

I/A Series® HARDWARE
Product Specifications

invenSys

HighFive PLC

PSS 21H-2Z38 B4

FBM238, Discrete 24DI/8DO Interface Module

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The FBM238 Discrete 24DI/8DO Interface Module provides twenty-four voltage monitor digital inputs with eight digital output (external sourcing) channels.

FEATURES

Key features of the FBM238 are:

- Twenty-four digital input channels, used for either contact sensing, or dc voltage monitoring
- Eight digital output channels, used for either dc output switching with an external source (e.g. to control powering of various external loads), or dc output switching with an internal source only (e.g. to power external solid state relays or other similar devices)
- Compact, rugged design suitable for enclosure in Class G3 (harsh) environments
- Supports discrete input signals at voltages of:
 - 30 V dc/60 V dc
 - 120 V ac/125 V dc
 - 240 V ac
- Supports output switching at voltages of:
 - 60 V dc
 - 120 V ac/125 V dc
 - 240 V ac
- Executes the programs for Digital I/O (ECB5), and Ladder Logic (ECB8)

- Various Termination Assemblies (TAs) provide for per-channel isolation and 100 Series I/O upgrade, and contain:
 - High voltage attenuation and optical isolation for inputs
 - External power connection for device excitation.
 - Output current limiting

OVERVIEW

The FBM238 Discrete 24DI/8DO Interface Module provides twenty-four digital inputs with eight digital output channels. Associated Termination Assemblies (TAs) and Termination Assembly Adapters (TAAs) provide for discrete nominal inputs of 30 V dc, 60 V dc, 120 V ac/125 V dc or 240 V ac and nominal outputs of 60 V dc, 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 or TAAs support current limiting devices, high voltage attenuation circuits, optical isolation and external power source connections.

When connected to the appropriate TAs or TAAs, the FBM238 module provides functionality formerly provided by the 100 Series FBM I/O subsystem. TAs and TAAs are available which support the functionality of the main FBM09, FBM10, FBM11, FBM26 and FBM41 (8 input/ 8 output main FBMs). These main FBMs may be used with expansion FBM12, FBM13, FBM21, or FBM25 (16 input expansion FBMs).

COMPACT DESIGN

FBM238 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/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 2 Mbps module Fieldbus used by the FBMs. The FBM238 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.

FIELD I/O SIGNALS

Field I/O signals connect to the FBM subsystem via DIN rail mounted TAs or Termination Assembly Adapters (TAAs) mounted on the conversion mounting structures. TAAs are discussed in *Termination Assembly Adapter Modules for 100 Series Upgrade (PSS 21H-2W4 B4)*.

The TAs used with FBM238 are described in "" on page 6.

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FUNCTIONAL SPECIFICATIONS

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Input/Output Channels

24 group isolated digital input channels and eight group isolated digital output channels

Filter/Debounce Time

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

Voltage Monitor (FBM238 with feed through TA P0924VD)

INPUT

30 V dc maximum applied voltage

ON-STATE VOLTAGE

15 to 30 V dc

OFF-STATE VOLTAGE

0 to 5 V dc

CURRENT INPUT FOR ON-STATE

2.3 mA maximum at 30 V dc

SOURCE RESISTANCE LIMITS

ON-STATE

1 k Ω (maximum) at 15 V dc

OFF-STATE

100 k Ω (minimum) at 30 V dc

Contact Sense (FBM238 with feed through TA P0924VG)

CONTACT SUPPLY

24 V dc nominal (supplied by FBM through the TA)

CONTACT CURRENT

1.8 mA dc nominal

SOURCE RESISTANCE LIMITS

ON-STATE

1 k Ω (maximum) at 15 V dc

OFF-STATE

100 k Ω (minimum) at 30 V dc

Output (FBM238 with feed through TAs P0924VD or P0924VG)

APPLIED VOLTAGE (EXTERNAL)

60 V dc maximum

LOAD CURRENT

0.24 A dc maximum per channel

2.0 A dc maximum per TA

INDUCTIVE LOADS

Outputs may require a protective diode or MOV connected across the load

Isolation

Input and output channels are group isolated from each other and earth (ground). For details, refer to the *VA Series DIN Rail Mounting Substation User's Guide* (B0400FA). The module withstands without damage a potential of 600 V ac applied for one minute between the group isolated channels or between either set of group isolated channels and 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.

Communication

Communicates with its associated FCM or FCP via the module Fieldbus

Power Requirements

INPUT VOLTAGE RANGE

24 V dc +5%, -10%

MODULE CONSUMPTION

2.65 W (maximum) at 24 V dc

MODULE HEAT DISSIPATION

5.3 W (maximum) at 2 A total load and all inputs at 30 V dc

Calibration Requirements

Calibration of the module is not required.

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

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ENVIRONMENTAL SPECIFICATIONS

Operating

TEMPERATURE

FBM238

-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 (Halt) 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)

PHYSICAL SPECIFICATIONS

Mounting

MODULE

FBM238 mounts on a baseplate. The baseplate can be mounted on a DIN rail (horizontally or vertically), or horizontally on a 19-inch rack using a mounting kit. Alternatively, FBM238 mounts on a 100 Series conversion mounting structure. Refer to *DIN Rail Mounted Modular Baseplates* (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

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 20

Part Numbers

FBM238 MODULE

PO927AF

TERMINATION ASSEMBLIES

Refer to "FUNCTIONAL SPECIFICATIONS - Standard TERMINATION ASSEMBLIES" on page 7, "FUNCTIONAL SPECIFICATIONS - Main TERMINATION ASSEMBLIES" on page 8 and "FUNCTIONAL SPECIFICATIONS - Expansion TERMINATION ASSEMBLIES" on page 15.

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

BASEPLATE TO MAIN TA CABLE CONNECTION

FBM Baseplate End

37-pin D-subminiature

Termination Assembly End

37-pin D-subminiature

PHYSICAL SPECIFICATIONS (CONTINUED)

MAIN TA TO EXPANSION TA CABLE CONNECTION

Main TA End
25-pin D-subminiature
Expansion TA End
37-pin D-subminiature

Construction - Termination Assembly

MATERIAL

Polyamide (PA), compression

Field Termination Connections

COMPRESSION - ACCEPTED WIRING SIZES

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 FBM238 to provide I/O signal connections, signal conditioning, optical isolation from signal surges and external power connections for field devices as required by the particular FBM. 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 DIN rail mounted termination assemblies connect to the FBM subsystem baseplate by means of removable termination cables. 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 "Cable Types (Baseplate to Main TA Cables) and Part Numbers" on page 18 and "Cable Types (Main TA to Expansion TA Cables) and Part Numbers" on page 18 for termination cable part numbers and specifications.

Use of Termination Assemblies in 100 Series Upgrade

When an FBM238 is used to replace 100 Series FBMs, its associated termination assembly is

determined based on which 100 Series FBM is being replaced. Typically, the 100 Series FBM being replaced is a main FBM and may be used in conjunction with an expansion FBM.

A single FBM238 provides the I/O communications for both the 100 Series equivalent main and expansion TAs. To provide enough terminals for the field I/O wiring, two termination assemblies are used with the FBM238 - one for the field I/O wiring for the replaced main FBM, and one for the field I/O wiring for the replaced expansion FBM.

The "expansion" termination assembly is daisy-chained to the "main" termination assembly via the expansion cables listed in Table 3 on page 18.

The table "FUNCTIONAL SPECIFICATIONS - Main TERMINATION ASSEMBLIES" on page 8 lists the termination assemblies needed to replace the 100 Series main FBMs. "FUNCTIONAL SPECIFICATIONS - Expansion TERMINATION ASSEMBLIES" on page 15 lists the termination assemblies needed to replace the 100 Series expansion FBMs.

Alternatively, the FBM238 can accept field wiring through Termination Assembly Adapters (TAAs) instead of the termination assemblies when replacing 100 Series FBMs. This is discussed in *Termination Assembly Adapter Modules for 100 Series Upgrade* (PSS 21H-2W4 B4).