Apter Power

Foxboro Evo™ Process Automation System

Product Specifications

Foxboro by Schneider Electric

PSS 31H-2FEM100

FEM100 Fieldbus Expansion Module

The Fieldbus Expansion Module (FEM100) provides four Expanded Fieldbuses to the Field Control Processor 270 (FCP270). Each of the four Expanded Fieldbuses can accommodate up to thirty-two 200 Series Fieldbus Modules (FBMs).

OVERVIEW

The FEM100 module provides four Expanded Fieldbuses to an FCP270 to increase the number of 200 Series (or equivalent) FBMs supported by the FCP270 modules. The FEM100 module supports the 2 Mbps HDLC module Fieldbus for communication between the FCP270 and the 200 Series FBMs (see Figure 3 on page 5).

The FEM100s are installed in a DIN rail mounted Modular Two-Slot or Four-Slot Expansion Baseplate for 2 Mbps communication between the FBMs and FCP270 modules (see Figure 1 and Figure 2).

NOTE

The FEM100 is used exclusively with the FCP270. It is not used with other control processors, such as the FCP280.

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Figure 1. Redundant FEM100 Modules on DIN Rail Mounted Modular Two-Slot Expansion Baseplate

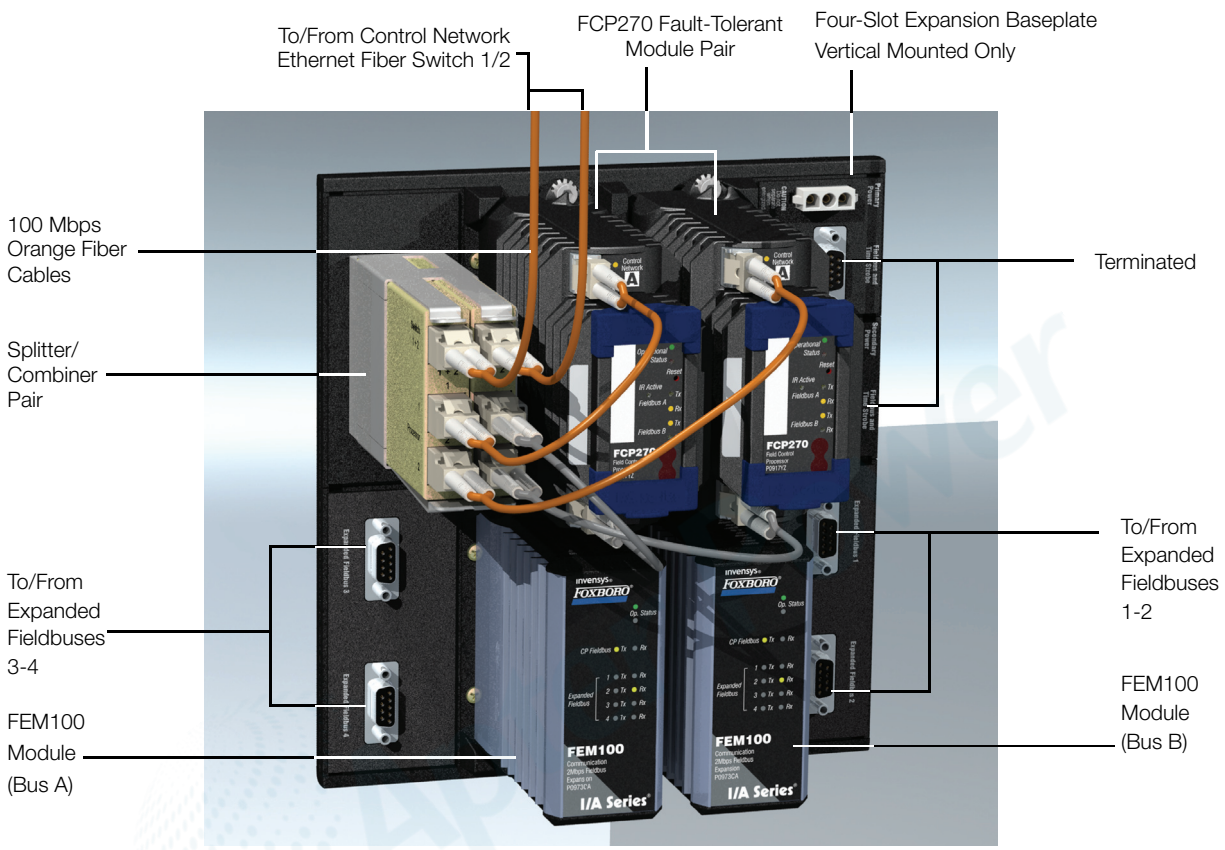

Figure 2. Redundant FEM100 Modules on DIN Rail Mounted Modular Four-Slot Expansion Baseplate

FEATURES

- For typical control usage enables a FCP270 to communicate with up to 128 of the 200 Series FBMs, over four Expanded Fieldbuses
- Redundancy minimizes communication interruption from Expanded Fieldbus 1 through 4
- Two-Slot and Four-Slot FEM100 Expansion Baseplates both support the 2 Mbps Module Fieldbus for 200 Series (or equivalent) FBMs
- Two-slot Expansion Baseplate accommodates FEM100 modules only, used to upgrade existing FCP270 installations
- Four-slot Expansion Baseplate accommodates two FCP270 control processors and their fiber optic splitter/combiners, plus two FEM100 modules, for new installations.
- Harsh (Class G3 - ISA S71.04) contamination protection.

FEM100 MODULE DESIGN

FEM100 modules have a compact design, with a rugged extruded aluminum exterior for physical protection of the electronics. Enclosures specially designed for mounting of DIN rail mounted Fieldbus equipment provide various levels of environmental protection for the FEM100 modules, up to harsh environments per ISA Standard S71.04.

The FEM100 can be removed/replaced from an Expansion Baseplate without removing power. Light-emitting diodes (LEDs) incorporated into the front of the FEM100 indicate module Fieldbus communications activity and module status.

The FEM100 communicates to the FCP270 over the 2 Mbps HDLC Fieldbus, as shown in Figure 3 on page 5.

HIGH AVAILABILITY

A pair of FEM100 modules provides redundancy for the Extended Fieldbuses to maintain very high subsystem availability. When both modules are active, the FCP270 sends and receives communications across both A and B buses. In the case of a FEM100 module failure, the FCP270 switches all traffic to the bus with the available FEM100 module until the failed module is replaced.

Either module may be replaced without upsetting input or output communications to the other module.

EXPANSION BASEPLATE MOUNTING

The FEM100 modules mount on either the Two-Slot or Four-Slot Expansion Baseplate. These baseplates are DIN rail mounted and vertically oriented only. These baseplates include signal connectors for the FEM100s, redundant independent dc power connections, and four cable connections to the 2 Mbps HDLC Expanded Fieldbuses.

The Two-Slot Expansion Baseplate includes a redundant I/O cable connection to the FCP270s. One connector supports both A and B buses, while the other is terminated. Alternatively, both connectors can be used in conjunction with a Fieldbus Splitter/Terminator (RH926KW (supersedes P0926KW)).

The Four-Slot Expansion Baseplate includes two slots for mounting a fault-tolerant pair of FCP270s and their fiber optic splitter/combiners.

For more information on these baseplates, refer to *Standard 200 Series Baseplates* (PSS 31H-2SBASPLT).

MODULE FIELDBUS COMMUNICATION

The Expansion Baseplates support the 2 Mbps module Fieldbus. They connect to the 2 Mbps module Fieldbus for communication to all 200 Series I/O FBMs, the Siemens APACS+™ and Westinghouse competitive migration modules (see “DEVICES SUPPORTED” on page 7).

The 2 Mbps module Fieldbus is redundant and all 200 Series modules can receive/transmit messages over both A and B buses.

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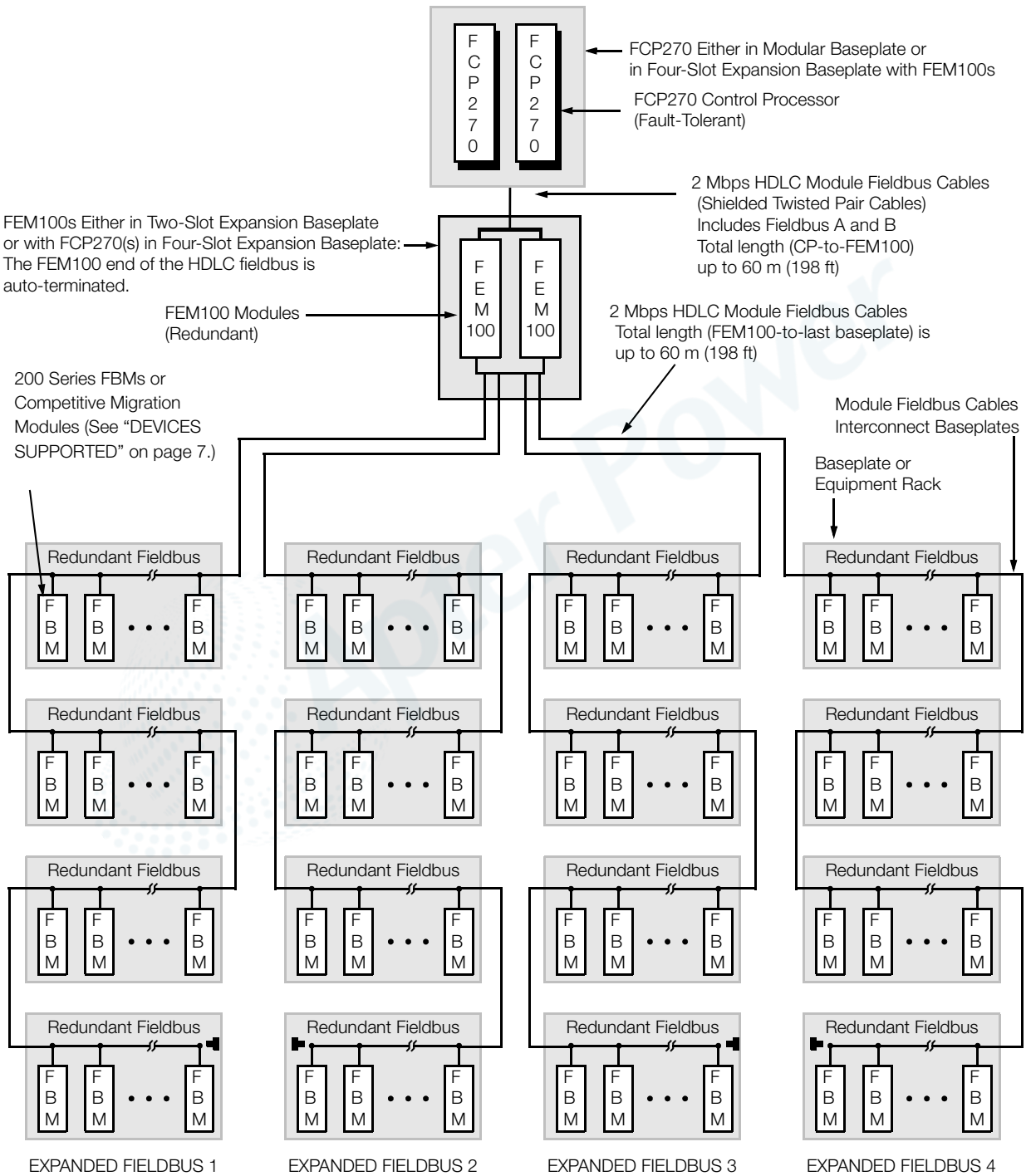

NOTE: First and Last Fieldbus Connector in each Chain must be terminated P0916RB.

Figure 3. Typical Expanded Fieldbus Network Configuration (Simplified) With Four Expanded Baseplate Groups

EXPANDED FIELDBUS EXTENSION VIA FCM2F2/FCM2F4/FCM2F10 FIELDBUS COMMUNICATIONS MODULES

The FCM2F2/FCM2F4/FCM2F10 Fieldbus Communications Modules provide baseplate-to-baseplate fiber optic extension of the Expanded Fieldbuses. This allows 200 Series 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 any baseplate which accepts both FCMs and FBMs. For the Expanded Fieldbuses, FCM2Fs must be installed redundant, one on each end of one of the “A” and “B” cables of the Expanded Fieldbuses (four FCM2Fs total).

The FCM2Fs can extend any of the Expanded Fieldbuses between the FEM100 baseplate and the FBM baseplates. The redundant FCM2F pair on the baseplate-side of the fiber optic extension may be installed on the first FBM baseplate in the chain, or on a separate baseplate, such as an FCM/FBM 2-position baseplate. Keeping the FCM2F pair on a separate baseplate allows the baseplate chain to use all 32 possible slots for FBMs, while including the FCM2F pair on the first baseplate in the chain leaves 30 slots for FBMs. Figure 4 illustrates this configuration for the first Expanded Fieldbus.

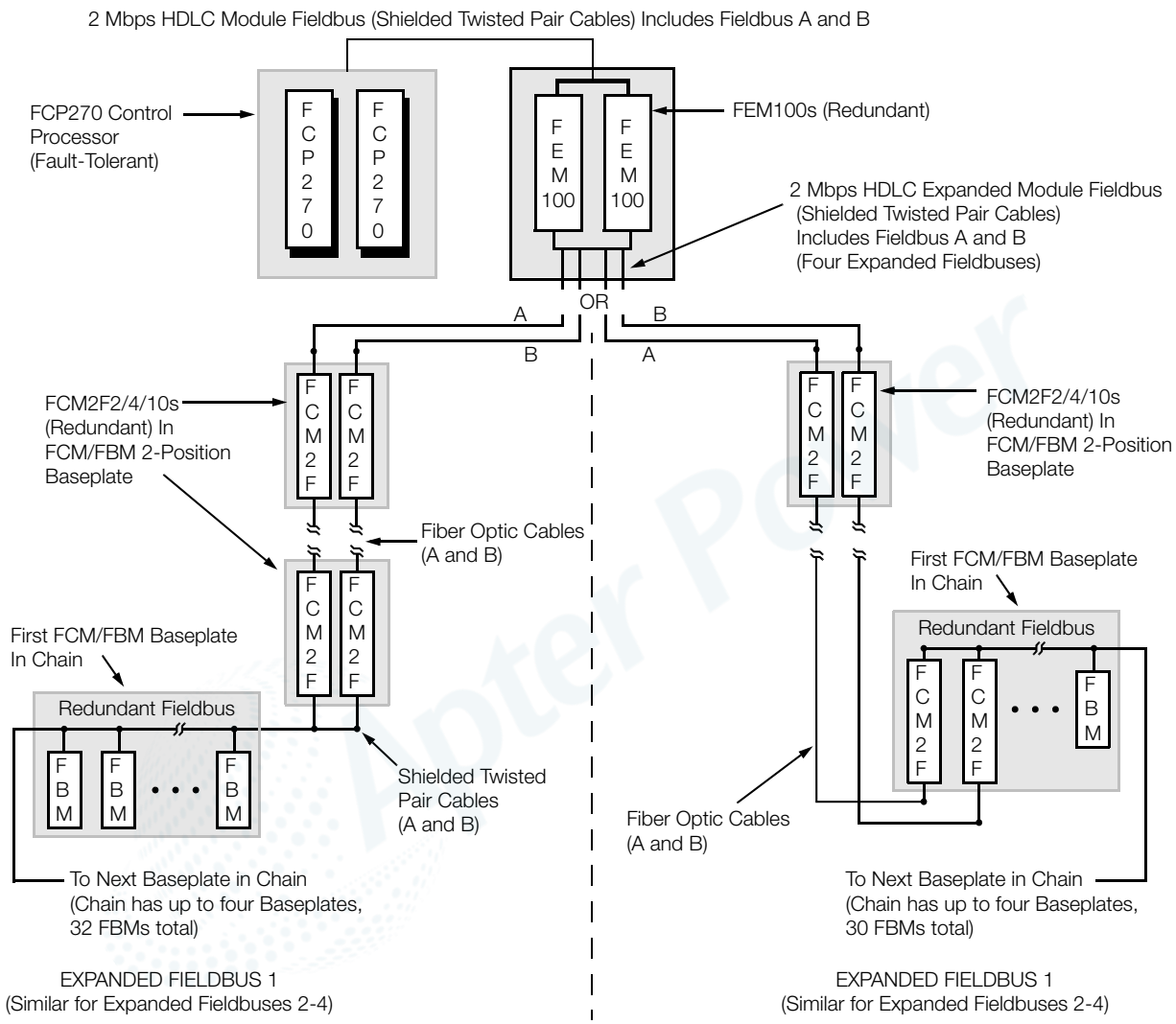

Figure 4. FCM2F2/FCM2F4/FCM2F10 Fieldbus Communications Modules on Expanded Fieldbus

DEVICES SUPPORTED

The FEM100 supports the following devices on the 2 Mbps module Expanded Fieldbus:

- All 200 Series FBMs (FBM201, FBM202, and so forth)
- Fieldbus Communications Modules, FCM2F2/FCM2F4/FCM2F10, for remote Fieldbuses
- Field Device Systems Integrator (FDSI) modules
- The Foxboro Evo™ Process Automation System (the Foxboro Evo system) Fieldbus Modules for Siemens APACS+ systems
- The Foxboro Evo system Fieldbus Modules for Westinghouse WPDF® systems.

NOTE

Existing 200 Series FBMs must be upgraded with I/A Series® software v8.3 to v8.8 or Foxboro Evo Control Core Services software v9.0 or later release IOM files to support the Expanded Fieldbus.

LED INDICATORS

Light-emitting diodes (LEDs) on the front of the FEM100 module provide visual indication of the:

- FEM100 operational status - power and watch dog timer
- HDLC transmit/receive - for Field Control Processors
- HDLC transmit/receive - for Expanded Fieldbuses 1-4.

FUNCTIONAL SPECIFICATIONS

Process I/O Communications

MODULE FIELDBUS COMMUNICATIONS

Transmission Rate

2 Mbps for 200 Series DIN FBMs

Process I/O Capacity (2 Mbps Fieldbus)

CABLE LENGTH

FCP270 Fieldbus and Expanded Fieldbuses (1-4) without FCM2Fs

The cable length of the Fieldbus cannot exceed 60 m (198 ft) (see Figure 5)

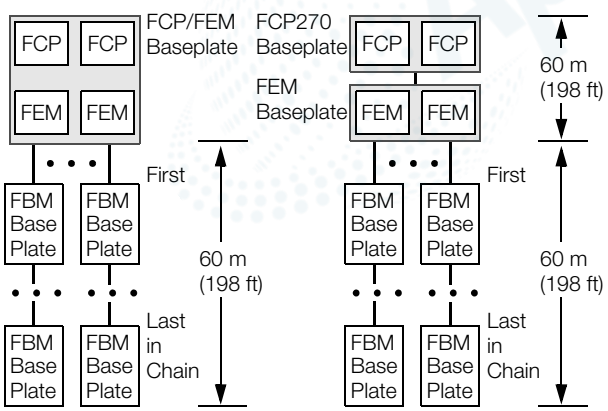

Figure 5. Expanded Fieldbus Cable Length Restrictions

FCP270 Fieldbus and Expanded Fieldbuses (1-4) with FCM2Fs

The cable (not counting the fiber optic cabling provided by the FCM2F2/4/10 modules) cannot exceed 60 m (198 ft) (see Figure 6)

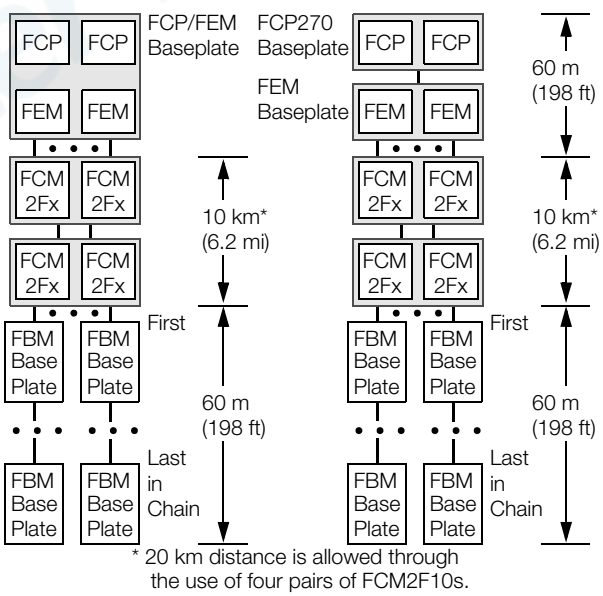

Figure 6. Expanded Fieldbus Cable Length Restrictions w/FCM2Fs

FUNCTIONAL SPECIFICATIONS (CONTINUED)

200 SERIES FBMS

32 (maximum) Fieldbus Modules per Expanded Fieldbus (four per FEM100 pair).
Up to 128 FBMs for typical control usage. Number of FBMs depends on control processor sizing constraints (refer to *Field Control Processor 270 (FCP270) Sizing Guidelines and Excel Workbook* (B0700AV)).

Power Requirements

INPUT VOLTAGE RANGE

21 to 26 V dc

CONSUMPTION

2.2 W (maximum)

Regulatory Compliance

ELECTROMAGNETIC COMPATIBILITY (EMC)

European EMC Directive 2004/108/EC
Meets EN61326-1:2013 Class A Emissions and Industrial Immunity Levels

RoHS Compliance

Complies with European Recast RoHS Directive 2011/65/EU.

PRODUCT SAFETY

Underwriters Laboratories (UL) for U.S. and Canada
UL/UL-C listed as suitable for use in UL/UL-C listed Class 1, Groups A-D; Division 2; temperature code T5 enclosure based systems. These modules are also UL and UL-C listed for supplying communication circuits for Class 1, Groups A-D hazardous locations when connected to specified Foxboro Evo processor modules as described in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). Communications circuits also meet the requirements for Class 2 as defined in Article 725 of the National Electrical Code (NFPA No.70) and Section 16 of the Canadian Electrical Code (CSA C22.1). Conditions for use are as specified in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

European Low Voltage Directive 2006/95/EC and Explosive Atmospheres (ATEX) directive 94/9/EC
DEMKO certified as Ex nA IIC T4 for use in Zone 2 enclosure certified for supplying field circuits for Zone 2, Group IIC, potentially explosive atmospheres when connected to specified Foxboro Evo processor modules as described in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

Marine Certification

ABS Type Approved and Bureau Veritas Marine Certification for Environmental Category EC31.

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FUNCTIONAL SPECIFICATIONS (CONTINUED)

Calibration Requirements
Calibration of the module is not required.

ENVIRONMENTAL SPECIFICATIONS(1)

Operating
TEMPERATURE
-20 to +70°C (-4 to +158°F)
RELATIVE HUMIDITY
5 to 95% (noncondensing)
ALTITUDE
-300 to +3,000 m (-1,000 to +10,000 ft)

Storage
TEMPERATURE
-40 to +85°C (-40 to +185°F)
RELATIVE HUMIDITY
5 to 95% (noncondensing)
ALTITUDE
-300 to +12,000 m (-1,000 to +40,000 ft)

Contamination
Suitable for Class G3 (Harsh) environments as defined in ISA Standard S71.04, based on exposure testing according to EIA Standard 364-65, Class III.

Vibration
0.75 g from 5 to 500 Hz

PHYSICAL SPECIFICATIONS

Mounting
The redundant installation consists of two modules. A single module can also be used.

FEM100 mounts on a Two-Slot (P0973CG) or Four-Slot (P0973CN) Expansion Baseplate. These baseplates can be mounted on a vertical DIN rail. Refer to PSS 31H-2SBASPLT for details.

Weight
0.6 kg (1.3 lb) approximate (each module)

Part Number
P0973CA

Dimensions
HEIGHT
99 mm (3.9 in)
114 mm (4.5 in) including mounting lugs
WIDTH
44.6 mm (1.75 in)
DEPTH
105 mm (4.12 in)

(1) The environmental limits of this module may be enhanced by the type of enclosure containing the module. Refer to the applicable Product Specification Sheet (PSS) which describes the specific type of enclosure that is to be used.

FOR MORE INFORMATION

For more information refer to the following Product Specification Sheets (PSS):

PSS Number	Description
PSS 21H-1B9	Field Control Processor 270 (FCP270)
PSS 31H-2SOV	Standard 200 Series Subsystem Overview
PSS 31H-2SBASPLT	Standard 200 Series Baseplates
PSS 31H-2FCM	Fieldbus Communications Module, FCM2F2/FCM2F4/FCM2F10

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