Program	Software Function(s)[a]	PSS Number
FBM246b	Redundant, 4-Channel Bi-directional FoxCom Dual Baud Rate Intelligent Device Interface Communication, Plus 4-Channel 0 to 20 mA, Output	Intelligent Device Interface and Analog Output	Output in Engineering Units, Fail-Safe information, Tag Number name and location, Device name (letterbug), last calibration date; two levels of upload/download capabilities and Output Fail-Safe Configuration	PSS 21H-2Z46 B4
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	PSS 21H-2Z47 B4

(a) Software functions for inputs are exercised on a per module basis; those for outputs are exercised on a per channel basis.
(b) FBM208b is for use in conversion mounting structures only with a Termination Assembly Adapter (TAA), discussed in *Termination Assembly Adapter Modules for 100 Series Upgrade* (PSS 21H-2W4 B4). FBM208b cannot be used in standard 200 Series baseplates with a FBM208 redundancy adapter and termination assembly.
(c) The Termination Assembly for this FBM provides channel isolation for the FBM's inputs as well. Details are provided in the FBM's PSS.
(d) 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 DIN rail mounted Fieldbus Modules are listed in Table 2 on page 23.

FIELDBUS EXPANSION MODULES

Fieldbus Expansion Modules provide four Expanded Fieldbuses to the FCP270. Each of the four Expanded Fieldbuses can accommodate up to thirty-two 200 Series Fieldbus Modules (FBMs). The FEM100 is discussed in PSS 21H-2Y14 B4.

The FCP280 provides the same functionality as the Fieldbus Expansion Modules, so these modules are not used with the FCP280.

REDUNDANT FIELDBUS MODULES

Redundant fieldbus modules must be installed in pairs along with a redundancy adapter. These include FBM205, FBM208, FBM216, FBM218, FBM231, FBM233, FBM245, FBM246 and FBM246b. Two single modules are combined at the associated baseplate with the field signals wired to one common termination assembly. Redundant control blocks interface to the inputs and/or outputs. A pair of FBM208b modules must only be installed in a 100 Series Migration mounting structure along with two TAAs and the original FBM05 termination assembly and cabling. Each redundant Fieldbus Module independently attempts to hold the output(s) at its specified output value(s), and each independently reports its observed value of the inputs.

REDUNDANT READY FIELDBUS MODULES

Redundant ready fieldbus modules 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. These include FBM207, FBM207b, FBM207c, FBM217, FBM222, FBM228, FBM237 and FBM240. 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. Redundant control blocks interface to the inputs and/or outputs. Each redundant Fieldbus Module independently attempts to hold the output(s) at its specified output value(s), and each independently reports its observed value of the inputs.

CALIBRATION

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

Table 2. DIN Rail Mounted Fieldbus Communications Modules

Module Type	Function	PSS Number
FCM10E	Fieldbus Communications Module, Ethernet - Converts 10 Mbps 10Base2 trunk Fieldbus signals to 2 Mbps signals used by the DIN rail mounted FBMs (used in pairs for redundancy).	PSS 21H-2Y1 B3
FCM10Ef	Fieldbus Communications Module, Fiber Optic - Converts 10 Mbps 10BaseFL trunk Fieldbus signals to 2 Mbps signals used by the DIN rail mounted FBMs (used in pairs for redundancy).	PSS 21H-2Y2 B3
FCM100Et	Converts 100 Mbps fiber optic signals to 2 Mbps signals used by the DIN rail mounted FBMs (used in pairs for redundancy).	PSS 21H-2Y10 B4
FCM100E	Converts 100 Mbps fiber optic signals to 2 Mbps signals used by the DIN rail mounted FBMs (used in pairs for redundancy), or to the 268 Kbps Fieldbus used by the 100 Series FBMs.	PSS 21H-2Y11 B4
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 Modular Baseplates (used in pairs for redundancy).	PSS 31H-2Y3 B3
ISCM	Intrinsically Safe Communications Module - Acts a gateway between supported Pepperl+Fuchs (P+F) intrinsically safe I/O modules (part of the Intrinsically Safe I/O Subsystem) and the I/A Series system. Converts signals from the Pepperl+Fuchs (P+F) modular intrinsically safe remote I/O systems to 2 Mbps signals used by the DIN rail mounted FBMs (used in pairs for redundancy).	PSS 21H-2Y6 B4

RELATED PRODUCT SPECIFICATION SHEETS

For reference purposes, Table 3 lists the Product Specification Sheets (PSSs) for additional hardware and software elements in the DIN rail mounted subsystem. (PSSs for the FBMs and FCMs are listed in Table 1 and Table 2.) The ZCP270 is mounted in a 1x8 Mounting Structure, but is listed herein for its relationship to DIN rail mounted equipment.

Table 3. Related Product Specification Sheets

PSS Number	Title
PSS 21H-2W1 B4	100 Series Fieldbus Module Upgrade Subsystem Overview
PSS 31H-2W2 B3	DIN Rail Mounted Equipment Agency Certification
PSS 21H-2W3 B4	DIN Rail Mounted Power Supplies - FPS400-24
PSS 21H-2W6 B4	DIN Rail Mounted Modular Baseplates
PSS 31H-2W7 B4	DIN Rail Mounted Power Supplies - FPS240-24 and FPS120-24
PSS 21H-2Y6 B4	Intrinsically Safe I/O Subsystem
PSS 21H-2Y12 B4	Intrinsically-Safe Combination Termination Assemblies and Baseplates (ISTA*BP*)
PSS 21H-2Y14 B4	FEM100 Fieldbus Expansion Module
PSS 21H-2Y18 B4	FBI200 Fieldbus Isolator/Filter
PSS 21H-2X1 B3	DIN Rail Mounted FBM Enclosures, Overview - (for legacy Enclosures)
PSS 21H-2X8 B3	G-Series Enclosures Overview - (for current Enclosures)
PSS 21H-1B9 B3	Field Control Processor 270 (FCP270)
PSS 21H-1B10 B3	Z-Module Control Processor 270 (ZCP270)
PSS 31H-1B11 B3	Field Control Processor 280 (FCP280)

FUNCTIONAL SPECIFICATIONS

Software Requirements

FCP280
I/A Series software Version 9.0 or higher

FCP270 OR ZCP270
I/A Series software Version 8.0 or higher

FBM229 OR FBM247
I/A Series software Version 8.7 or higher

Compatible I/A Series Control Processor

Control Processor FCP280, FCP270 or ZCP270

Equipment Quantities

FBMS HOSTED BY FCP280(2)
100 Series FBMs - 64 maximum
200 Series FBMs - 128 maximum (when used exclusively with 200 Series FBMs) or
96 maximum (when used with a mix of 100 Series and 200 Series FBMs)

FBMS HOSTED BY FCP270(3)
100 Series FBMs - 64 maximum
200 Series FBMs - 32 maximum (without FEM) or
128 maximum (with FEM)

FBMS HOSTED BY ZCP270(4)
Up to 128 100 Series or 200 Series FBMs per ZCP270 with FCM100E (dependent upon the number of FCM100Es implemented)

FCM100Et PAIRS PER ZCP270
32 maximum

FBMS HOSTED BY FCM100Et(4)
32 maximum

FBMS HOSTED BY FCM100E(4)
100 Series FBMs - 64 maximum
200 Series FBMs - 32 maximum

(2) Depending on control processor sizing constraints [Refer to *Field Control Processor 280 (FCP280) Sizing Guidelines and Excel Workbook* (B0700FY).]
(3) Depending on control processor sizing constraints [Refer to *Field Control Processor 270 (FCP270) Sizing Guidelines and Excel Workbook* (B0700AV).]
(4) Depending on control processor sizing constraints [Refer to *Z-Module Control Processor 270 (ZCP270) Sizing Guidelines and Excel Workbook* (B0700AW).]

Invensys
10900 Equity Drive
Houston, TX 77041
United States of America
http://invensys.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424 or contact your local Invensys representative.
Website: http://support.ips.invensys.com