

HighFive PLC

PSS 21H-2Z41 B4

FBM241/b/c/d Discrete I/O Interface Modules

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The FBM241 has eight discrete inputs and eight discrete outputs.

FEATURES

Key features of the FBM241/b/c/d modules are:

- ▶ Eight discrete inputs
- ▶ Eight discrete outputs
- ▶ Supports discrete inputs/output signals at voltages of:
 - 15 to 60 V dc
 - 120 V ac/125 V dc
 - 240 V ac.
- ▶ Each input and output is galvanically isolated:
group isolated when used with external excitation
- ▶ Compact, rugged design suitable for enclosure in Class G3 (harsh) environments
- ▶ Executes the Discrete VO or Ladder Logic program, with the following configurable options: Input Filter Time, Fail Safe Configuration, Fail-Safe Fall-Back, and Sustained or Momentary Outputs
- ▶ Various Termination Assemblies (TAs) that contain:
 - Current limiting devices
 - Fuses
 - Relay outputs

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- Relay outputs with internal or external power source and fusing
- Solid state outputs.

OVERVIEW

The Channel Isolated, Discrete I/O Interface Modules (FBM241/b/c/d) have eight discrete input channels and eight discrete output channels. Associated termination assemblies (TAs) support discrete input or output signals at voltages of under 60 V dc, 120 V ac/125 V dc, or 240 V ac.

Depending on the type of I/O signal required, the TAs contain current limiting devices, fuses, relays, or relay outputs with internal or external power source and fusing.

The module is available in four distinct types and each type with its associated TA supports the following discrete inputs and outputs:

FBM	Inputs	Outputs
FBM241	15 to 60 V dc, 125 V dc, 120 V ac, or 240 V ac Switch (external or internal power source)	15 to 60 V dc at 2 A, or 30 V dc at 5 A, or 125 V dc at 0.5 A, or 120 V ac at 5 A, or 240 V ac at 5 A Switch (external or internal power source)
FBM241b	15 to 60 V dc Switch	12 V dc at 12 mA Switch (internal power source)
FBM241c	15 to 60 V dc Contact (unprotected - no fuse, or protected - fused)	15 to 60 V dc at 2 A, or 240 V ac at 5 A Switch (external or internal power source)
FBM241d	15 to 60 V dc Contact	12 V dc at 12 mA Switch (internal power source)

Each type of FBM, without signal conditioning, uses a 15 to 60 V dc input or output signal. Each discrete input and output is galvanically isolated from other channels and ground. When used with external excitation, each discrete input and output is group isolated.

The module performs signal conversion required to interface electrical input signals from field sensors to the optionally redundant Fieldbus. It executes the Discrete I/O or Ladder Logic program, with the following configurable options: Input Filter Time, Fail Safe Configuration, Fail-Safe Fail-Back, and Sustained or Momentary Outputs. If the Momentary Output configuration is selected, then Pulse Output Interval is also configurable.

COMPACT DESIGN

The module 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 and output points.

EASY REMOVAL/REPLACEMENT

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

FIELDBUS COMMUNICATION

A Fieldbus Communications Module or a Control Processor interfaces to the redundant 2 Mbps module Fieldbus used by the Fz Ms. The FBM241 accepts communication from either path (A or B) of the redundant 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 Module Fieldbus, redundant independent dc power, and termination cables.

SECURITY

Field power for contacts or solid state switches is current limited.

TERMINATION ASSEMBLIES

Field I/O signals connect to the FBM subsystem via DIN rail mounted TAs. The TAs used with the FBM241/b/c/d are described in "TERMINATION ASSEMBLIES AND CABLES" on page 9.

FUNCTIONAL SPECIFICATIONS

Input/Output Channels

8 input and 8 output isolated channels

Filter/Debounce Time⁽¹⁾

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

Voltage Monitor Function (FBM241 and FBM241b)

INPUT

On-State Voltage

15 to 60 V dc

Off-State Voltage

0 to 5 V dc

Current

1.4 mA (typical) at 5 to 60 V dc

SOURCE RESISTANCE LIMITS

On-State

1 k Ω (maximum) at 15 V dc

Off-State

100 k Ω (minimum) at 60 V dc

Contact Sensor Function (FBM241c and FBM241d)

RANGE (EACH CHANNEL)

Contact open (off) or closed (on)

OPEN-CIRCUIT VOLTAGE

24 V dc \pm 15%

SHORT-CIRCUIT CURRENT

2.5 mA (maximum)

ON-STATE RESISTANCE

1.0 k Ω (maximum)

OFF-STATE RESISTANCE

100 k Ω (minimum)

Output Switch with External Source (FBM241 and FBM241c)

APPLIED VOLTAGE

60 V dc (maximum)

LOAD CURRENT

2.0 A (maximum)

OFF-STATE LEAKAGE CURRENT

0.1 mA (maximum)

Output Switch with Internal Source (FBM241b and FBM241d)

OUTPUT VOLTAGE (NO LOAD)

12 V dc \pm 20%

SOURCE RESISTANCE

680 Ω (nominal)

SHORTED OUTPUT (ON-STATE) DURATION

Indefinite

OFF-STATE LEAKAGE CURRENT

0.1 mA (maximum)

Inductive Loads

Output may require a protective diode or metal oxide varistor (MOV) connected across the inductive load.

Isolation

Each channel is galvanically isolated from all other channels and earth (ground). The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel.

Channels are group isolated when used with external excitation.

CAUTION

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

Communication

Communicates with its associated FCM or FCP via the redundant 2 Mbps module Fieldbus

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

FUNCTIONAL SPECIFICATIONS (CONTINUED)

Power Requirements

AMPLIFIED (NON-DEPENDANT)

12 Vdc +50% -10%

CONSUMPTION

5 W (maximum) at 24 V dc

HEAT DISSIPATION

6 W (maximum) at 24 V dc

Loop Power Supply Protection

Current limited to 2.5 mA for inputs.

Resistor limited (680 Ω) for outputs with internal power.

Field Terminations Functional Specifications

Refer to "TERMINATION ASSEMBLIES AND CABLES" on page 9

Calibration Requirements

Calibration of the modules and TA is not required.

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

ELECTROMAGNETIC COMPATIBILITY (EMC) (CONT.)

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, 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 communication circuits for Class I, Groups A-D hazardous locations when connected to specified I/A 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 2006/95/EC

and Explosive Atmospheres (ATEX) directive

94/9/EC

CENELEC (DEMKO) certified for use in

CENELEC certified 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).

FUNCTIONAL SPECIFICATIONS (CONTINUED)

PRODUCT SAFETY - TERMINATION ASSEMBLIES WITH RELAY OUTPUTS OR HIGH VOLTAGE INPUTS

Underwriters Laboratories (UL) for U.S. and Canada

UL/UL-C listed as suitable for use in ordinary locations and compliant with UL 3121, First Edition, and Canadian Standard, C22.2

No.1010.1-92 when connected to specified I/A Series processor modules as described in the *I/A Series DIN Rail Mounted Subsystem User's Guide (B0400FA)*.

European Low Voltage Directive 73/23/EEC

Certified for use in ordinary locations and compliant with IEC 61010 when connected as described in the *I/A Series DIN Rail Mounted Subsystem User's Guide (B0400FA)*

ENVIRONMENTAL SPECIFICATIONS⁽²⁾

Operating

TEMPERATURE

FBM240/bk/d

-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/S² (5 to 500 Hz)

(2) The environmental ranges can be extended by the type of enclosure containing the module. [Refer to the Product Specification Sheet (PSS) applicable to the enclosure that is to be used.]

PHYSICAL SPECIFICATIONS

Mounting

MODULE
FBM241/241b/241c/241d 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. Refer to PSS 21H-2W6 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

127 mm (5.02 in) – 272 g (0.60 lb, approximate)

181 mm (7.13 in) – 300 g (0.70 lb, approximate)

TERMINATION ASSEMBLY - RING LUG OR KNIFE SWITCH

181 mm (7.13 in) – 363 g (0.80 lb, approximate)

198 mm (7.78 in) – 400 g (0.90 lb, approximate)

251 mm (9.88 in) – 454 g (1.0 lb, approximate)

286 mm (11.25 in) – 308 g (2.0 lb, approximate)

Part Numbers

MODULES

FBM241

P0914TG

FBM241b

P0914WK

FBM241c

P0914WM

FBM241d

P0914WP

TERMINATION ASSEMBLIES

Refer to "FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES" on page 11.

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 19.

RING LUG AND KNIFE SWITCH

Refer to page 21.

Termination Cables

CABLE LENGTHS

Up to 30 m (98 ft)

CABLE MATERIALS

Polyurethane or Low Smoke Zero Halogen (LSZH)

TERMINATION CABLE TYPE

Type 4 or type 4H - Refer to Table 2.

CABLE CONNECTION

37-pin male D-subminiature

Construction - Termination Assembly

MATERIAL

Polypropylene (PVC), compression

PVC, ring lug

Polyamide (PA), ring lug

PVC, knife terminal

FAMILY GROUP COLOR

Dark blue - discrete

TERMINAL BLOCKS

Inputs - 2 tiers, 8 positions

Outputs - 2 tiers, 8 positions or 3 tiers, 8 positions

Excitation - 2 tiers, 2 positions

Power Distribution - 2 tiers, 2 positions

PHYSICAL SPECIFICATIONS (CONTINUED)

Field Termination Connections

COMPRESSION - ACCEPTED WIRING SIZES

Solid/Stranded/AWG

0.2 to 4 mm²/0.2 to 2.5 mm²/24 to 12 AWG

Stranded with Ferrules

0.2 to 2.5 mm² with or without plastic collar

RING-LUG - ACCEPTED WIRING SIZES

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

0.5 to 4 mm²/22 AWG to 12 AWG

Termination Assembly Switching Relays

ELECTRICAL SERVICE LIFE

100,000 operations at rated resistive load

5,000,000 operations at no load.

5 A RELAY

Type

Single-Pole, Double-Throw, Normally Open
(SPDT_NO)

Switching Current

5 A at up to 120 V ac (see "GENERAL
PURPOSE PLUG-IN RELAY TERMINATION
ASSEMBLY SPECIFICATIONS" on page 23)

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