Foxboro Evo™ Process Automation System

Product Specifications

Foxboro® by Schneider Electric

PSS 31H-2S241

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

The FBM241 contains eight discrete inputs and eight discrete outputs that are compatible with voltages and currents commonly found in industrial plants.

OVERVIEW

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

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

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

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

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

The module performs signal conversion required to interface electrical input signals from field sensors to the optionally redundant Fieldbus. It executes the Discrete I/O or Ladder Logic program, with the following configurable options: Input Filter Time, Fail Safe Configuration, Fail-Safe 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 FBM241/b/c/d modules are:

- Eight discrete inputs
- Eight discrete outputs
- Supports discrete inputs/output signals at voltages of:
  - 15 to 60 V dc
  - 120 V ac/125 V dc
  - 240 V ac
- Each input and output is galvanically isolated: group isolated when used with external excitation
- 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.

STANDARD DESIGN

The module has a rugged extruded aluminum exterior for physical protection of the circuits. Enclosures specially designed for mounting the FBMs provide various levels of environmental protection, up to harsh environments, per ISA Standard S71.04.

VISUAL INDICATORS

Light-emitting diodes (LEDs) incorporated into the front of the module provide visual indication of the Fieldbus Module operational status, as well as the discrete states of the individual input and output points.

EASY REMOVAL/REPLACEMENT

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

FIELDBUS COMMUNICATION

A Fieldbus Communications Module or a Control Processor interfaces to the redundant 2 Mbps module Fieldbus used by the FBMs. The FBM241 accepts communication from either path (A or B) of the redundant 2 Mbps Fieldbus - should one path fail or be switched at the system level, the module continues communication over the active path.

MODULAR BASEPLATE MOUNTING

The module mounts on a DIN rail mounted baseplate, which accommodates up to four or eight Fieldbus Modules. The Modular Baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for redundant Module Fieldbus, redundant independent dc power, and termination cables.

SECURITY

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

TERMINATION ASSEMBLIES

Field I/O signals connect to the FBM subsystem via DIN rail mounted TAs. The TAs used with the FBM241/b/c/d are described in “5 A at up to 120 V ac (see “GENERAL PURPOSE PLUG-IN RELAY TERMINATION ASSEMBLY SPECIFICATIONS” on page 23)” on page 8.

FUNCTIONAL SPECIFICATIONS

Input/Output Channels
8 input and 8 output isolated channels

Filter/Debounce Time(1)
Configurable (No Filtering, 4, 8, 16, or 32 ms)

Voltage Monitor Function (FBM241 and FBM241b)

INPUT

On-State Voltage
15 to 60 V dc
Off-State Voltage
0 to 5 V dc
Current
1.4 mA (typical) at 5 to 60 V dc

SOURCE RESISTANCE LIMITS

On-State
1 k Ω (maximum) at 15 V dc
Off-State
100 k Ω (minimum) at 60 V dc

Contact Sensor Function (FBM241c and FBM241d)

RANGE (EACH CHANNEL)
Contact open (off) or closed (on)

OPEN-CIRCUIT VOLTAGE
24 V dc ±15%

SHORT-CIRCUIT CURRENT
2.5 mA (maximum)

ON-STATE RESISTANCE
1.0 k Ω (maximum)

OFF-STATE RESISTANCE
100 k Ω (minimum)

Output Switch with External Source (FBM241 and FBM241c)

APPLIED VOLTAGE
60 V dc (maximum)

LOAD CURRENT
2.0 A (maximum)

OFF-STATE LEAKAGE CURRENT
0.1 mA (maximum)

Output Switch with Internal Source (FBM241b and FBM241d)

OUTPUT VOLTAGE (NO LOAD)
12 V dc ±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
5 W (maximum) at 24 V dc

HEAT DISSIPATION
6 W (maximum) at 24 V dc

Loop Power Supply Protection

Current limited to 2.5 mA for inputs.
Resistor limited (680 Ω) for outputs with internal power.

Field Terminations Functional Specifications

Refer to “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).

FUNCTIONAL SPECIFICATIONS (CONTINUED)

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

Underwriters Laboratories (UL) for U.S. and Canada
UL/UL-C listed as suitable for use in 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).

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

FBM240/b/c/d
-20 to + 70°C (-4 to +158°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 +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)

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

PHYSICAL SPECIFICATIONS

Mounting

MODULE

FBM241/241b/241c/241d mounts on a Modular Baseplate. The baseplate can be mounted on a DIN rail (horizontally or vertically), or horizontally on a 19-inch rack using a mounting kit. Refer to PSS 31H-2SBASPLT 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

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

FBM241
RH914TG (supersedes P0914TG)
FBM241b
RH914WK (supersedes P0914WK)
FBM241c
RH914WM (supersedes P0914WM)
FBM241d
RH914WP (supersedes P0914WP)

TERMINATION ASSEMBLIES

Refer to “FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES” on page 10.

Dimensions - Module

HEIGHT

102 mm (4 in),114 mm (4.5 in) including mounting lugs

WIDTH

45 mm (1.75 in)

DEPTH

104 mm (4.11 in)

Dimensions - Termination Assembly

COMPRESSION SCREW

Refer to page 20.

RING LUG AND 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

37-pin male 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 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 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 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 “FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES” on page 10 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 my 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

FBM Type	Input Signal	Output Signal[a]	TA Part Number[b] PA	Term. Type [c]	TA Cable Type [d]	TA Cert. Type[e]
FBM241	8 channel, voltage monitor 15 to 60 V dc FBM241 channel isolation	8 channel, switch (externally sourced) <60 V dc at 2 A maximum, unprotected -no fuse FBM241 channel isolation	RH916UY (supersedes P0916UY)	C	4, 4H	1,2
FBM241	8 channel, voltage monitor 15 to 60 V dc FBM241 channel isolation	8 channel, switch (externally sourced) 15 to 60 V dc at 2 A maximum (protected - fused) FBM241 channel isolation	RH916AQ (supersedes P0916AQ) RH916AR (supersedes P0916AR)	C	4, 4H	1,2
FBM241	8 channel, voltage monitor 15 to 60 V dc 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 (supersedes P0916QE)	C	4	3

FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal[a]	TA Part Number[b] PA	Term. Type [c]	TA Cable Type [d]	TA Cert. Type[e]
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 (supersedes P0916QV[f])	C	4	5
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 (supersedes P0916YH P0916AS[f])	C	4	5

FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal[a]	TA Part Number[b] PA	Term. Type [c]	TA Cable Type [d]	TA Cert. Type[e]
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 (supersedes P0916QG)	C	4	5
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 (supersedes P0916QT)	C	4	5

FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal[a]	TA Part Number[b] PA	Term. Type [c]	TA Cable Type [d]	TA Cert. Type[e]
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 (supersedes P0917MX)	C/ Knife	4	5
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 (supersedes P0926DS)	Knife	4	5

FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal[a]	TA Part Number[b] PA	Term. Type [c]	TA Cable Type [d]	TA Cert. Type[e]
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 (supersedes P0916QX)	C	4	5
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 supersedes (P0916QZ)	C	4	5

FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal[a]	TA Part Number[b] PA	Term. Type [c]	TA Cable Type [d]	TA Cert. Type[e]
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 (supersedes P0916QJ)	C	4	5
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 (supersedes P0916QL)	C	4	5
FBM241b	8 channel, voltage monitor 15 to 60 V dc FBM241b channel isolation	8 channel, switch (internally [FBM] sourced) 12 V dc at 15 mA maximum FBM241b channel isolation	RH916JV (supersedes P0916JV)	C	4	1, 2

FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal[a]	TA Part Number[b] PA	Term. Type [c]	TA Cable Type [d]	TA Cert. Type[e]
FBM241c	8 channel, contact sense 24 V dc contact wetting from FBM241c FBM241c channel isolation	8 channel, switch (externally sourced) 15 to 60 V dc at 2 A maximum, protected - fused FBM241c channel isolation	RH916JW (supersedes P0916JW)	C	4	1, 2
FBM241c	8 channel, contact sense 24 V dc contact wetting from FBM241c FBM241c channel isolation	8 channel, switch (externally sourced) <60 V dc at 2 A maximum, unprotected - no fuse FBM241c channel isolation	RH916UD (supersedes P0916UD)	C	4, 4H	1, 2
FBM241c	8 channel, contact sense 24 V dc contact wetting from FBM241c 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 (supersedes P0916AW)	C	4	3

FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES (CONTINUED)

FBM Type	Input Signal	Output Signal[a]	TA Part Number[b] PA	Term. Type [c]	TA Cable Type [d]	TA Cert. Type[e]
FBM241c	8 channel, contact sense 24 V dc contact wetting from FBM241c 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 (supersedes P0916QQ)	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 (supersedes (P0916YW P0916JX)	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. Knife has compression terminals.

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

(e) See Table 1Termination Assembly certification definitions.

Note: For 120Vac / 240Vac 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).

(f) The 120 V ac/125 V dc termination assemblies (P0916AS and RH916QV (supersedes P0916QV)) incorporate an improved circuit design. The improved design will operate reliably at distances up to 305 m (1000 ft) when wired with individually twisted or parallel pair wiring. To avoid false tripping of ac type inputs, care should be taken in routing long wiring or bundled runs to minimize coupling from adjacent signals and/or noise from heavy equipment. When possible, dc excitation of input circuits is recommended for runs greater than 305 m (1000 ft).

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 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 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 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 P/PVC[a]	Type 4H P/PVC[a][b]	Type 4 LSZH[c]	Type 4H LSZH[c]
0.5 (1.6)	RH916FG (supersedes P0916FG)	--	RH928BA (supersedes P0928BA)	--
1.0 (3.2)	RH916FH (supersedes P0916FH)	--	RH928BB (supersedes P0928BB)	--
2.0 (6.6)	RH931RQ (supersedes P0931RQ)	--	RH928BC (supersedes P0928BC)	--
3.0 (9.8)	RH916FJ (supersedes P0916FJ)	--	RH928BD (supersedes P0928BD)	--
5.0 (16.4)	RH916FK (supersedes P0916FK)	--	RH928BE (supersedes P0928BE)	--
10.0 (32.8)	RH916FL (supersedes P0916FL)	RH916GE (supersedes P0916GE)	RH928BF (supersedes P0928BF)	RH928BW (supersedes P0928BW)
15.0 (49.2)	RH916FM (supersedes P0916FM)	RH916GF (supersedes P0916GF)	RH928BG (supersedes P0928BG)	RH928BX (supersedes P0928BX)
20.0 (65.6)	RH916FN (supersedes P0916FN)	RH916GG (supersedes P0916GG)	RH928BH (supersedes P0928BH)	RH928BY (supersedes P0928BY)
25.0 (82.0)	RH916FP (supersedes P0916FP)	RH916GH (supersedes P0916GH)	RH928BJ (supersedes P0928BJ)	RH928BZ (supersedes P0928BZ)
30.0 (98.4)	RH916FQ (supersedes P0916FQ)	RH916GJ (supersedes P0916GJ)	RH928BK (supersedes P0928BK)	RH928CA (supersedes P0928CA)

(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.

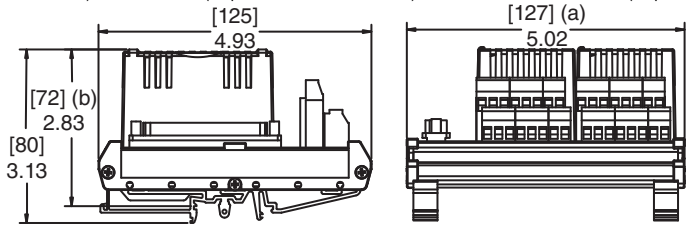
(c) Low smoke zero halogen or low smoke free of halogen (LSZH) is a material classification used for cable jacketing. LSZH is composed of thermoplastic or thermoset compounds that emit limited smoke and no halogen when exposed to high sources of heat. Temperature range: -40 to +105°C (-40 to +221°F).

DIMENSIONS – NOMINAL

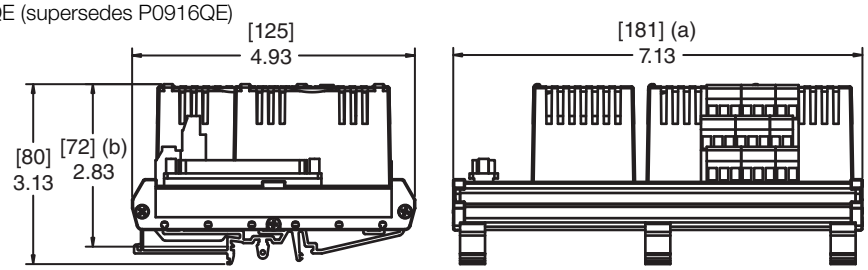
[mm]
in

Compression Termination Assemblies

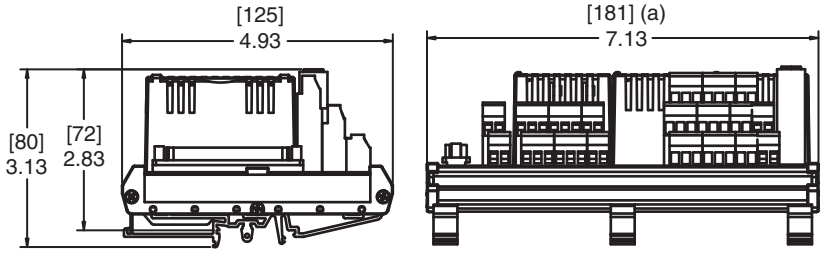
RH916UY (supersedes P0916UY), RH916AQ (supersedes P0916AQ), RH916JV (supersedes P0916JV), RH916JW (supersedes P0916JW), RH916UD (supersedes P0916UD), P0916JX, RH916YW (supersedes P0916YW)[1]



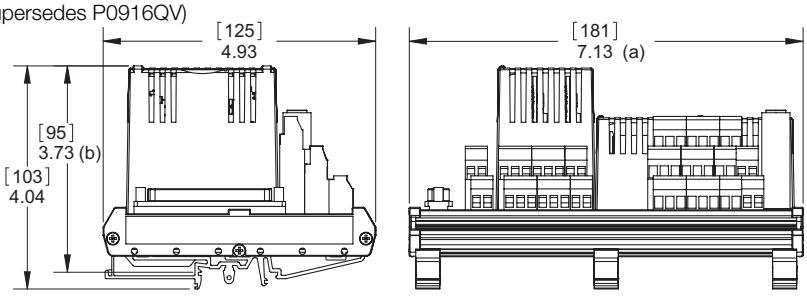
RH916QE (supersedes P0916QE)



RH916QZ (supersedes P0916QZ)



RH916QV (supersedes P0916QV)



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

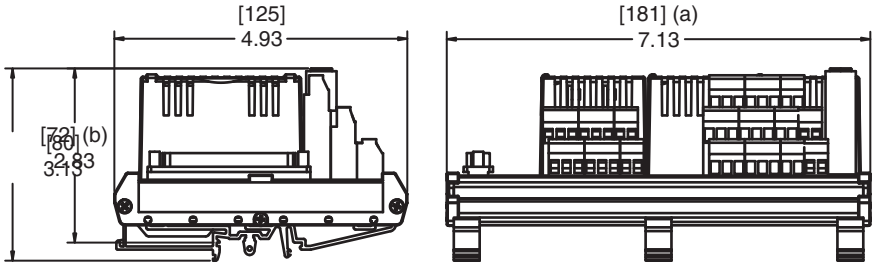
NOTE: Dimensions shown are for the PVC versions. All dimensions for this polyamide termination assembly are smaller.

DIMENSIONS – NOMINAL (CONTINUED)

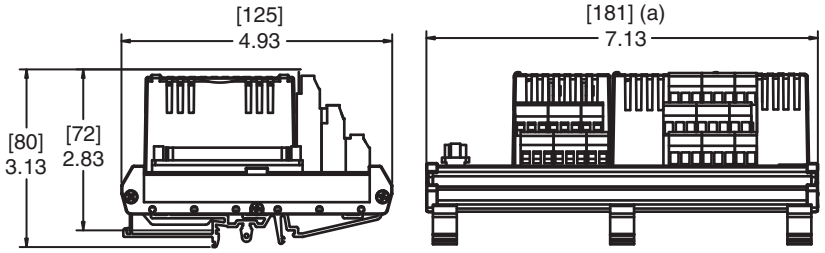
[mm]
in

Compression Termination Assemblies (Continued)

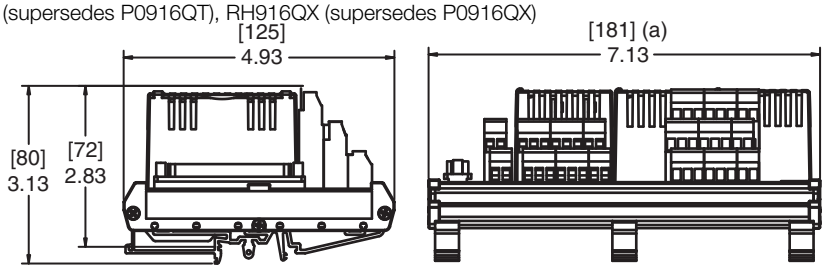
RH916QG (supersedes P0916QG), RH916QL (supersedes P0916QL), RH916QQ (supersedes P0916QQ)



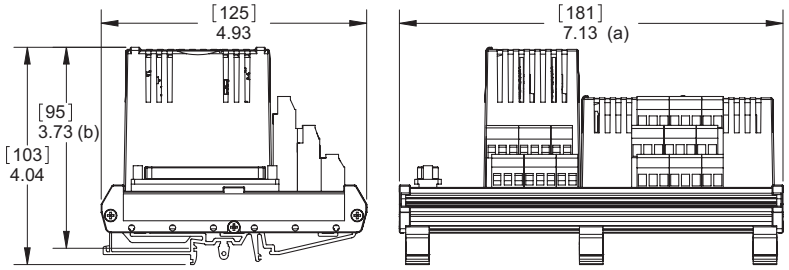
RH916AW (supersedes P0916AW), RH916YH (supersedes P0916YH[1]), RH916QJ (supersedes P0916QJ)



RH916QT (supersedes P0916QT), RH916QX (supersedes P0916QX)



P0916AS



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

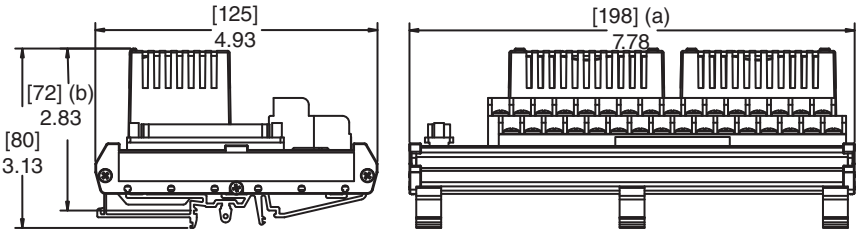
NOTE: Dimensions shown are for the PVC versions. All dimensions for this polyamide termination assembly are smaller.

DIMENSIONS – NOMINAL (CONTINUED)

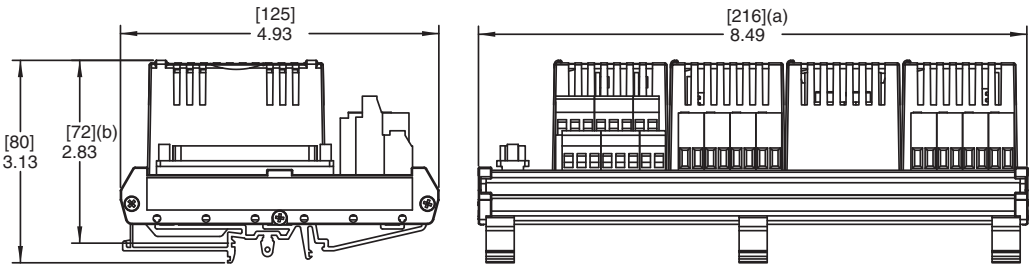
[mm]
in

RIng Lug and Knife Switch Termination Assemblies

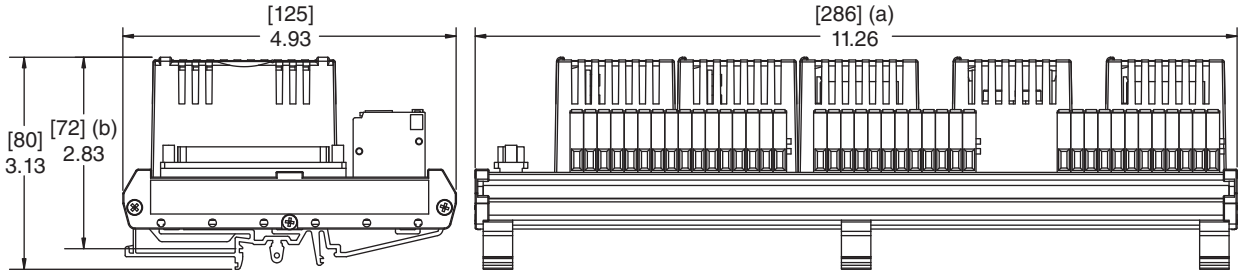
RH916AR (supersedes P0916AR)



RH0917MX (supersedes P0917MX)



RH926DS (supersedes P0926DS)



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

NOTE: Dimensions shown are for the PVC versions. All dimensions for this polyamide termination assemblies are smaller.

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 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

(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 SPECIFICATION SHEETS (PSS)

PSS Number	Description
PSS 31H-2SOV	Standard 200 Series Subsystem Overview
PSS 31H-2CERTS	Standard and Compact 200 Series I/O - Agency Certifications
PSS 21S-3CP270IC	Control Processor 270 (CP270) Integrated Control Software
PSS 31S-3FCPICS	Field Control Processor 280 (CP280) Integrated Control Software

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