

# HighFive PLC

PSS 21H-2Y14 B4

## FEM100 Fieldbus Expansion Module

sales@5gplc.com

+86 13306036024



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).

### 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.

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## OVERVIEW

The FEM100 module provides four Expanded Fieldbuses to an I/A Series 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 I/A Series® FCP270 and the 200 Series FBMs (see Figure 3 on page 5).

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

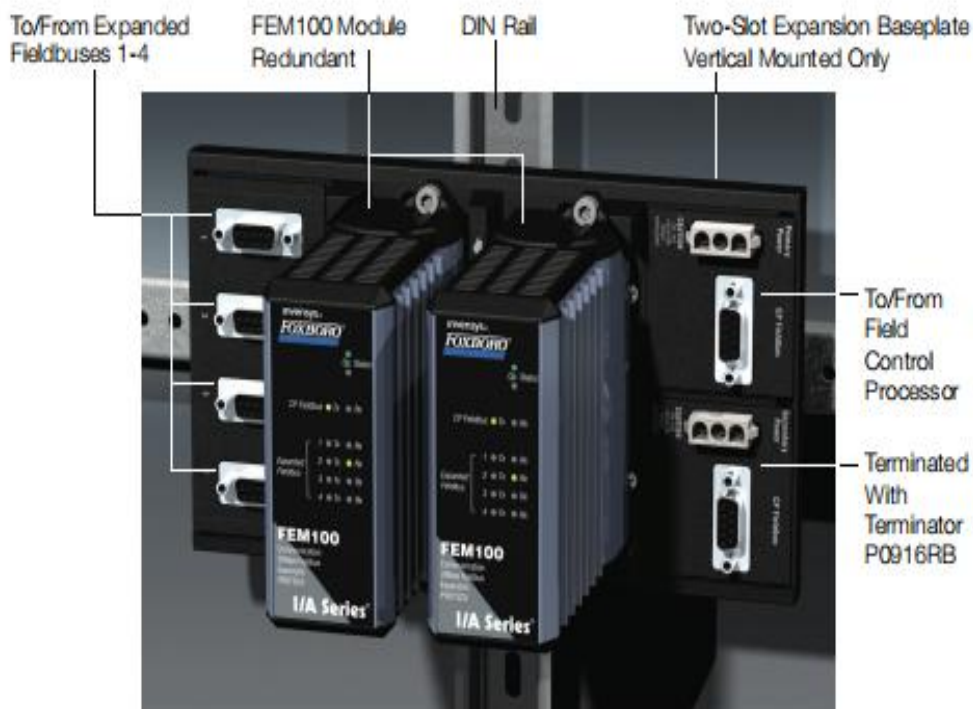


Figure 1. Redundant FEM100 Modules on DIN Rail Mounted Modular Two-Slot Expansion Baseplate

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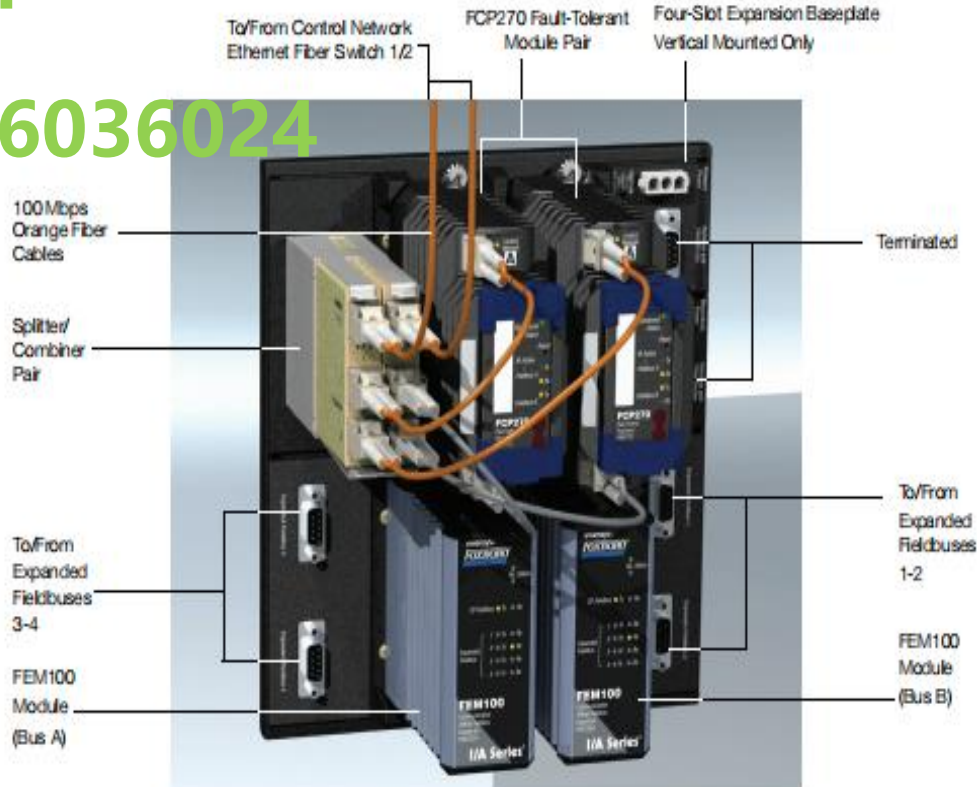


Figure 2. Redundant FEM100 Modules on DIN Rail Mounted Modular Four-Slot Expansion Baseplate

### 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 (P0326KW).

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 *DIN Rail Mounted Modular Baseplates* (PSS 21H-2W6 B4).

## 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 DIN I/O FBMs, the Siemens AFACS+™ 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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## 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 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 a 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.

[sales@5gplc.com](mailto:sales@5gplc.com)

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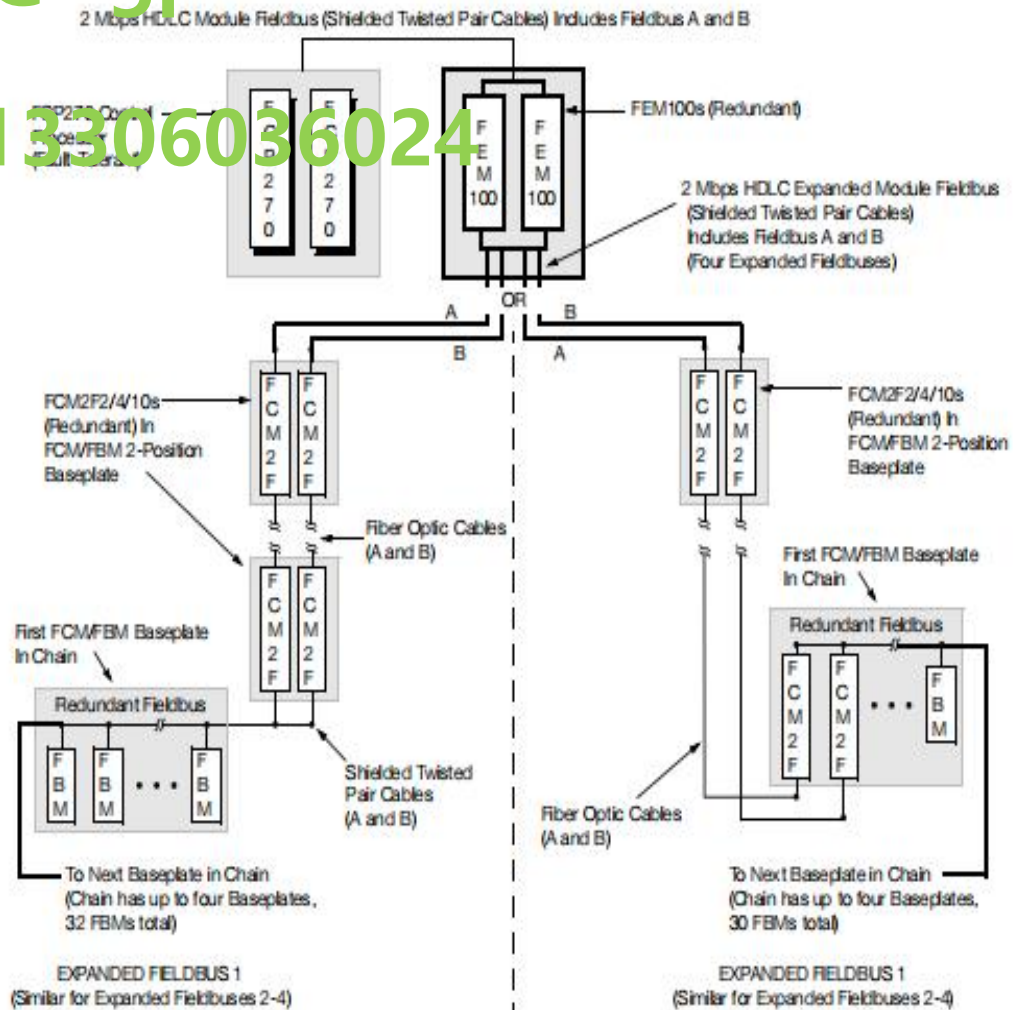


Figure 4. FCM2F2/FCM2F4/FCM2F10 Fieldbus Communications Modules on Expanded Fieldbus

## DEVICES SUPPORTED

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

- ▶ All 200 Series DIN rail mounted FBMs (FBM201, FBM202, and so forth)
- ▶ Fieldbus Communications Modules, FCM2F2/FCM2F4/FCM2F10, for remote Fieldbuses
- ▶ Field Device Systems Integrator (FDSI) modules
- ▶ DCS Fieldbus Modules for Siemens APACS+ systems
- ▶ DCS Fieldbus Modules for Westinghouse WPDF® systems.

**NOTE**

Existing 200 Series FBMs must be upgraded with VA Series system 8.3 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)

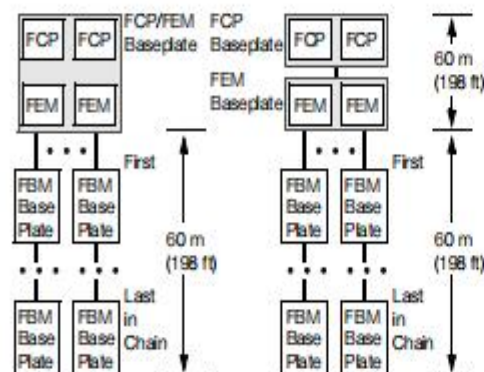


Figure 5. Expanded Fieldbus Cable Length Restrictions

*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)

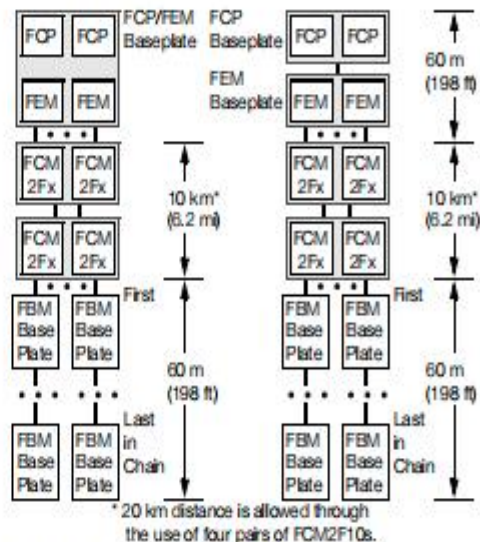


Figure 6. Expanded Fieldbus Cable Length Restrictions w/FCM2Fs



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## FUNCTIONAL SPECIFICATIONS (CONTINUED)

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### 200 SERIES FBMS

32 (maximum) Fibibus Modules per Expanded Fibibus for VME (120-pin)  
Up to 128 FBMs for typical control usage.  
Number of FBMs depends on control processor sizing constraints (refer to *FCP270 Sizing Guidelines* (B0700AV)).

### Power Requirements

#### INPUT VOLTAGE RANGE

21 to 26 V dc

#### CONSUMPTION

2.2 W (maximum)

### Regulatory Compliance

#### ELECTROMAGNETIC COMPATIBILITY (EMC)

*European EMC Directive 89/336/EEC*

Meets: EN 50081-2 Emission standard

EN 50082-2 Immunity standard

EN 61326 Annex A (Industrial Levels)

*CISPR 11, Industrial Scientific and Medical*

*(ISM) Radio-frequency Equipment -*

*Electromagnetic Disturbance Characteristics*

*- Limits and Methods of Measurement*

Meets: Class A Limits

*IEC 61000-4-2 ESD Immunity*

6 kV current discharge

*IEC 61000-4-3 Radiated Field Immunity*

10 V/m at 26 to 1000 MHz

*IEC 61000-4-4 Electrical Fast*

*Transient/Burst Immunity*

2 kV on I/O, dc power and communication lines

*IEC 61000-4-5 Surge Immunity*

2kV on ac and dc power lines; 1kV on I/O and communications lines

*IEC 61000-4-6 Immunity to Conducted Disturbances Induced by Radio-frequency Fields*

10 V (rms) at 150 kHz to 80 MHz on I/O, dc power and communication lines

### ELECTROMAGNETIC COMPATIBILITY (EMC) (CONT.)

*IEC 61000-4-8 Power Frequency Magnetic Field Immunity*

30 A/m at 50 and 60 Hz

### 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 as associated apparatus for supplying non-incendive communication circuits for Class 1, Groups A-D hazardous locations when connected to specified

VA Series processor modules as described in the *I/A Series DIN Rail Mounted 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 *I/A Series DIN Rail Mounted Subsystem User's Guide* (B0400FA).

*European Low Voltage Directive 73/23/EEC and Explosive Atmospheres (ATEX) directive 94/9/EC*

CENELEC (DEMKO) certified as EEx nA IIC T4 for use in CENELEC certified Zone 2 enclosure certified as associated apparatus for supplying non-incendive field circuits for Zone 2, Group IIC, potentially explosive atmospheres when connected to specified VA Series processor modules as described in the *I/A Series DIN Rail Mounted Subsystem User's Guide* (B0400FA).

### Calibration Requirements

Calibration of the module is not required.

## ENVIRONMENTAL SPECIFICATIONS<sup>(1)</sup>

### 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 21H-2W6 B4 for details.

### Mass

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.