Foxboro Evo™ Process Automation System

Product Specifications

Foxboro®

by Schneider Electric

PSS 31H-2Z39

FBM239, Discrete 16DI/16DO Module

The FBM239 contains 16 discrete input and 16 discrete output channels that are compatible with voltages and currents commonly found in industrial plants. An external power supply is used to energize the field circuits.

OVERVIEW

The FBM239 Discrete 16DI/16DO Module provides 16 digital inputs with sixteen 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 Termination Assembly Adapters (TAAs) or TAs, the FBM239 module provides functionality formerly provided by the 100 Series FBM I/O subsystem. TAAs and TAs 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 FBM14, FBM15, FBM16, FBM27 or FBM42 (8 input/8/output expansion FBMs).

FEATURES

Key features of the FBM239 are:

- Sixteen digital input channels, used for either contact sensing, or dc voltage monitoring
- Sixteen 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.

COMPACT DESIGN

FBM239 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 FBM239 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 31H-2W4).The TAs used with the FBM239 are described in "TERMINATION ASSEMBLIES AND CABLES" on page 7.

FUNCTIONAL SPECIFICATIONS

Input/Output Channels
16 group isolated digital input channels and 16 group isolated digital output channels

Filter/Debounce Time
Configurable (No Filtering, 4, 8, 16 or 32 ms)

Voltage Monitor (FBM239 with feed through TA P0924VJ)

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 (FBM239 with feed through TA P0924VM)

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 (FBM239 with feed through TAs P0924VJ or P0924VM)

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 *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). The module/TA 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

FUNCTIONAL SPECIFICATIONS (CONTINUED)

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.

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

Regulatory Compliance (Continued)

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 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
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 *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

ENVIRONMENTAL SPECIFICATIONS

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 +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^2 (5 to 500 Hz)

PHYSICAL SPECIFICATIONS

Mounting

MODULE

FBM239 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, FBM239 mounts on a 100 Series conversion mounting structure. Refer to *Standard 200 Series Baseplates* (PSS 31H-2SBASEPLT) or *100 Series Conversion Mounting Structures* (PSS 31H-2W8) 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)

Weight

MODULE

284 g (10 oz) approximate

TERMINATION ASSEMBLY - COMPRESSION

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 25

Part Numbers

FBM239 MODULE

P0927AG

TERMINATION ASSEMBLIES

Refer to “FUNCTIONAL SPECIFICATIONS - Standard TERMINATION ASSEMBLIES” on page 8, “FUNCTIONAL SPECIFICATIONS - Main TERMINATION ASSEMBLIES” on page 9 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

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

Solid/Stranded/AWG

0.2 to 4 mm^2/0.2 to 2.5 mm^2/24 to 12 AWG

Stranded with Ferrules

0.2 to 2.5 mm^2 with or without plastic collar

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 FBM239 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 and Part Numbers" on page 22 and "Cable Types (Main TA to Expansion TA Cables) and Part Numbers" on page 23 for termination cable part numbers and specifications.

Use of Termination Assemblies in 100 Series Upgrade

When an FBM239 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 FBM239 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 FBM239 - 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 23.

The table "FUNCTIONAL SPECIFICATIONS - Main TERMINATION ASSEMBLIES" on page 9 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 FBM239 can accept field wiring through a Termination Assembly Adapter (TAA) instead of the termination assemblies when replacing 100 Series FBMs. This is discussed in *Termination Assembly Adapter Modules for 100 Series Upgrade* (PSS 31H-2W4).

Discrete Inputs/Outputs

Various termination assemblies are available to support the interfacing of field signals to the low level FBM I/O circuits. Active termination assemblies support input/output signal conditioning for the FBM as well as channel isolation. The I/O signal conditioning circuits are designed to emulate the 100 Series FBM I/O subsystem. This provides for functional I/O equivalence during upgrades from 100 Series to 200 Series hardware. The signal conditioning circuits are located on daughter boards that are mounted under the component covers of the termination assemblies. To condition signals, these termination assemblies provide optical isolation, current limiting, voltage attenuation and optional terminal blocks to connect externally supplied excitation voltage.

FUNCTIONAL SPECIFICATIONS - STANDARD TERMINATION ASSEMBLIES

FBM Type	Input Signal	Output Signal	TA Part No.[a]		Term. Type [b]	BP to TA Cable [c]	TA Cert. Type [d]
			PVC	PA			
FBM239	16 channel, Voltage Monitor, external source 30 V dc maximum applied voltage Logic Zero – 0 to 5 V dc Logic One – 15 to 30 V dc 2.2 mA typical at 30 V dc 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	16 channel output switch, external source 60 V dc maximum voltage 0.25 A dc maximum current 2.0 A dc maximum current per FBM 0.25 mA dc maximum off-state leakage current 0.4 A over-current fuse	P0924VJ		C	4	1, 2, 4
FBM239	16 channel, Contact Sense, internal source 24 V dc nominal open circuit voltage 7 mA nominal maximum current 2.2 mA typical at 30 V dc 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	16 channel output switch, external source 60 V dc maximum voltage 0.25 A dc maximum current 2.0 A dc maximum current per FBM 0.25 mA dc maximum off-state leakage current 0.4 A over-current fuse	P0924VM		C	4	1, 2, 4

(a) PVC is polyvinyl chloride rated from -20 to +80°C (-4 to 176°F).
(b) C = TA with compression terminals, RL = TA with ring lug terminals. Knife has compression terminals.
(c) Refer to Table 2 for cable part numbers and specifications.
(d) Refer to Table 1 Termination Assembly certification definitions.

FUNCTIONAL SPECIFICATIONS - MAIN TERMINATION ASSEMBLIES

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	BP to TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing a main FBM09A/B: Voltage Monitor external source 130 V dc Maximum voltage Logic Zero: 0 to 5 V dc Logic One: 15 to 130 V dc 2.2 mA typical 5 to 130 V dc 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance When replacing a main FBM09C/D: Contact sense internal source 24 V dc ±10% Open circuit voltage 2.5 mA maximum short circuit current 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing a main FBM09A/C: Output Switch external source 60 V dc Maximum voltage 0.5 V maximum voltage drop @ 0.5 A 0.5 A maximum current 0.75 A current limit Shorted load duration: indefinite (duty-cycle limited) 1.0 mA maximum off-state leakage When replacing a main FBM09B/D: output switch internal source 11 V dc ±2 V Open circuit voltage Source resistance 680 Ω nominal Shorted load duration: indefinite 0.5 mA maximum off-state leakage		P0924HE	C	4	1, 2, 4

FUNCTIONAL SPECIFICATIONS - MAIN TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	BP to TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing a main FBM10: Voltage Monitor, external source 132 V ac Maximum voltage Logic Zero: 0 to 20 V ac Logic One: 79 to 132 V ac 2.2 mA typical 20 to 132 V ac 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing a main FBM10: Output Switch external source 132 V ac Maximum voltage 0.4 V maximum voltage drop @ 1 A 2 A maximum current per channel 12 A maximum current per TA 3 A current limit 24 A surge current limit for 10 msec Shorted load duration: indefinite (duty-cycle limited) 3 mA maximum off-state leakage		P0924HG	C	4	1, 4

FUNCTIONAL SPECIFICATIONS - MAIN TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	BP to TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing a main FBM11: Voltage Monitor 264 V ac Maximum voltage Logic Zero: 0 to 40 V ac Logic One: 164 to 264 V ac 2.2 mA typical 40 to 264 V ac 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing a main FBM11: Output Switch external source 264 V ac Maximum voltage 0.6 V maximum voltage drop @ 0.5 A 1 A maximum current per channel 7 A maximum current per TA 1.5 A current limit 12 A surge current limit for 10 msec Shorted load duration: indefinite (duty-cycle limited) 2.5 mA maximum off-state leakage		P0924HJ	C	4	1

FUNCTIONAL SPECIFICATIONS - MAIN TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	BP to TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing a main FBM26A: Voltage Monitor, external source 150 V dc Maximum voltage Logic Zero: 0 to 10 V dc Logic One: 33 to 150 V dc 2.5 mA typical 10 to 150 V dc 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing a main FBM26A: Output Switch external source 150 V dc Maximum voltage 0.4 V maximum voltage drop @ 1 A 2 A maximum current per channel 12 A maximum current per TA 2.3 A current limit 20 A surge current limit, 20 ms Shorted load duration: indefinite (duty-cycle limited) 2 mA maximum off-state leakage		P0924HU	C	4	1, 2, 4
FBM239	When replacing a main FBM26B: Contact Sense internal source 48 V dc nominal open circuit voltage 2.5 mA ±20% short circuit current 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing a main FBM26B: Output Switch external source 150 V dc Maximum voltage 0.4 V maximum voltage drop @ 1 A 2 A maximum current per channel 12 A maximum current per TA 2.3 A current limit 20 A surge current limit, 20 ms Shorted load duration: indefinite (duty-cycle limited) 2 mA maximum off-state leakage		P0924HV	C	4	1, 2, 4

FUNCTIONAL SPECIFICATIONS - MAIN TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	BP to TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing a main FBM26C: Contact Sense external source on channel 1 150 V dc Maximum voltage Logic Zero: 0 to 10 V dc Logic One: 33 to 150 V dc 2.5 mA typical 10 to 150 V dc 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing a main FBM26C: Output Switch external source 150 V dc Maximum voltage 0.4 V maximum voltage drop @ 1 A 2 A maximum current per channel 12 A maximum current per TA 2.3 A current limit 20 A surge current limit, 20 ms Shorted load duration: indefinite (duty-cycle limited) 2 mA maximum off-state leakage		P0924HW	C	4	1, 2, 4

FUNCTIONAL SPECIFICATIONS - MAIN TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	BP to TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing a main FBM41A: Voltage Monitor external source 60 V dc Maximum voltage Logic Zero: 0 to 5 V dc Logic One: 15 to 60 V dc 6 mA maximum input current 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance When replacing a main FBM41C: Contact sense internal source 24 V dc ±20% Open circuit voltage 5 mA maximum short circuit current 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing a main FBM41A/C: Output Switch external source 60 V dc Maximum voltage 0.4 V maximum voltage drop @ 1 A 2.25 A maximum current 12 A maximum current per TA 10 A surge current limit for 20 msec maximum Shorted load duration: indefinite (duty-cycle limited) 0.5 mA maximum off-state leakage		P0924JA	C	4	1, 2, 4

(a) PVC is polyvinyl chloride rated from -20 to +80°C (-4 to 176°F). PA is Polyamide rated from -20 to +70°C (-4 to +158°F).
(b) C = TA with compression terminals; RL = TA with ring lug terminals. Knife has compression terminals.
(c) See Table 2 for cable part numbers and specifications.
(d) See Table 1 for Termination Assembly certification definitions.

FUNCTIONAL SPECIFICATIONS - EXPANSION TERMINATION ASSEMBLIES

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	Main TA to Exp. TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing an expansion FBM14A/B: Voltage Monitor external source 130 V dc Maximum voltage Logic Zero: 0 to 5 V dc Logic One: 15 to 130 V dc 2.2 mA typical 5 to 130 V dc 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance When replacing an expansion FBM14C/D: Contact sense internal source 24 V dc ±10% Open circuit voltage 2.5 mA maximum short circuit current 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing an expansion FBM14A/C: Output Switch external source 60 V dc Maximum voltage 0.5 V maximum voltage drop @ 0.5 A 0.5 A maximum current 0.75 A current limit Shorted load duration: indefinite (duty-cycle limited) 1.0 mA maximum off-state leakage When replacing an expansion FBM14B/D: output switch internal source 11 V dc ±2 V Open circuit voltage Source resistance 680 Ω nominal Shorted load duration: indefinite 0.5 mA maximum off-state leakage		P0924HF	C	6	1, 2, 4
Connect this TA to the main TA.							

FUNCTIONAL SPECIFICATIONS - EXPANSION TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	Main TA to Exp. TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing an expansion FBM15: Voltage Monitor, external source 132 V ac Maximum voltage Logic Zero: 0 to 20 V ac Logic One: 79 to 132 V ac 2.2 mA typical 20 to 132 V ac 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing an expansion FBM15: Output Switch external source 132 V ac Maximum voltage 0.4 V maximum voltage drop @ 1 A 2 A maximum current per channel 12 A maximum current per TA 3 A current limit 24 A surge current limit for 10 msec Shorted load duration: indefinite (duty-cycle limited) 3 mA maximum off-state leakage		P0924HH	C	6	1, 4
Connect this TA to the main TA.							

FUNCTIONAL SPECIFICATIONS - EXPANSION TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	Main TA to Exp. TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing an expansion FBM16: Voltage Monitor 264 V ac Maximum voltage Logic Zero: 0 to 40 V ac Logic One: 164 to 264 V ac 2.2 mA typical 40 to 264 V ac 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing an expansion FBM16: Output Switch external source 264 V ac Maximum voltage 0.6 V maximum voltage drop @ 0.5 A 1 A maximum current per channel 7 A maximum current per TA 1.5 A current limit 12 A surge current limit for 10 msec Shorted load duration: indefinite (duty-cycle limited) 2.5 mA maximum off-state leakage		P0924HK	C	6	1
Connect this TA to the main TA.							

FUNCTIONAL SPECIFICATIONS - EXPANSION TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	Main TA to Exp. TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing an expansion FBM27A: Voltage Monitor, external source 150 V dc Maximum voltage Logic Zero: 0 to 10 V dc Logic One: 33 to 150 V dc 2.5 mA typical 10 to 150 V dc 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing an expansion FBM27A: Output Switch external source 150 V dc Maximum voltage 0.4 V maximum voltage drop @ 1 A 2 A maximum current per channel 12 A maximum current per TA 2.3 A current limit 20 A surge current limit, 20 ms Shorted load duration: indefinite (duty-cycle limited) 2 mA maximum off-state leakage		P0924HX	C	6	1, 2, 4
Connect this TA to the main TA.							

FUNCTIONAL SPECIFICATIONS - EXPANSION TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	Main TA to Exp. TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing an expansion FBM27B: Contact Sense internal source 48 V dc nominal open circuit voltage 2.5 mA ±20% short circuit current 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing an expansion FBM27A: Output Switch external source 150 V dc Maximum voltage 0.4 V maximum voltage drop @ 1 A 2 A maximum current per channel 12 A maximum current per TA 2.3 A current limit 20 A surge current limit, 20 ms Shorted load duration: indefinite (duty-cycle limited) 2 mA maximum off-state leakage		P0924HY	C	6	1, 2, 4
Connect this TA to the main TA.							

FUNCTIONAL SPECIFICATIONS - EXPANSION TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	Main TA to Exp. TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing an expansion FBM27C: Contact Sense external source on channel 1 150 V dc Maximum voltage Logic Zero: 0 to 10 V dc Logic One: 33 to 150 V dc 2.5 mA typical 10 to 150 V dc 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing an expansion FBM27A: Output Switch external source 150 V dc Maximum voltage 0.4 V maximum voltage drop @ 1 A 2 A maximum current per channel 12 A maximum current per TA 2.3 A current limit 20 A surge current limit, 20 ms Shorted load duration: indefinite (duty-cycle limited) 2 mA maximum off-state leakage		P0924HZ	C	6	1, 2, 4
Connect this TA to the main TA.							

FUNCTIONAL SPECIFICATIONS - EXPANSION TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal	TA Part Number		Termination	Main TA to Exp. TA Cable	TA Certification
			PVC[a]	PA[a]	Type[b]	Type[c]	Type[d]
FBM239	When replacing an expansion FBM42A: Voltage Monitor external source 60 V dc Maximum voltage Logic Zero: 0 to 5 V dc Logic One: 15 to 60 V dc 6 mA maximum input current 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance When replacing an expansion FBM42C: Contact sense internal source 24 V dc ±20% Open circuit voltage 5 mA maximum short circuit current 1 KΩ Maximum On-state resistance 100 KΩ Minimum Off-state resistance	When replacing an expansion FBM42A/C: Output Switch external source 60 V dc Maximum voltage 0.4 V maximum voltage drop @ 1 A 2.25 A maximum current 10 A surge current limit for 20 msec maximum Shorted load duration: indefinite (duty-cycle limited) 0.5 mA maximum off-state leakage		P0924JB	C	6	1, 2, 4
Connect this TA to the main TA.							

(a) PVC is polyvinyl chloride rated from -20 to +80°C (-4 to 176°F). PA is Polyamide rated from -20 to +70°C (-4 to +158°F).
(b) C = TA with compression terminals; RL = TA with ring lug terminals. Knife has compression terminals.
(c) See Table 2 for cable part numbers and specifications.
(d) See Table 1 for Termination Assembly certification definitions.

Table 1. Certifications for Termination Assemblies

Type	Certification
Type 1	TAs are UL/UL-C listed as suitable for use in Class I; Groups A-D; Division 2 temperature code T4 hazardous locations. They are CENELEC (DEMKO) certified EEx nA IIC T4 for use in Zone 2 potentially explosive atmospheres.
Type 2	TAs are UL/UL-C listed as associated apparatus for supplying non-incendive field circuits Class I; Groups A-D; Division 2 hazardous locations when connected to specified 200 Series FBMs and field circuits meeting entity parameter constraints specified in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). They are also CENELEC (DEMKO) certified as associated apparatus for supplying field circuits for Group IIC, Zone 2 potentially explosive atmospheres. Field circuits are also Class 2 limited energy (60 V dc, 30 V ac, 100 VA or less) if customer-supplied equipment meets Class 2
Type 3	Same as Type 2 above except that only input circuits are non-incendive/Class 2.
Type 4	All field circuits are NEC/CEC Class 2 limited energy if customer-supplied equipment meets Class 2 limits.

Table 2. Cable Types and Part Numbers

Cable Length m (ft)	Type 4 P/PVC[a]	TYPE 4 LSZH[b]	Type 4 H/XLPE[c]
0.5 (1.6)	P0916FG	P0928BA	P0916WD
1.0 (3.2)	P0916FH	P0928BB	P0916WE
2.0 (6.6)	P0931RQ	P0928BC	P0931RU
3.0 (9.8)	P0916FJ	P0928BD	P0916WF
5.0 (16.4)	P0916FK	P0928BE	P0916WG
10.0 (32.8)	P0916FL	P0928BF	P0916WH
15.0 (49.2)	P0916FM	P0928BG	P0916WJ
20.0 (65.6)	P0916FN	P0928BH	P0916WK
25.0 (82.0)	P0916FP	P0928BJ	P0916WL
30.0 (98.4)	P0916FQ	P0928BK	P0916WM

(a) P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation. PVC is rated from -20 to +80°C (-4 to 176°F).
(b) Low smoke zero halogen or low smoke free of halogen (LSZH) is a material classification used for cable jacketing. LSZH is composed of thermoplastic or thermoset compounds that emit limited smoke and no halogen when exposed to high sources of heat. Temperature range; -40 to +105°C (-40 to +221°F)
(c) H/XLPE is Hypalon outer jacket and XLPE (cross-linked polyethylene) primary conductor insulation. H/XLPE is rated from -40 to +90°C (-40 to 194°F). Hypalon cables are no longer available for purchase.

Table 3. Cable Types (Main TA to Expansion TA Cables) and Part Numbers

Cable Length m (ft)	Type 6 P/PVC[a]	TYPE 6 LSZH[b]	Type 6 H/XLPE[c]
0.75 (2.5)	P0924CK	P0928CQ	P0924CL

(a) P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation. PVC is rated from -20 to +80°C (-4 to 176°F). These cables are no longer available for purchase.
(b) Low smoke zero halogen or low smoke free of halogen (LSZH) is a material classification used for cable jacketing. LSZH is composed of thermoplastic or thermoset compounds that emit limited smoke and no halogen when exposed to high sources of heat. Temperature range; -40 to +105°C (-40 to +221°F).
(c) H/XLPE is Hypalon outer jacket and XLPE (cross-linked polyethylene) primary conductor insulation. H/XLPE is rated from -40 to +90°C (-40 to 194°F). Hypalon cables are no longer available for purchase.

Use of Termination Assemblies in 100 Series Upgrade

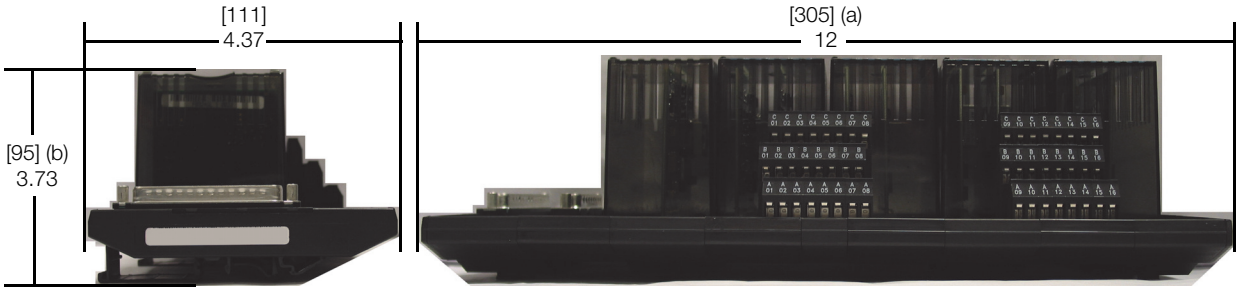
When an FBM239 is used to replace the 100 Series FBMs, it may use any of the appropriate termination assemblies listed above for the FBM239's field I/O wiring. Alternatively, the FBM239 can accept this field wiring through main and expansion Termination Assembly Adapters (TAA) instead of termination assemblies. This is discussed in *Termination Assembly Adapter Modules for 100 Series Upgrade* (PSS 31H-2W4).

DIMENSIONS – NOMINAL

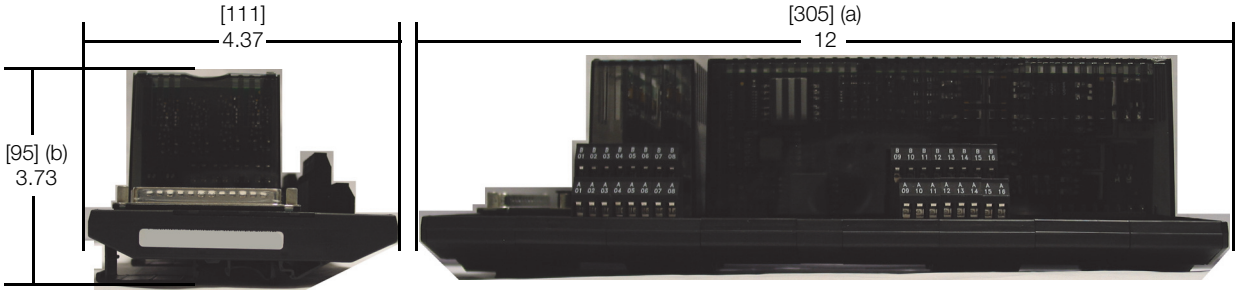
[mm]
in

Compression Termination Assemblies

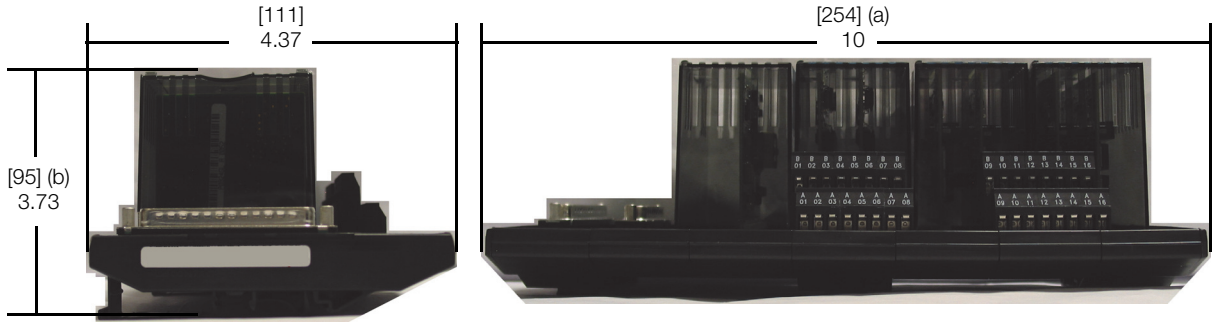
P0924HE/P0924HF



P0924HG/P0924HH/P0924HJ/P0924HK



P0924HU/P0924HV/P0924HW/P0924HX/P0924HY/P0924HZ



(a) Overall width – for determining DIN rail loading.
(b) Height above DIN rail (add to DIN rail height for total).

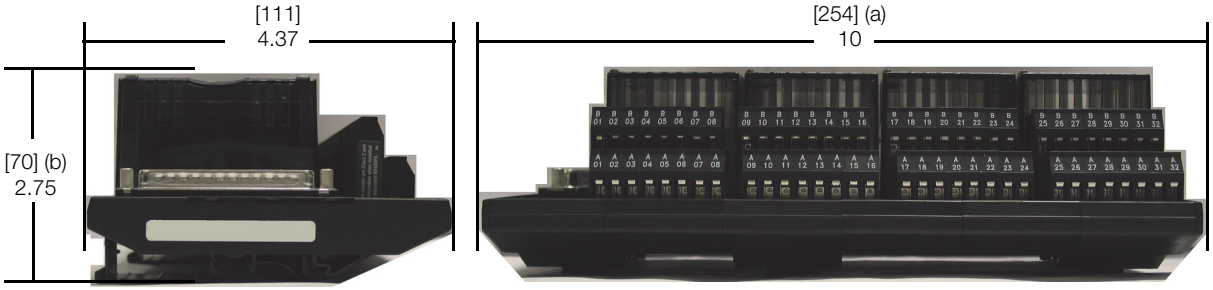
DIMENSIONS – NOMINAL (CONTINUED)

[mm]
in

Compression Termination Assemblies

P0924JA/P0924JB

P0924VJ/P0924VM



(a) Overall width – for determining DIN rail loading.
(b) Height above DIN rail (add to DIN rail height for total).

RELATED PRODUCT SPECIFICATION SHEETS (PSS)

PSS Number	Description
PSS 31H-2S200	Standard 200 Series Subsystem Overview
PSS 31H-2W100	100 Series Fieldbus Module Upgrade Subsystem Overview
PSS 31H-2CERTS	Standard and Compact 200 Series I/O - Agency Certifications
PSS 31H-2W4	Termination Assembly Adapter Modules for 100 Series Upgrade
PSS 31H-2SBASEPLT	Standard 200 Series Baseplates
PSS 31H-2W8	100 Series Conversion Mounting Structures
PSS 21S-3CP270ICS	Control Processor 270 (CP270) Integrated Control Software

Foxboro®

by Schneider Electric

Invensys Systems, Inc
10900 Equity Drive
Houston, TX 77041
United States of America
http://www.invensys.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424
Website: https://support.ips.invensys.com

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