Foxboro™ DCS

Compact FBM241/c/d, Redundant, Discrete I/O Modules

PSS 41H-2C241

Product Specification

May 2025

https://www.se.com

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Overview

The Compact FBM241, FBM241c, and FBM241d each have eight discrete inputs and eight discrete outputs available as a single or redundant module. A redundant pair of the modules combine to provide redundancy at the FBM level with field I/O wired to one common termination assembly.

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 VDC, 120 VAC/125 VDC, or 240 VAC.

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 VDC, 125 VDC, 120 VAC, or 240 VAC Switch (external or internal power source)	15 to 60 VDC at 2 A, or 30 VDC at 5 A, or 125 VDC at 0.5 A, or 120 VAC at 5 A, or 240 VAC at 5 A Switch (external power source)
Compact FBM241c	15 to 60 VDC Contact (unprotected -no fuse, or protected - fused)	15 to 60 VDC at 2 A, or 240 VAC at 5 A Switch (external power source)
FBM241d	15 to 60 VDC Contact	12 VDC at 12 mA Switch (internal power source)

Each type of Fieldbus Module (FBM), without signal conditioning, uses a 15 to 60 VDC 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 Fall-Back, and Sustained or Momentary Outputs. If the Momentary Output configuration is selected, then Pulse Output Interval is also configurable.

Features

- 8 discrete inputs
- 8 discrete outputs
- Single or Redundant Module
- Supports discrete inputs/output signals at voltages of:
  - 15 to 60 VDC
  - 120 VAC/125 VDC
  - 240 VAC
- 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

Redundant Outputs

A redundant contact output function block, COUTR, is used for each redundant pair of outputs. The COUTR block handles output writes and initialization logic for the redundant channels. On each write of the COUTR block, identical output writes are sent to both modules, fully exercising the Fieldbus and the logic circuitry of each module. You can select a sustained output that follows the block input or a pulsed output with a selectable pulse width.

When a failure is detected in the modules, its output is marked as BAD and the corresponding channel in the good module automatically continues to drive the discrete outputs. Each output channel drives an externally powered load. Power for each Compact FBM241 module is diode OR'd together in the redundant adapter to help assure redundant power. The microprocessor of each module executes the digital output application program, plus diagnostic routines that validate the health of the FBM.

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 help secure the module to the baseplate.

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

Redundant modules must be located in adjacent positions on the baseplate, with the first module located in an odd-numbered position (for example, the positions labelled 3 and 4). To achieve redundancy, a redundant adapter module is placed on the two adjacent baseplate termination cable connectors to provide termination for a single cable. A single termination cable connects from the redundant adapter to the associated termination assembly (TA).

When redundant, either module can be replaced without upsetting field input signals to the good module. Each module can be removed or replaced without removing field termination cabling, power, or communications 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. If one path is unsuccessful or is switched at the system level, the module continues communication over the active path.

Modular Baseplate Mounting

The modules mount on a DIN rail mounted modular baseplate, which accommodates up to 16 compact FBMs. The baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for redundant 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 Compact FBM241/c/d are described in Termination Assemblies And Cables, page 14.

The redundant adapter connects the redundant FBM's baseplate connectors together. The redundant adapter provides a single termination connection to a single TA.

Functional Specifications

Input/Output Channels	8 input and 8 output isolated channels
Filter or Debounce Time[a]	Configurable (No Filtering, 4, 8, 16, or 32 ms)
Voltage Monitor Function (Compact FBM241)	Input • On-State Voltage: 15 to 60 VDC • Off-State Voltage: 0 to 5 VDC • Current: ◦ (Single Module) 1.4 mA typical at 5 to 60 VDC source ◦ (Redundant Module) 2.8 mA typical at 5 to 60 VDC source Resistance Limits • On-State: 1 k Ω (maximum) at 15 VDC • Off-State: 100 k Ω (minimum) at 60 VDC
Contact Sensor Function (Compact FBM241c and FBM241d)	• Range (each channel): Contact open (off) or closed (on) • Open-Circuit Voltage: 24 VDC ±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 VDC (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 VDC ±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 VAC 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. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** Although the module can withstand a maximum of 600 VAC applied for one minute between any channel, DO NOT apply voltages beyond the published input ranges. The channels are NOT intended for permanent connection to hazardous voltage circuits. Understand that connection of these channels to voltages greater than 30 VAC or 60 VDC violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**
Communication	Communicates with its associated FCM or FCP via the redundant 2 Mbps HDLC module Fieldbus
Power Requirements	• Input Voltage Range (Redundant): 24 VDC +5%, -10% • Consumption (Maximum): 5 W for a single module • Heat Dissipation (Maximum): 6 W for a single module
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	See General Purpose Plug-In Relay Termination Assembly Specifications, page 26)”
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
Regulatory Compliance, 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™ DCS 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).

RoHS Compliance	Complies with European RoHS Directive 2011/65/EU, including amending Directives 2015/863 and 2017/2102.
IECEx Certification	IECEx Certified
(a) Digital filtering available for 200 Series FBM or competitive migration modules with version 1.25H or later firmware.	

Environmental Specifications

	Operating	Storage
Temperature	• Compact FBM241/c: -20 to +60°C (-4 to +140°F) • Termination Assembly - PA: -20 to +70°C (-4 to +158°F)	-40 to +70°C (-40 to +158°F)
Relative Humidity	5 to 95% (noncondensing)	5 to 95% (noncondensing)
Altitude	-300 to +3,000 m (-1,000 to +10,000 ft)	-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 g (5 to 500 Hz)	

NOTE: The environmental ranges can be extended by the type of enclosure containing the module. See the Product Specification Sheet (PSS) applicable to the enclosure that is to be used.

Physical Specifications

	Compact FBM241/241C/241D	Termination Assembly
Mounting	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. Redundant modules must be in odd and even adjacent positions on the baseplate (positions 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9, and 10 (the second 1 and 2), 11 and 12 (the second 3 and 4), 13 and 14 (the second 5 and 6), or 15 and 16 (the second 7 and 8)). See *Compact 200 Series 16-Slot Horizontal Baseplate* (PSS 41H-2C200) for details.	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	185 g (6.5 oz) approximate	Compression: • 127 mm (5.02 in) – 272 g (0.60 lb, approximate) • 181 mm (7.13 in) – 300 g (0.70 lb, approximate) 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)
Dimensions	• 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)	• Compression Screw: See Figure 1 and Figure 2 • Knife Switch: See Figure 3
Part Numbers	• Compact FBM241: RH101DH • Compact FBM241c: RH101DJ • Compact FBM241d: RH101GL • Redundant Adapter: RH927BM	See Functional Specifications - Termination Assemblies, page 16
Termination Cables	• Cable Lengths: Up to 30 m (98 ft)	

	• Cable Materials: Polyurethane or Low Smoke Zero Halogen • Termination Cable Type: Type 4 or type 4H - See Table 2, page 22

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	
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 Ring-Lug — Accepted Wiring Sizes: • #6 size connectors (0.375 in (9.5 mm)) • 0.5 to 4 mm^2/22 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 VAC (see General Purpose Plug-In Relay Termination Assembly Specifications, page 26)	

Termination Assemblies and Cables

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. See Functional Specifications - Termination Assemblies, page 16 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 VDC and active high voltage levels of 125 VDC, 120 VAC, or 240 VAC. Active termination assemblies support input signal conditioning for FBMs. To condition signals, these termination assemblies can 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 VDC) 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 VDC 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 VDC, 120 VAC, or 240 VAC. 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 VDC and active high voltage levels of 120 VAC or 240 VAC. 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 VDC) 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 VDC auxiliary power supply (internally (FBM) sourced) or by a field voltage source (externally sourced).

High Voltage Discrete Outputs

The high voltage output (120 VAC or 240 VAC) 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 VDC 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 VDC Compact FBM241 channel isolation	8 channel, switch (externally sourced) <60 VDC 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 VDC Compact FBM241 channel isolation	8 channel, switch (externally sourced) 15 to 60 VDC 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 VDC Compact FBM241 channel isolation	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum Up to 250 VAC 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
Compact FBM241	8 channel, contact sense 125 VAC or 125 VDC with external excitation Logic Zero 0 to 20 VAC; 0 to 20 VDC Logic One 80 to 132 VAC; 75 to 150 VDC *Input Current for Logic One; 2 mA (typical)* Group isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum Up to 250 VAC 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 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 125 VAC or 125 VDC Logic Zero 0 to 20 VAC; 0 to 20 VDC Logic One 80 to 132 VAC; 75 to 150 VDC Input Current for Logic One; 2 mA (typical) Channel isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum Up to 250 VAC 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 VAC or 125 VDC Logic Zero 0 to 20 VAC; 0 to 20 VDC Logic One 80 to 132 VAC; 75 to 150 VDC Input Current for Logic One; 2 mA (typical) Channel isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum Up to 250 VAC 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
Compact FBM241	8 channel, voltage monitor 125 VAC or 125 VDC with external excitation Logic Zero 0 to 20 VAC; 0 to 20 VDC Logic One 80 to 132 VAC; 75 to 150 VDC Input Current for Logic One; 2 mA (typical) Group isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum Up to 250 VAC 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 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 VAC or 125 VDC with external excitation Logic Zero 0 to 20 VAC; 0 to 20 VDC Logic One 80 to 132 VAC; 75 to 150 VDC Input Current for Logic One; 2 mA (typical) Channel isolation provided by termination assembly	8 channel, switch (externally sourced) Solid State Switch 125 VAC/125 VDC at 2 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel isolation provided by termination assembly	RH917MX	C/ Knife	4	5
Compact FBM241	8 channel, voltage monitor 120 VAC or 125 VDC with external excitation Logic Zero 0 to 20 VAC; 0 to 20 VDC Logic One 80 to 132 VAC; 75 to 150 VDC Input Current for Logic One; 2 mA (typical) Channel isolation provided by termination assembly	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum Up to 250 VAC 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 VAC with external excitation Logic Zero 0 to 40 VAC Logic One 160 to 280 VAC 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 VDC at 5 A maximum Up to 250 VAC at 5 A maximum Total current for all 8 channels simultaneously is 12 A maximum Channel isolation provided by termination assembly relay P0165CL	RH916QX	C	4	5

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 VAC with external excitation Logic Zero 0 to 40 VAC Logic One 160 to 280 VAC 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 VDC at 5 A maximum Up to 250 VAC 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 VAC Logic Zero 0 to 40 VAC Logic One 160 to 280 VAC 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 VDC at 5 A maximum Up to 250 VAC 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 VAC Logic Zero 0 to 40 VAC Logic One 160 to 280 VAC 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 VDC at 5 A maximum Up to 250 VAC 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

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 VDC contact wetting from Compact FBM241c Channel isolation	8 channel, switch (externally sourced) 15 to 60 VDC at 2 A maximum, protected - fused Compact FBM241c channel isolation	RH916JW	C	4	1, 2
Compact FBM241c	8 channel, contact sense 24 VDC contact wetting from Compact FBM241c Channel isolation	8 channel, switch (externally sourced) <60 VDC at 2 A maximum, unprotected - no fuse Compact FBM241c channel isolation	RH916UD	C	4, 4H	1, 2
Compact FBM241c	8 channel, contact sense 24 VDC contact wetting from Compact FBM241c Channel isolation	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum Up to 250 VAC 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
Compact FBM241c	8 channel, contact sense 24 VDC contact wetting from Compact FBM241c Channel isolation	8 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum Up to 250 VAC 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

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 FBM241d	8 channel, contact sense 24 VDC contact wetting from FBM241d channel isolation	8 channel, switch (internally sourced) 12 VDC 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 VAC 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, page 22 for cable part numbers and specifications.

[e] See Table 1, page 21 for Termination Assembly certification definitions.

NOTE: For 120 VAC / 240 VAC 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 *Standard and Compact 200 Series Subsystem User's Guide* (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 VDC, 30 VAC, 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 assembles 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

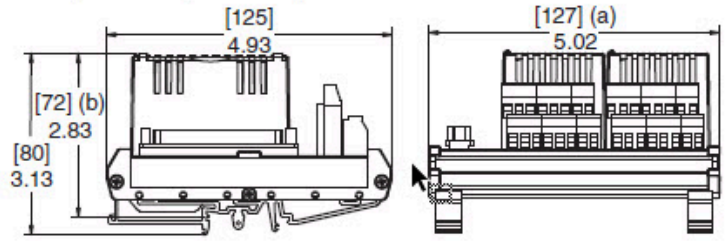
[c] Low smoke zero halogen or low smoke free of halogen (LSZH) is a material classification used for cable jacketing. LSZH is composed of thermoplastic or thermoset compounds that emit limited smoke and no halogen when exposed to high sources of heat. Temperature range: -40 to +105°C (-40 to +221°F).

Dimensions - Nominal

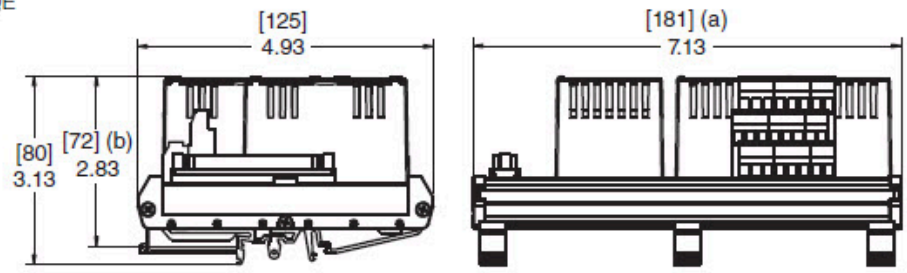
[mm]
in

Compression Termination Assemblies

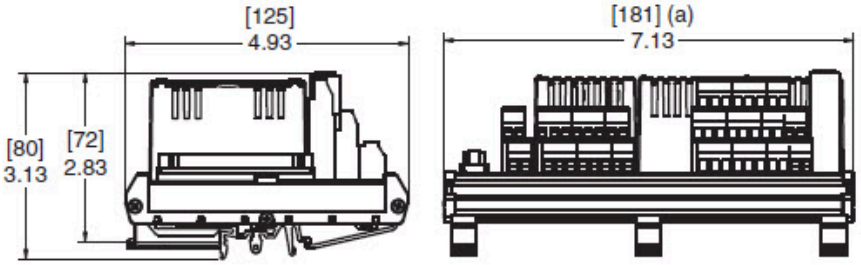
RH916UY, RH916AQ, RH916JW, RH916YW, RH916UD



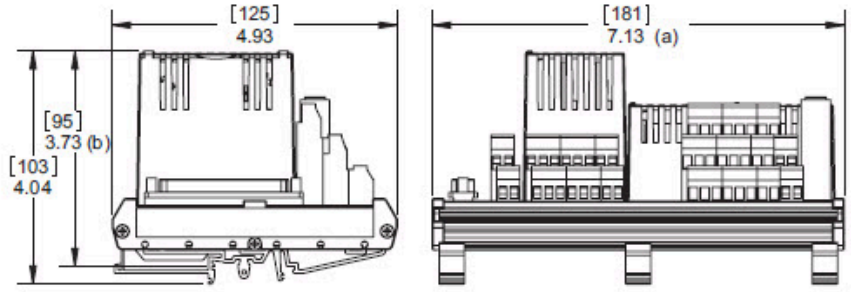
RH916QE



RH916QZ



RH916QV



(a) Overall width – for determining DIN rail loading.

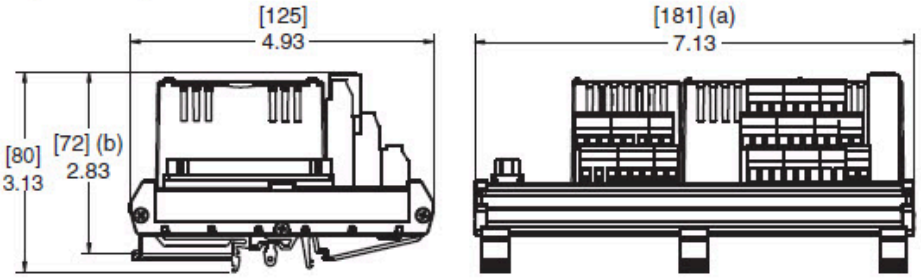
(b) Height above DIN rail (add to DIN rail height for total)

NOTE: Dimensions for this polyamide termination assembly are smaller

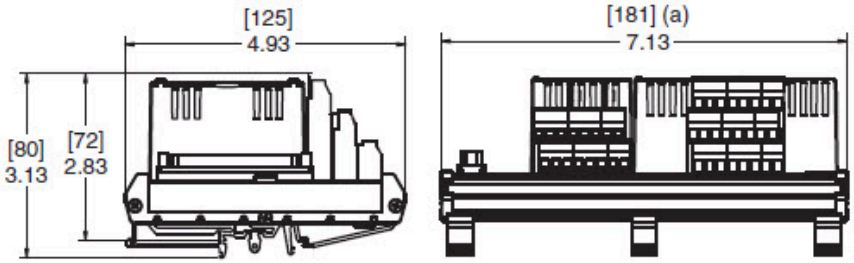
[mm]
in

Compression Termination Assemblies (Continued)

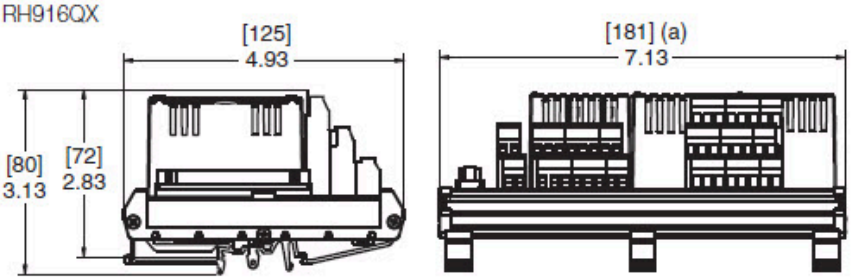
RH916QG, RH916QL, RH916QQ



RH916AW, P0916YH, RH916QJ



RH916QT, RH916QX



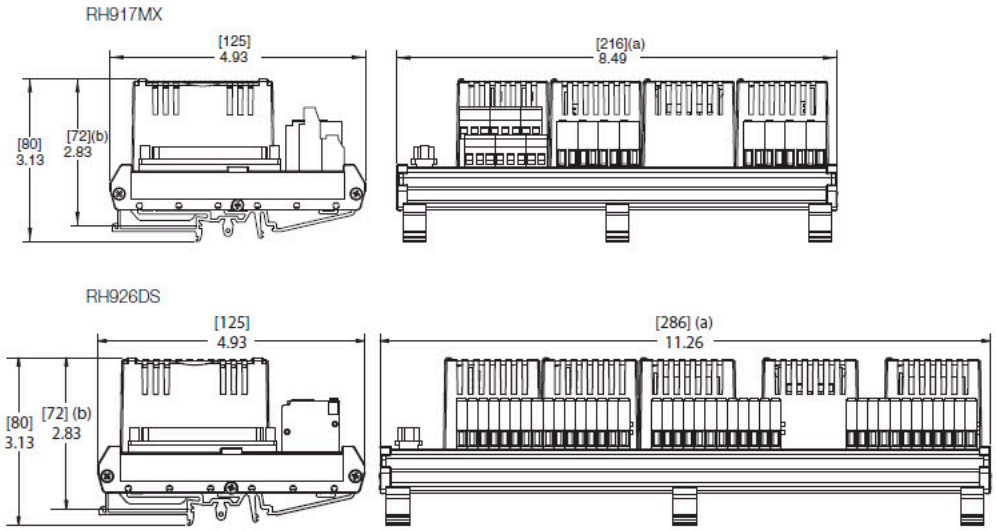
(a) Overall width – for determining DIN rail loading.

(b) Height above DIN rail (add to DIN rail height for total)

NOTE: Dimensions for this polyamide termination assembly are smaller

[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[a]	• dc Resistive: 5 A at 30 VDC • dc Inductive (L/R = 7 MS): 5 A at 30 VDC • ac Resistive: 5 A at 240 VAC • ac Inductive (P.F. = 0.4): 5 A at 240 VAC
Carry Current[a]	5 A
Maximum Operating Voltage[a]	240 VAC, 30 VDC[b]
Maximum Operating Current[a]	5 A
Maximum Switching Capacity[a]	1200 VA, 150 W
Minimum Permissible Load	100 mA, 5 VDC
Contact Material	AgCdO
Contact Resistance	30 m Ω maximum
Life Expectancy	• Mechanical: 20 X 10^6 operations minimum • Electrical: 100 X10^3 (at rated load)
Response Time	• Operate: 15 ms maximum • Release: ◦ AC: 10 ms maximum ◦ DC: 5 ms maximum
(a) The manufacturer's rated load is derated; the Termination Assembly maximum rated load is 5 A at 240 VAC/5 A at 30 VDC per channel, or 12 A maximum per group of eight outputs. (b) The relay load must be derated at higher dc voltages.	

Related Documents

Document Number	Description
B0400FA	*Standard and Compact 200 Series Subsystem User's Guide*
PSS 41H-2COV	*Compact 200 Series I/O Subsystem Overview*
PSS 41H-2C200	*Compact 200 Series 16-Slot Horizontal Baseplate*
PSS 41H-2SOV	*Standard 200 Series Subsystem Overview*
PSS 41H-2CERTS	*Standard and Compact 200 Series I/O - Agency Certifications*
PSS 41H-2C480	*Compact Power Supply - FPS480-24*
PSS 41S-3FCPICS	*Field Control Processor 280 (FCP280) Integrated Control Software*

Proposition 65

WARNING: This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

PSS 41H-2C241, Rev C