

Compact FBM241/c/d Discrete I/O Modules



The Compact FBM241, FBM241c, and FBM241d each have eight discrete inputs and eight discrete outputs.

OVERVIEW

The Compact Channel Isolated, Discrete I/O Interface Modules (Compact FBM241/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. They are part of the Compact 200 Series I/O subsystem described in *Compact 200 Series I/O Subsystem Overview* (PSS 31H-2COV).

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 three distinct types and each type with its associated TA supports the following discrete inputs and outputs:

Type	Inputs	Outputs
Compact 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 power source)
Compact 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 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 FCP or ZCP. It executes the Discrete I/O or Ladder Logic program, with the following configurable options: Input Filter Time, Fail Safe Configuration, Fail-Safe Fall-Back, and Sustained or Momentary Outputs. If the Momentary Output configuration is selected, then Pulse Output Interval is also configurable.

FEATURES

Key features of the Compact FBM241/FBM241c/FBM241d 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 I/O 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
 - Relay outputs with internal or external power source and fusing
 - Solid state outputs.

COMPACT DESIGN

The Compact FBM241's design is narrower than the standard 200 Series FBMs. It has a rugged Acrylonitrile Butadiene Styrene (ABS) 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 mounts on a Compact 200 Series baseplate. Two screws on the FBM secure the module to the baseplate.

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 FBMs. The Compact FBM241/c/d 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.

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 Compact FBM241/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 (Compact FBM241)**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 (Compact 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 (nominal)

ON-STATE RESISTANCE

1.0 k Ω (maximum)

OFF-STATE RESISTANCE

100 k Ω (minimum)

Output Switch with External Source (Compact 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 (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 HDLC 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

INPUT VOLTAGE RANGE (REDUNDANT)

24 V dc +5%, -10%

CONSUMPTION

2 W

HEAT DISSIPATION

6 W

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 "5 A at up to 120 V ac (see "GENERAL PURPOSE PLUG-IN RELAY TERMINATION ASSEMBLY SPECIFICATIONS" on page 23)" on page 8

Calibration Requirements

Calibration of the modules and TA is not required.

Regulatory Compliance

ELECTROMAGNETIC COMPATIBILITY (EMC)

European EMC Directive 2004/108/EC (Prior to April 20, 2016) and 2014/30/EU (Beginning April 20, 2016)

Meets: EN61326-1:2013 Class A Emissions and Industrial Immunity Levels

RoHS COMPLIANCE

Complies with European RoHS Directive 2011/65/EU

PRODUCT SAFETY

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

UL/UL-C listed as suitable for use in UL/UL-C listed Class I, Groups A-D; Division 2; temperature code T4 enclosure based systems 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 (Prior to April 20, 2016) and 2014/35/EU (Beginning April 20, 2016) and Explosive Atmospheres (ATEX) directive 94/9/EC (Prior to April 20, 2016) and 2014/34/EU (Beginning April 20, 2016)

DEMKO certified as Ex nA IIC T4 for use in certified Zone 2 enclosure when connected to specified I/A Series processor modules as described in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

MARINE CERTIFICATION

ABS Type Approved and Bureau Veritas Marine certified for Environmental Category EC31.

ENVIRONMENTAL SPECIFICATIONS⁽²⁾

Operating

TEMPERATURE

Compact FBM241/c

-20 to +60°C (-4 to +140°F)

Termination Assembly - 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 +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 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

COMPACT FBM241/241C/241D

The Compact FBM241/241c/241d mounts on a Compact 200 Series 16-slot horizontal baseplate. The baseplate can be mounted on a horizontal DIN rail, or horizontally on a 19-inch rack using a mounting kit.

Refer to *Compact 200 Series 16-Slot Horizontal Baseplate* (PSS 31H-2C200) 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

185 g (6.5 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) – 908 g (2.0 lb, approximate)

Part Numbers

MODULES

Compact FBM241

RH101DH

Compact FBM241c

RH101DJ

Compact FBM241d

RH101GL

TERMINATION ASSEMBLIES

Refer to “FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES” on page 11.

Dimensions

COMPACT FBM241/241C/241D

Height

130 mm (5.12 in)

Width

25 mm (0.98 in)

Depth

150 mm (5.9 in) - Including baseplate connectors, 139 mm (5.46 in)

TERMINATION ASSEMBLY

Compression Screw

Refer to page 20.

Knife Switch

Refer to page 22.

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

FBM Baseplate End

37-pin D-subminiature

Termination Assembly End

37-pin D-subminiature

Construction - Termination Assembly

MATERIAL

Polyamide (PA), compression

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)

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 FBMs to provide I/O signal connections, signal conditioning, optical isolation from signal surges, external power connections, and/or fusing for protection of the FBM and/or field device 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 Compact FBM 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 as needed by plant design. Refer to "FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES" on page 11 for termination cable part numbers and specifications.

Discrete Inputs

Termination assemblies with discrete inputs support eight 2-wire discrete input signals at passive low voltage levels of less than 60 V dc and active high voltage levels of 125 V dc, 120 V ac, or 240 V ac. Active termination assemblies support input signal conditioning for FBMs. To condition signals, these termination assemblies may provide optical isolation, current limiting, noise reduction, voltage attenuation, or optional terminal blocks to connect externally supplied excitation voltage.

Low Voltage Discrete Inputs

The low voltage inputs (less than 60 V dc) use passive termination assemblies. Inputs can either be voltage monitor, switched or contact sense types. Voltage monitor inputs require an external field voltage source. Contact sense input use the FBM auxiliary +24 V dc power supply to wet field contacts.

A load may not be required for proper operation of the input channels. A diode may be required for a dc inductive load only.

High Voltage Discrete Inputs

The high voltage input circuits support 125 V dc, 120 V ac, or 240 V ac. Inputs can be either voltage monitor or switched types. Voltage monitor inputs require a field voltage source. Switch inputs use customer supplied excitation voltage applied to dedicated terminals on the termination assembly and distributed on the termination assembly to each of the input channels.

These circuits are located on daughter boards that are mounted under the component covers of the termination assemblies.

Discrete Outputs

Termination assemblies with discrete outputs support eight 2-wire discrete output signals at passive low voltages of less than 60 V dc and active high voltage levels of 120 V ac or 240 V ac. Active termination assemblies support output signal conditioning for FBMs. To condition signals, these termination assemblies provide fuse protection, relays, solid-state devices, and terminal blocks to connect externally supplied optional power distribution.

Low Voltage Discrete Outputs

The low voltage outputs (less than 60 V dc) use passive termination assemblies. These assemblies are available with and without output protection (fusing). Termination assemblies with protection have individual user serviceable fuses that are designed to limit the output current to 2 A. Eight vertically mounted, one per channel, 3.15 A sand filled fuses (temperature derated) allow a maximum of 2 A current per output channel. Termination assemblies without fusing (unprotected) are intended for use by Foxboro engineers or customers who are using interposing relays or fuse terminal blocks between the termination assembly and the field devices.

Power for the low voltage outputs can be supplied by the FBM +24 V dc auxiliary power supply (internally (FBM) sourced) or by a field voltage source (externally sourced).

High Voltage Discrete Outputs

The high voltage output (120 V ac or 240 V ac) termination assemblies use plug-in SPDT (Form C) electromechanical relays and solid-state switches. The plug-in sockets allow field replacement of individual relays. The relays and associated sockets are located under the component covers of the termination assemblies. The termination assembly's switched outputs use unsealed, general purpose relays. These assemblies are capable of providing

mixed voltage and are designed to provide signal segregation by locating the low voltage inputs and the opposite side of the terminal assembly from the outputs. A solid-state output module is optionally available. High voltage discrete outputs are always externally sourced power.

The output termination assemblies come in either output or output with power distribution (user-supplied via terminals on the termination assembly). In both configurations, when the FBM output is on, the relay coil is energized and the relay contact is switched from normally closed (NC) position to the normally open (NO) position. The FBM +24 V dc auxiliary power supply is used to energize the relay coil.

Termination assemblies with power distribution have a dedicated terminal block which provides a connection to externally supplied power and distributed internally on the termination assembly to each of the output channels. The line or positive side of the supply is fused; the neutral or negative side of the supply is connected to the field.

The termination assembly has a pair of external excitation voltage terminals, which distribute customer-supplied wetting voltage to all input channels on the assembly. These terminals allow the field power to be daisy chained between terminal assemblies.

FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES

Compact FBM Type	Input Signal	Output Signal ^(a)	TA Part Number ^(b)	Term. Type ^(c)	TA Cable Type ^(d)	TA Cert. Type ^(e)
			PA			
Compact FBM241	8 channel, voltage monitor 15 to 60 V dc Compact FBM241 channel isolation	8 channel, switch (externally sourced) <60 V dc at 2 A maximum, unprotected - no fuse Compact FBM241 channel isolation	RH916UY	C	4, 4H	1,2
Compact FBM241	8 channel, voltage monitor 15 to 60 V dc Compact FBM241 channel isolation	8 channel, switch (externally sourced) 15 to 60 V dc at 2 A maximum (protected - fused) Compact FBM241 channel isolation	RH916AQ	C	4, 4H	1,2
			RH916AR	RL		
Compact FBM241	8 channel, voltage monitor 15 to 60 V dc Compact FBM241 channel isolation	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 5 A maximum, Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel Isolation provided by termination assembly	RH916QE	C	4	3

**FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES
(CONTINUED)**

Compact FBM Type	Input Signal	Output Signal ^(a)	TA Part Number ^(b)	Term. Type ^(c)	TA Cable Type ^(d)	TA Cert. Type (e)
			PA			
Compact FBM241	8 channel, contact sense 125 V ac or 125 V dc with external excitation Logic Zero 0 to 20 V ac; 0 to 20 V dc Logic One 80 to 132 V ac; 75 to 150 V dc Input Current for Logic One; 2 mA (typical) Group isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Group isolation provided by termination assembly	RH916QV	C	4	5
Compact FBM241	8 channel, voltage monitor 125 V ac or 125 V dc Logic Zero 0 to 20 V ac; 0 to 20 V dc Logic One 80 to 132 V ac; 75 to 150 V dc Input Current for Logic One; 2 mA (typical) Channel isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel isolation provided by termination assembly	RH916YH	C	4	5
Compact FBM241	8 channel, voltage monitor 125 V ac or 125 V dc Logic Zero 0 to 20 V ac; 0 to 20 V dc Logic One 80 to 132 V ac; 75 to 150 V dc Input Current for Logic One; 2 mA (typical) Channel isolation provided by termination assembly	8 channel, switch (externally sourced) with power distribution SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Group isolation provided by termination assembly	RH916QG	C	4	5

**FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES
(CONTINUED)**

Compact FBM Type	Input Signal	Output Signal ^(a)	TA Part Number ^(b)	Term. Type ^(c)	TA Cable Type ^(d)	TA Cert. Type ^(e)
			PA			
Compact FBM241	8 channel, contact sense 125 V ac or 125 V dc with external excitation Logic Zero 0 to 20 V ac; 0 to 20 V dc Logic One 80 to 132 V ac; 75 to 150 V dc Input Current for Logic One; 2 mA (typical) Group isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel isolation provided by termination assembly	RH916QT	C	4	5
Compact FBM241	8 channel, voltage monitor 120 V ac or 125 V dc with external excitation Logic Zero 0 to 20 V ac; 0 to 20 V dc Logic One 80 to 132 V ac; 75 to 150 V dc Input Current for Logic One; 2 mA (typical) Channel isolation provided by termination assembly	8 channel, switch (externally sourced) Solid State Switch 125 V ac/125V dc at 2 A maximum Channel isolation provided by termination assembly	RH917MX	C/ Knife	4	5

**FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES
(CONTINUED)**

Compact FBM Type	Input Signal	Output Signal ^(a)	TA Part Number ^(b)	Term. Type ^(c)	TA Cable Type ^(d)	TA Cert. Type (e)
			PA			
Compact FBM241	8 channel, voltage monitor 120 V ac or 125 V dc with external excitation Logic Zero 0 to 20 V ac; 0 to 20 V dc Logic One 80 to 132 V ac; 75 to 150 V dc Input Current for Logic One; 2 mA (typical) Channel isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 2 A maximum Up to 250 V ac at 2 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel isolation provided by termination assembly relay P0165CL. The max current rating is 2 A due to a fuse in each channel.	RH926DS	Knife	4	5
Compact FBM241	8 channel, contact sense 240 V ac with external excitation Logic Zero 0 to 40 V ac Logic One 160 to 280 V ac Input Current for Logic One; 1.6 mA maximum Group isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel isolation provided by termination assembly	RH916QX	C	4	5

**FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES
(CONTINUED)**

Compact FBM Type	Input Signal	Output Signal ^(a)	TA Part Number ^(b)	Term. Type ^(c)	TA Cable Type ^(d)	TA Cert. Type ^(e)
			PA			
Compact FBM241	8 channel, contact sense 240 V ac with external excitation Logic Zero 0 to 40 V ac Logic One 160 to 280 V ac Input Current for Logic One; 1.6 mA maximum Group isolation provided by termination assembly	Externally sourced with power distribution SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Group isolation provided by termination assembly	RH916QZ	C	4	5
Compact FBM241	8 channel, voltage monitor 240 V ac Logic Zero 0 to 40 V ac Logic One 160 to 280 V ac Input Current for Logic One; 1.6 mA maximum Channel isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel isolation provided by termination assembly	RH916QJ	C	4	5
Compact FBM241	8 channel, voltage monitor 240 V ac Logic Zero 0 to 40 V ac Logic One 160 to 280 V ac Input Current for Logic One; 1.6 mA maximum Channel isolation provided by termination assembly	8 channel, switch (externally sourced) with power distribution SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Group isolation provided by termination assembly	RH916QL	C	4	5

**FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES
(CONTINUED)**

Compact FBM Type	Input Signal	Output Signal ^(a)	TA Part Number ^(b)	Term. Type ^(c)	TA Cable Type ^(d)	TA Cert. Type (e)
			PA			
Compact FBM241c	8 channel, contact sense 24 V dc contact wetting from Compact FBM241c Channel isolation	8 channel, switch (externally sourced) 15 to 60 V dc at 2 A maximum, protected - fused Compact FBM241c channel isolation	RH916JW	C	4	1, 2
Compact FBM241c	8 channel, contact sense 24 V dc contact wetting from Compact FBM241c Channel isolation	8 channel, switch (externally sourced) <60 V dc at 2 A maximum, unprotected - no fuse Compact FBM241c channel isolation	RH916UD	C	4, 4H	1, 2
Compact FBM241c	8 channel, contact sense 24 V dc contact wetting from Compact FBM241c Channel isolation	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel isolation provided by termination assembly	RH916AW	C	4	3

**FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES
(CONTINUED)**

Compact FBM Type	Input Signal	Output Signal ^(a)	TA Part Number ^(b)	Term. Type ^(c)	TA Cable Type ^(d)	TA Cert. Type ^(e)
			PA			
Compact FBM241c	8 channel, contact sense 24 V dc contact wetting from Compact FBM241c Channel isolation	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 V dc at 5 A maximum Up to 250 V ac at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Group isolation provided by termination assembly	RH916QQ	C	4	1, 2
FBM241d	8 channel, contact sense 24 V dc contact wetting from FBM241d FBM241d channel isolation	8 channel, switch (internally sourced) 12 V dc at 15 mA maximum FBM241d channel isolation	RH916YW	C	4	1, 2

(a) Output inductive load limits based on current of 2 A. Inductance limit increases by a factor of 4, for each factor of 2 reduction in current. For an inductive load above stated limits, a snubber diode is required for a dc inductive load or a MOV (metal oxide varistor) is required for an ac inductive load. Diode current rating must be equal to the maximum load current and voltage rating equal to 1.3X maximum supply voltage. MOV must be rated for 120 V ac use and current rating must be equal to maximum load current.

(b) PA (polyamide) termination assemblies rated from -20 to +70°C (-4 to +158°F).

(c) C = TA with compression terminals, RL = TA with ring lug terminals. Knife has compression terminals.

(d) See Table 2 for cable part numbers and specifications.

(e) See Table 1 Termination Assembly certification definitions.

Note: For 120 V ac / 240 V ac input channel applications, a maximum cable length of 61 m (200 ft) is recommended, in order to minimize customer plant stray physical capacitance, and coupling/ leakage current from possibly effecting channel currents. Additional details are provided in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

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 DEMKO certified Ex nA IIC T4 Gc for use in Zone 2 potentially explosive atmospheres.
Type 2	TAs are UL/UL-C listed for supplying 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 <i>Standard and Compact 200 Series Subsystem User's Guide</i> (B0400FA). They are also DEMKO certified 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 5	The TA and its field circuitry are for use in only ordinary (non-hazardous) locations.

Table 2. Cable Types and Part Numbers

Length m (ft)	Type 4, 26 AWG^(a) P/PVC	Type 4H, 22 AWG^{(a)(b)} P/PVC	Type 4 LSZH^(c)	Type 4H LSZH^{(b)(c)}
0.5 (1.6)	RH100CJ	-	RH100BN	-
1.0 (3.2)	RH100CK	-	RH100BP	-
1.5 (4.9)	RH100EQ	-	RH100EN	-
2.0 (6.6)	RH100CL	-	RH100BQ	-
3.0 (9.8)	RH100CM	-	RH100BR	-
5.0 (16.4)	RH100CN	-	RH100BS	-
10.0 (32.8)	RH100CP	RH100CX	RH100BT	RH100DC
15.0 (49.2)	RH100CQ	RH100CY	RH100BU	RH100DD
20.0 (65.6)	RH100CR	RH100CZ	RH100BV	RH100DE
25.0 (82.0)	RH100CS	RH100DA	RH100BW	RH100DF
30.0 (98.4)	RH100CT	RH100DB	RH100BX	RH100DG

(a) P/PVC cable assemblies polyurethane outer jacket and semi-rigid PVC primary conductor insulation temperature range: -20 to + 70°C (-4 to 158°F).

(b) Type 4H cables are used to reduce voltage drop in long (greater than 5 m (15 ft)) cable run applications.

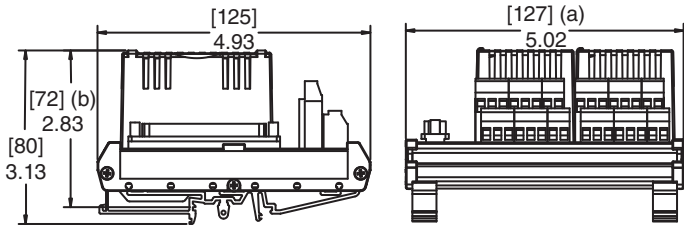
(c) Low smoke zero halogen or low smoke free of halogen (LSZH) is a material classification used for cable jacketing. LSZH is composed of thermoplastic or thermoset compounds that emit limited smoke and no halogen when exposed to high sources of heat. Temperature range: -40 to +105°C (-40 to +221°F).

DIMENSIONS – NOMINAL

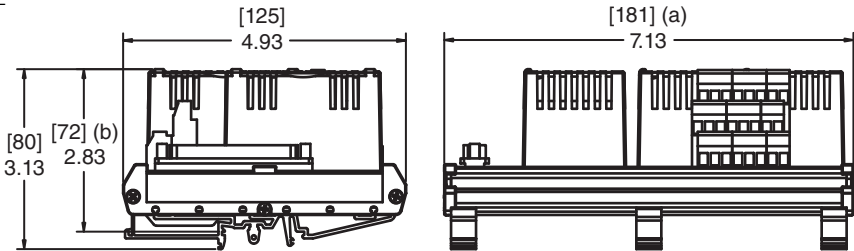
[mm]
in

Compression Termination Assemblies

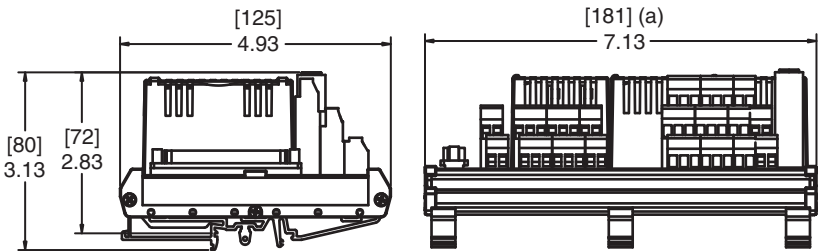
RH916UY, RH916AQ, RH916JW, RH916YW, RH916UD



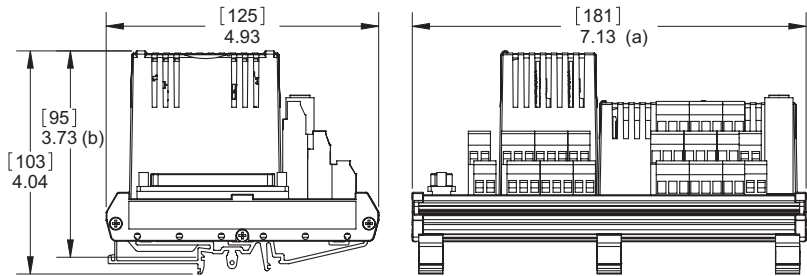
RH916QE



RH916QZ



RH916QV



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

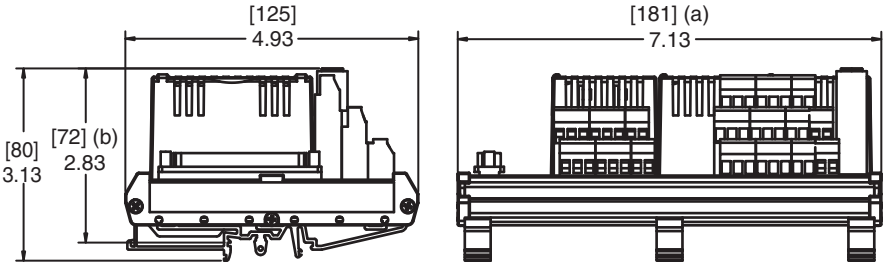
NOTE: Dimensions for this polyamide termination assembly are smaller.

DIMENSIONS – NOMINAL (CONTINUED)

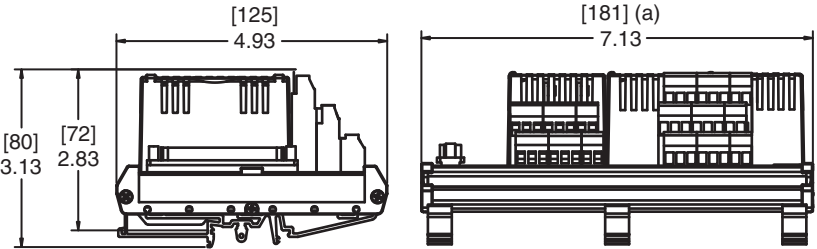
[mm]
in

Compression Termination Assemblies (Continued)

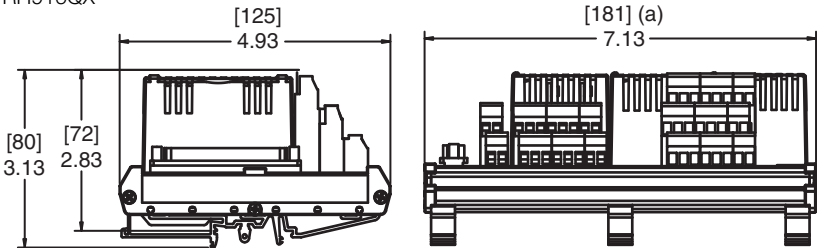
RH916QG, RH916QL, RH916QQ



RH916AW, P0916YH, RH916QJ



RH916QT, RH916QX



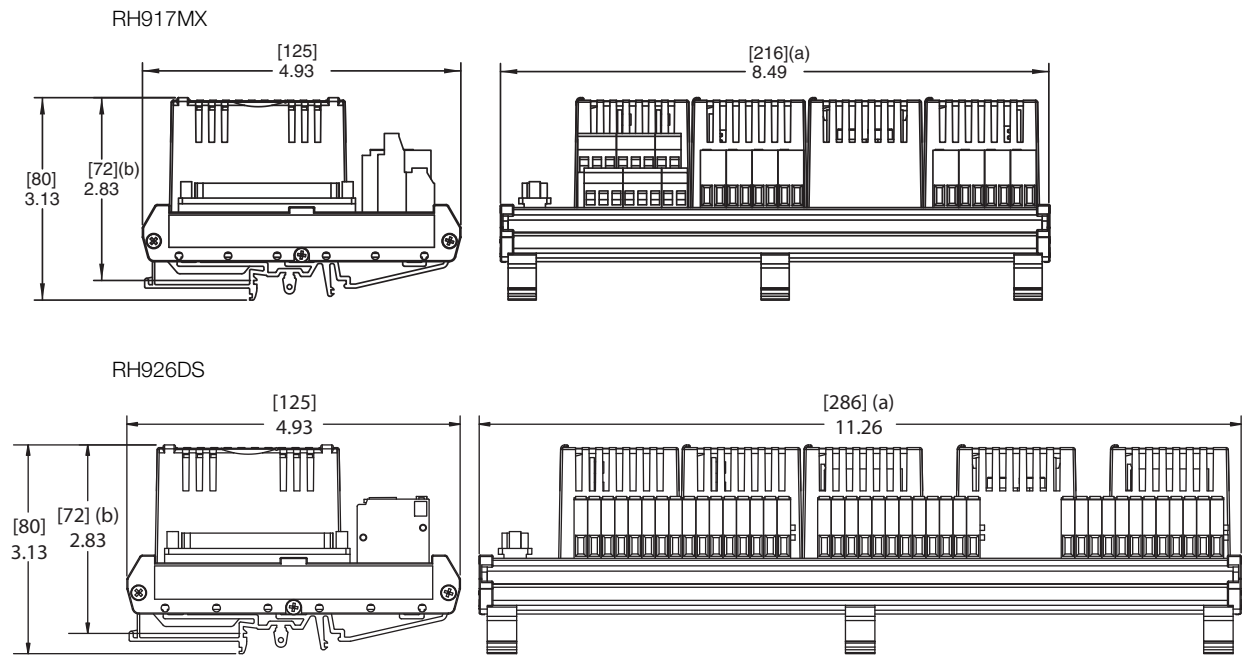
- (a) Overall width – for determining DIN rail loading.
(b) Height above DIN rail (add to DIN rail height for total).

NOTE: Dimensions for this polyamide termination assembly are smaller.

DIMENSIONS – NOMINAL (CONTINUED)

[mm]
in

Knife Switch Termination Assemblies (Continued)



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

GENERAL PURPOSE PLUG-IN RELAY TERMINATION ASSEMBLY SPECIFICATIONS

Description

SPDT, plug-in, field replaceable

Rated Load⁽³⁾

dc RESISTIVE

5 A at 30 V dc

dc INDUCTIVE (L/R = 7 MS)

5 A at 30 V dc

ac RESISTIVE

5 A at 240 V ac

ac INDUCTIVE (P.F. = 0.4)

5 A at 240 V ac

Carry Current⁽³⁾

5 A

Maximum Operating Voltage⁽³⁾

240 V ac, 30 V dc⁽⁴⁾

Maximum Operating Current⁽³⁾

5 A

Maximum Switching Capacity⁽³⁾

1200 VA, 150 W

Minimum Permissible Load

100 mA, 5 V dc

Contact Material

AgCdO

Contact Resistance

30 m Ω maximum

Life Expectancy

MECHANICAL

20 X 10⁶ operations minimum

ELECTRICAL

100 X10³ (at rated load)

Response Time

OPERATE

15 ms maximum

RELEASE

ac

10 ms maximum

dc

5 ms maximum

(3) The manufacturer's rated load is derated; the Termination Assembly maximum rated load is 5 A at 240 V ac/5 A at 30 V dc per channel, or 12 A maximum per group of eight outputs.

(4) The relay load must be derated at higher dc voltages.

RELATED PRODUCT DOCUMENTS

Table 3. Other Related Documents

PSS Number	Description
PSS 31H-2COV	Compact 200 Series I/O Subsystem Overview
B0400FA	Standard and Compact 200 Series Subsystem User's Guide
PSS 31H-2C200	Compact 200 Series 16-Slot Horizontal Baseplate
PSS 31H-2SOV	Standard 200 Series Subsystem Overview
PSS 31H-2CERTS	Standard and Compact 200 Series I/O - Agency Certifications
PSS 31H-2C480 B4	Compact Power Supply - FPS480-24
PSS 31S-3FCPICS	Field Control Processor 280 (FCP280) Integrated Control Software
PSS 21S-3CP270ICS	Control Processor 270 (CP270) Integrated Control Software