

**FBM217 Discrete Input Interface Module**

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*The FBM217 Discrete Input Interface Module provides 32 dc voltage input channels.*

**FEATURES**

Key features of the FBM217 are:

- ▶ Thirty-Two (32) discrete inputs
  - ▶ Supports discrete input signals at voltages of:
    - 15 to 60 V dc
    - 120 V ac/125 V dc
    - 240 V ac
  - ▶ Single or redundant modules
  - ▶ Compact, rugged design suitable for enclosure in Class G3 (harsh) environments
  - ▶ Executes the programs for Discrete Input, Ladder Logic, Pulse Count, and Sequence of Events,
- with the configurable options: Input Filter Time and Fail-Safe Configuration
- ▶ Various Termination Assemblies (TAs) that contain:
    - High voltage attenuation and optical isolation for inputs
    - External power connection for device excitation.



### OVERVIEW

The FBM217 Discrete Input Interface Module provides 32 input channels, each accepting a 2-wire input from a dc voltage source. Associated termination assemblies (TAs) provide for discrete inputs of under 60 V ac, 120 V ac/125 V dc or 240 V ac. The module performs signal conversion required to interface the electrical input signals from the field sensors to the Module Fieldbus.

Depending on the type of I/O signal required, the TAs contain current limiting devices, high voltage attenuation circuits, optical isolation and external power source connections.

The module with its associated TA supports the following discrete inputs:

FBM	Inputs
FBM217	30 V dc, 125 V dc, 120 V ac, or 240 V ac Voltage monitor or Contact sense

The module can be used as a single unit, or as a redundant pair (two FBM217s). When used as a redundant pair, the modules combine to provide redundancy at the Fieldbus Module (FBM) level, with field input signals received from one common termination assembly through a redundant adapter affixed to the FBMs' baseplate. The field input current for redundant modules is doubled. A redundant digital input block in the control 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.

In a redundant configuration, contact sense power from each module is diode OR'd together in the redundant adapter to assure redundant power.

A redundant contact input function block, CINR, is used for each redundant pair of inputs. The CINR block handles input reads and initialization logic for the redundant channels. On each execution cycle of

the CINR block, identical reads are sent to both modules, fully exercising the fieldbus and the logic circuitry of each module.

When connected to the appropriate TAs, the FBM217 module provides functionality formerly provided by the 100 Series FBM I/O subsystem. TAs are available which support the functionality of the 100 Series main FBM07A/B, FBM08, FBM20, and FBM24A/B/C (16 input main FBMs). Expansion TAs are available for use with these main FBM TAs to support the functionality of expansion FBM12, FBM13, FBM21, or FBM25A/B/C (16 input expansion FBMs).

### COMPACT DESIGN

FBM217 has a compact design, with a rugged extruded aluminum exterior for physical protection of the circuits. Enclosures specially designed for mounting the FBMs provide various levels of environmental protection, up to harsh environments, per ISA Standard S71.04.

### VISUAL INDICATORS

Light-emitting diodes (LEDs) incorporated into the front of the module provide visual indication of the Fieldbus Module operational status, as well as the discrete states of the individual input points.

### EASY REMOVAL/REPLACEMENT

The module can be removed/replaced without removing field device termination cabling, power, or communication cabling.

When redundant, either module may be replaced without upsetting field input signals to the good module. The module can be removed/replaced without removing field device termination cabling, power, or communications cabling.

#### SEQUENCE OF EVENTS

The Sequence of Events (SOE) software package (for use with I/A Series v8.x or later software) is used for acquisition, storage, display, and reporting of events associated with digital input points in a control system. SOE, using the optional GPS based time synchronization capability, supports data acquisition across control processors at intervals of up to one millisecond, depending on the signal source.

Refer to PSS 21S-2B9 B4, *Sequence of Events* to learn more about this package, and to PSS 21H-4C2 B3, *Time Synchronization Equipment*, for a description of the optional time synchronization capability.

I/A Series systems with software earlier than V8.x can support SOE through ECB6 and EVENT blocks. However, these systems do not support GPS time synchronization and use a timestamp sent by the Control Processor which is accurate to the nearest second and does not provide synchronization between different Control Processors.

#### FIELDBUS COMMUNICATION

A Fieldbus Communications Module or a Control Processor interfaces to the 2 Mbps module Fieldbus used by the FBMs. The FBM217 accepts communication from either path (A or B) of the 2 Mbps Fieldbus — should one path fail or be switched at the system level, the module continues communication over the active path.

#### MODULAR BASEPLATE MOUNTING

The module mounts on a DIN rail mounted baseplate, which accommodates up to four or eight Fieldbus Modules. The Modular baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for redundant Fieldbus, redundant independent dc power, and termination cables.

Redundant modules must be located in odd and even adjacent positions on the baseplate (positions 1 and 2, 3 and 4, 5 and 6, or 7 and 8). To achieve the redundancy, a redundant adapter module is placed on the two adjacent baseplate termination cable connectors to provide a single termination cable connection. A single termination cable connects from the redundant adapter to the associated TA.

To system configurator applications and monitoring through SMON, System Manager, and SMDH, redundant modules appear to be separate, nonredundant modules. The functional redundancy for these modules is provided by their associated control blocks.

#### TERMINATION ASSEMBLIES

Field I/O signals connect to the FBM subsystem via DIN rail mounted TAs. The TAs used with the FBM217 are described in "TERMINATION ASSEMBLIES AND CABLES" on page 7.

## FUNCTIONAL SPECIFICATIONS

### Input

32 group isolated channels

### On-State Voltage

15 to 30 V dc

### Off-State Voltage

0 to 5 V dc

### Current

2.2 mA (typical) at 30 V dc Input

### Source Resistance Limits

#### ON-STATE

1 k  $\Omega$  (maximum) at 15 V dc

#### OFF-STATE

100 k  $\Omega$  (minimum) at 30 V dc

### Filter/Debounce Time<sup>(1)</sup>

Configurable (No Filtering, 4, 8, 16, or 32 ms)

### Maximum Pulse Count Rate

250 Hz

### Isolation (Module/TA Combination)

For TAs which provide group isolation (P0916CA, P0916CB, P0916PW, P0916PX and P0916XZ), input channels are group isolated from earth (ground). For details, refer to the *IA Series DIN Rail Mounted Subsystem User's Guide (B0400FA)*. These module/TA combinations can withstand, without damage, a potential of 600 V ac applied for one minute between the group isolated channels and earth (ground).

### CAUTION

This does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock.

### Isolation (Module/TA Combination) (Cont.)

For high-voltage TAs P0916PY, P0916PZ, P0916YB, P0916QA and P0916QB, the inputs are group-isolated. These TAs can withstand UL required dielectric potentials.

For high-voltage TAs P0916PS, PT, YA, PU and PV, the inputs are channel isolated. These TAs can withstand UL required dielectric potentials.

### Communication

Communicates with its associated FCM or FCP via the module Fieldbus

### Power Requirements

#### INPUT VOLTAGE RANGE (REDUNDANT)

24 V dc +5%, -10%

#### CONSUMPTION

3 W (maximum) at 24 V dc

#### HEAT DISSIPATION

5 W (maximum) at 24 V dc

### Calibration Requirements

Calibration of the module and termination assembly is not required.

(1) Digital filtering available for 200 Series FBM or competitive migration modules with version 1.25H or later firmware.

#### FUNCTIONAL SPECIFICATIONS (CONTINUED)

##### Regulatory Compliance

###### ELECTROMAGNETIC COMPATIBILITY (EMC)

*European EMC Directive 2004/108/EC*

Meets: EN 50081-2 Emission standard

EN 50082-2 Immunity standard

EN 61326 EMC Standard (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*

Contact 4 kV, air 8 kV

*IEC 61000-4-3 Radiated Field Immunity*

10 V/m at 80 to 1000 MHz

*IEC 61000-4-4 Electrical Fast*

*Transient/Burst Immunity*

2 kV on I/O, V 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*

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

*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 Class I, Groups A-D; Division 2; temperature code

T4 enclosure based systems. These

modules are also UL and UL-C listed as

associated apparatus for supplying non-

incendive circuits for Class I, Groups A-D

hazardous locations when connected to

specified I/A Series<sup>®</sup> 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 2006/95/EC*

*and Explosive Atmospheres (ATEX) directive*

*94/9/EC*

CENELEC (DEMKO) certified for use in

Zone 2 enclosures and certified as

associated apparatus for supplying non-

incendive field circuits for Zone 2, Group IIC,

potentially explosive atmospheres when

connected as described in the *I/A Series*

*DIN Rail Mounted Subsystem User's Guide*

(B0400FA).

### ENVIRONMENTAL SPECIFICATIONS

#### Operating

##### TEMPERATURE

###### FBM217

-20 to + 70°C (-4 to +158°F)

###### Termination Assembly

###### PVC

-20 to + 50°C (-4 to +122°F)

###### PA

-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 +70°C (-40 to +158°F)

##### RELATIVE HUMIDITY

5 to 95% (noncondensing)

##### ALTITUDE

-300 to +12,000 m (-1,000 to +40,000 ft)

#### Contamination

Suitable for use in 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 m/S<sup>2</sup> (5 to 500 Hz)

### PHYSICAL SPECIFICATIONS

#### Mounting

##### MODULE

The FBM217 mounts on a modular baseplate.

The baseplate can be mounted on a DIN rail (horizontally or vertically), or horizontally on a 19-inch rack using a mounting kit. Redundant modules must be located in odd and even adjacent positions on the baseplate (positions 1 and 2, 3 and 4, 5 and 6, or 7 and 8) along with the appropriate redundancy adapter. Refer to *DIN Rail Mounted Modular Baseplates*

(PSS 21H-2W6 B4) for details. Alternatively, a non-redundant FBM217 mounts on a 100 Series conversion mounting structure. Refer to *100 Series Conversion Mounting Structures* (PSS 21H-2W8 B4) for details.

##### TERMINATION ASSEMBLY

The TA mounts on a DIN rail and accommodates multiple DIN rail styles including 32 mm (1.26 in) and 35 mm (1.38 in)

#### Mass

##### MODULE

284 g (10 oz) approximate

##### TERMINATION ASSEMBLY - COMPRESSION

216 mm (8.51 in) – 420 g (0.93 lb, approximate)

233 mm (9.15 in) – 454 g (1.0 lb, approximate)

##### TERMINATION ASSEMBLY - RING LUG

356 mm (14.02 in) – 908 g (2.0 lb, approximate)

391 mm (15.38 in) – 950 g (2.1 lb, approximate)

#### Dimensions - Module

##### HEIGHT

102 mm (4 in), 114 mm (4.5 in) including mounting lugs

##### WIDTH

45 mm (1.75 in)

##### DEPTH

104 mm (4.11 in)

#### Dimensions - Termination Assembly

Compression Screw - Refer to page 17

Ring Lug - Refer to page 20

#### Part Numbers

##### FBM217 MODULE

P0914TR

##### TERMINATION ASSEMBLIES

Refer to "FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES" on page 9

##### REDUNDANT ADAPTER

P0926ZY

#### PHYSICAL SPECIFICATIONS (CONTINUED)

##### Termination Cables

###### CABLE LENGTHS

Up to 30 m (98 ft)

###### CABLE MATERIALS

Polyurethane or Low Smoke Zero Halogen (LSZH)

###### TERMINATION CABLE TYPE

*Baseplate to Main TA*

Type 4 - Refer to Table 2

*Main TA to Expansion TA*

Type 6 - Refer to Table 3

###### CABLE CONNECTION

*Type 4*

FBM Baseplate End

37-pin D-subminiature plug

Termination Assembly End

37-pin D-subminiature receptacle

*Type 6*

Main TA End

25-pin D-subminiature receptacle

Expansion TA End

37-pin D-subminiature receptacle

##### Construction - Termination Assembly

###### MATERIAL

Polypropylene (PVC), compression and ring lug

Polyamide (PA), compression and ring lug

##### Field Termination Connections

###### COMPRESSION - ACCEPTED WIRING SIZES

*Solid/Stranded/AWG*

0.2 to 4 mm<sup>2</sup>/0.2 to 2.5 mm<sup>2</sup>/24 to 12 AWG

*Stranded with Ferrules*

0.2 to 2.5 mm<sup>2</sup> with or without plastic collar

###### RING-LUG - ACCEPTED WIRING SIZES

#6 size screw connectors (0.375 in (9.5 mm))

0.5 to 4 mm<sup>2</sup>/22 AWG to 12 AWG

#### TERMINATION ASSEMBLIES AND CABLES

##### General Description

Field I/O signals connect to the FBM subsystem via DIN rail mounted termination assemblies (TAs). Multiple types of TAs are available with FBM217 to provide input signal connections, signal conditioning, optical isolation from signal surges and external power connections for field devices. Since these features are built into the termination assemblies (where required), in most applications there is no need for additional termination equipment for field circuit functions such as circuit protection or signal conditioning (including fusing and power distribution).

The termination assembly can be used with a single FBM217 or with a redundant pair (two FBM217s).

The DIN rail mounted termination assemblies connect to the FBM subsystem baseplate by means of removable termination cables. When used with a redundant module pair, the termination assembly is connected to the baseplate using a redundant adapter (P0926ZY).

The cables are available in a variety of lengths, up to 30 meters (98 feet), allowing the termination assemblies to be mounted in either the enclosure or in an adjacent enclosure. Refer to "FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES" on page 9 for termination cable part numbers and specifications.