Foxboro™ DCS

FBM203/b/c/d Platinum/Nickel/Copper RTD Input Modules

PSS 41H-2S203

Product Specification

May 2025

https://www.se.com

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Overview

The FBM203/b/c/d Platinum/Nickel/Copper RTD Input Modules contain eight resistance temperature detector (RTD) input channels.

Each input channel of the FBM203/b/c modules accepts a 2 or 3-wire RTD sensor input, within a 0 to 320 ohms (FBM203), 0 to 640 ohms (FBM203b), or 0 to 30 ohms (FBM203c) resistance range. Each input channel of the FBM203d accepts a 4-wire RTD sensor input, within a 0 to 320 ohms resistance range. Each analog input is galvanically isolated from other channels and ground.

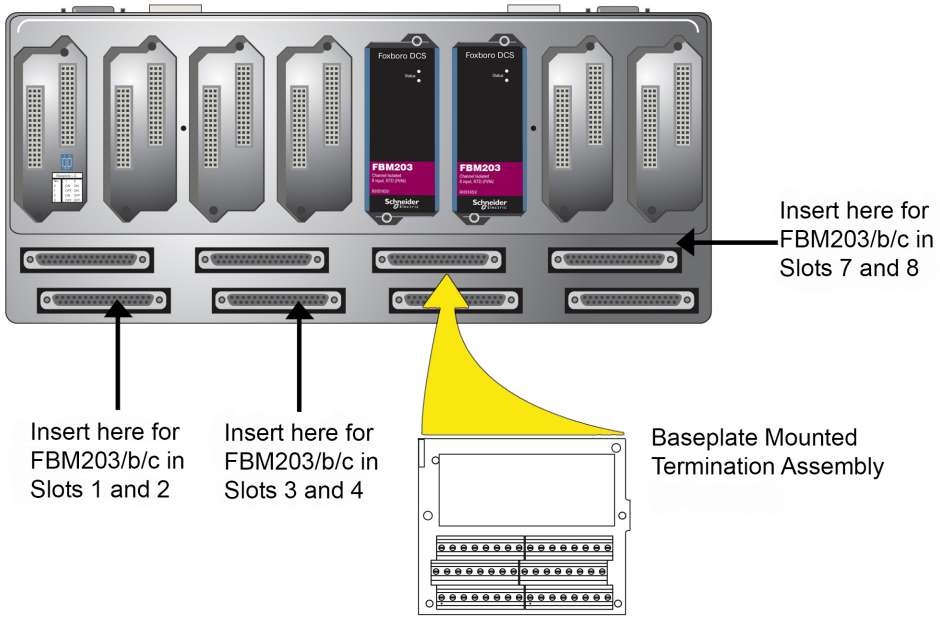
The modules perform the signal conversion required to interface the electrical input signals from the field sensors to the optionally redundant fieldbus.

The FBM203/b/c/d modules execute an analog input application program, which provides conversion time (on a per module basis) and configurable options for Rate of Change Limits.

Two types of passive termination assemblies (TAs) are available for the FBM203/b/c modules:

- DIN rail mounted TAs, similar to those used with the other 200 Series Fieldbus Modules (FBMs)
- Baseplate-mounted TA, which mounts directly onto the field I/O connectors of the 200 Series baseplate. These TAs provide field I/O wiring support for two FBM203/b/c in paired slots (that is, in positions 1 and 2, 3 and 4, 5 and 6, or 7 and 8), as shown in Figure 1.

Figure 1 - Baseplate-Mounted Termination Assembly



TAs are available for:

- FBM203, which support the functionality of the 100 Series FBM03A when used with a 3-wire RTD input
- FBM203c, which support the functionality of the 100 Series FBM33A when used with a 3-wire RTD input
- FBM203d, which support the functionality of the 100 Series FBM03B or FBM33B when used with a 2-wire or 4-wire RTD input

Features

- Eight resistance temperature detector (RTD) input channels
- Each analog input is galvanically isolated
- Rugged design suitable for enclosure in Class G3 (harsh) environments
- Execution of an analog input application program that provides conversion time and configurable options for Rate of Change Limits
- High accuracy achieved by sigma-delta data conversions for each channel
- Termination Assemblies (TAs) for locally or remotely connecting field wiring to the FBM203/b/c/d

High Accuracy

For high accuracy, each channel incorporates a Sigma-Delta converter which can provide new analog input values for each channel every 25 ms, and a configurable integration period to remove any process noise and power line frequencies. Each time period, the FBM converts each analog input to a digital value, averages these values over the time period, and provides the averaged value to the controller.

Standard Design

FBM203/b/c/d have 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

Red and green light-emitting diodes (LEDs) incorporated into the front of the modules provide visual status indications of FBM functions.

Easy Removal/Replacement

The module mounts on a DIN rail mounted modular baseplate, which accommodates up to four or eight FBMs. The modular baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for redundant fieldbus, redundant independent DC power, and termination cables.

Modular Baseplate Mounting

The modules mount on a DIN rail mounted Modular Baseplate, which accommodates up to four or eight 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.

Fieldbus Communication

A Fieldbus Communications Module or a Control Processor interfaces to the redundant 2 Mbps module Fieldbus used by the FBMs. The FBM203/b/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.

Termination Assemblies

Field I/O signals connect to the FBM subsystem using one of these options:

- DIN rail mounted termination assemblies (TAs)
- Baseplate-mounted TA (FBM203/b/c only)

DIN rail mounted TAs for the FBM203/b/c/d are available in these forms:

- Compression screw type using Polyamide (PA) material
- Ring lug type using Polyamide (PA) material

Baseplate-mounted TAs for the FBM203/b/c are available with compression screw type terminals using Polycarbonate/Acrylonitrile Butadiene Styrene (PC/ABS) material.

A removable termination cable connects a DIN rail mounted TA to the FBM via a field connector on the baseplate in which the FBM is installed.

Termination cables are available in these materials:

- Polyurethane
- Low Smoke Zero Halogen (LSZH)

Termination cables are available in a variety of lengths, up to 30 m (98 ft), allowing the termination assembly to be mounted in either the enclosure or in an adjacent enclosure. See Figure 2.

Figure 2 - FBM203/b/c/d and DIN Rail Mounted Termination Assembly Installation

Legend	
A	Termination Cable
B	FBM203 (RH914SV shown)
C	FBM Baseplate
D	Termination Assembly

Functional Specifications

Input Channels	Eight resistance temperature detector (RTD) input channels. Each channel is isolated and independent.
Input Range (Each Channel)	• FBM203/203D: 0 to 320 ohms. 320 ohms equals 64000 counts. Minimum overrange value is 327.675 ohms at a count of 65535. • FBM203B: 0 to 640 ohms. 640 ohms equals 64000 counts. Minimum overrange value is 655.35 ohms at a count of 65535. • FBM203C: 0 to 30 ohms. 30 ohms equals 64000 counts. Minimum overrange value is 30.72 ohms at a count of 65535.
Sensor Current	• FBM203/203D: 0.19 mA DC nominal • FBM203B: 0.19 mA DC nominal • FBM203C: 0.54 mA DC nominal
Lead Resistance	• FBM203/FBM203B: 50 ohms maximum each lead. Any imbalance in extension leads will decrease accuracy. • FBM203C: 10 ohms maximum each lead. Any imbalance in extension leads will decrease accuracy. • FBM203D: 50 ohms maximum. Any imbalance in extension leads will not affect accuracy.

Input Channels (8)	• Analog Accuracy (Includes Linearity): ◦ FBM203/d: ±0.03% of span ◦ FBM203b: ±0.03% of span ◦ FBM203c: ±0.1% of span • Accuracy Temperature Coefficient: ±50 ppm/ºC • Input Signal A/D Conversion: Each channel performs its own A/D signal conversion, using an independent sigma-delta conversion technique. • Integration Period: Software configurable • Common Mode Rejection: >125 dB at 50 or 60 Hz • Normal Mode Rejection: >95 dB at 50 or 60 Hz
Typical Resistance Temperature Sensors	Platinum (DIN), Platinum (SAMA), Platinum (IEC), or Nickel (SAMA) • FBM203/203D: ◦ Platinum: 100 ohms nominal at 0°C ◦ Nickel: 235 ohms nominal at 0°C • FBM203B: ◦ Platinum: 200 ohms nominal at 0°C ◦ Nickel: 470 ohms nominal at 0°C • FBM203C: ◦ Copper: 10 ohms nominal at 25°C
Input Signal	Supports 2, 3 or 4-wire variable-resistance temperature sensors. For 2-wire inputs, there is no correction for lead resistance or lead resistance temperature changes.
Process I/O Communications	Communicates with its associated FCM or FCP via the redundant 2 Mbps module fieldbus.

Input Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The Termination Assembly (TA)/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. **⚠⚠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.** • Input Voltage Range (Redundant): 24 VDC +5%, -10% • Consumption: 3 W (maximum) • Heat Dissipation: 3 W (maximum)
Calibration Requirements	Calibration of the module 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/ULC listed Class I, Groups A-D; Division 2; temperature code T4 enclosure based systems when connected to specified Foxboro DCS processor modules. 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). For more information, see *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 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

Environmental Specifications

	Operating	Storage
Temperature	• Module: -20 to +70°C (-4 to +158°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)
Vibration	0.75g from 5 to 500 Hz	
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.	

NOTE: The environmental limits of this module may be enhanced by the type of enclosure containing the module. See the applicable Product Specification Sheet (PSS) that describes the specific type of enclosure that is to be used.

Physical Specifications

Mounting	• Modules: FBM203/b/c/d modules mount on a Modular Baseplate. The Modular Baseplate can be mounted horizontally or vertically on a DIN rail, or mounted horizontally in a 19-inch rack using a mounting kit. Alternatively, FBM203/c/d mount on a 100 Series conversion mounting structure. See *Standard 200 Series Baseplates* (PSS 41H-2SBASPLT) or *100 Series Conversion Mounting Structures* (PSS 31H-2W8) for details. • Termination Assemblies (TAs): The DIN rail mounted TA mounts on a DIN rail and accommodates multiple DIN rail styles including 32 mm (1.26 in) and 35 mm 1.38 in) The baseplate-mounted TA mounts on the two field I/O connectors associated with its two FBM203/b/cs on a 200 Series baseplate.
Weight	• Module: 284 g (10 oz) approximate • Termination Assemblies: ◦ Compression Type (DIN rail mounted): 181 g (0.40 lb) approximate ◦ Compression Type (Baseplate mounted): 245 g (0.57 lb) approximate ◦ Ring Lug Type: 249 g (0.55 lb) approximate
Dimensions - Compact FBM203	• 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 Assemblies	See Termination Assemblies, page 5.

Part Numbers	• Module: ◦ FBM203: RH914SV ◦ FBM203b: RH922UA ◦ FBM203c: RH922UD ◦ FBM203d: RH927AM • Termination Assemblies: ◦ Compression Screw TAs: Polyamide (DIN rail mounted): RH916XJ Polycarbonate/Acrylonitrile Butadiene Styrene (Baseplate Mounted): RH924WN ◦ FBM203d Compression Screw TA: Polyamide: RH924EX ◦ Ring Lug TA: Polyamide: P0917JM
Termination Cables	• Cable Lengths: Up to 30 m (98 ft) • Cable Materials: Polyurethane or Low Smoke Zero Halogen (LSZH) • Termination Cable Type: ◦ FBM203/b/c: Type 1 — See Termination Assemblies, page 5. ◦ FBM203d: Type 2 — See Termination Assemblies, page 5. • Cable Connection: ◦ FBM Baseplate End: 37-pin D-subminiature ◦ Termination Assembly End: – Compact FBM203/b/c: 25-pin D-subminiature – Compact FBM203d: 37-pin D-subminiature

Construction - Termination Assembly	Material: • DIN Rail Mounted TAs: Polyamide (PA), compression and ring lug • Baseplate-Mounted TAs: Polycarbonate/Acrylonitrile Butadiene Styrene (PC/ABS), compression
Field Termination Connections	• DIN Rail TA Compression—Type 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 • Baseplate Mounted TA Compression—Type Accepted Wiring Sizes: ◦ Solid/Stranded/AWG: 0.2 to 1.5 mm^2/0.2 to 1.5 mm^2/24 to 16 AWG ◦ Stranded with Ferrules: 0.25 to 0.75 mm^2 with plastic collar 0.2 to 1.5 mm^2 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

Functional Specifications - Termination Assemblies

FBM Type	Input Signal	TA Part Number[a]		Termination Type[b]	TA Cable Type[c]	TA Cert. Type[d]
		PA	PC/ABS[e]			
FBM203	8 channels, 0 to 320 ohms, passive feedthrough with FBM203 channel isolation	RH916XJ		C	1	1, 2
		P0917JM		RL		
	Two sets of 8 channels, 0 to 320 ohms, passive feedthrough with FBM203 channel isolation		RH924WN	C (Baseplate-mounted)	N/A	1, 2
FBM203b	8 channels, 0 to 640 ohms, passive feedthrough with FBM203b channel isolation	RH916XJ		C	1	1, 2
		P0917JM		RL		
	Two sets of 8 channels, 0 to 640 ohms, passive feedthrough with FBM203b channel isolation		RH924WN	C (Baseplate-mounted)	N/A	1, 2
FBM203c	8 channels, 0 to 30 ohms, passive feedthrough with FBM203c channel isolation	RH916XJ		C	1	1, 2
		P0917JM		RL		
	Two sets of 8 channels, 0 to 30 ohms, passive feedthrough with FBM203c channel isolation		RH924WN	C (Baseplate-mounted)	N/A	1, 2

FBM203d	8 channels, 0 to 320 ohms, passive feedthrough with FBM203d channel isolation	RH924EX		C	4	1, 2

(a) PA is polyamide rated from -20 to +70°C (-4 to +158°F).

(b) C = Termination Assembly (TA) with compression terminals; RL = TA with ring lug terminals.

(c) See Table 2 and Table 3 for cable part numbers and specifications.

(d) See Table 1 for Termination Assembly certification definitions.

(e) PC/ABS is Polycarbonate/Acrylonitrile Butadiene Styrene (PC/ABS) rated from-20 to +70°C (-4 to +158°F).

Table 1 - Certification for Termination Assemblies

Type	Certification[(a)]
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 [nL] 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 VDC, 30 VAC, 100 VA or less) if customer-supplied equipment meets Class 2 limits.

(a) All TAs are UL/UL-C listed to comply with applicable ordinary location safety standards for fire and shock hazards. Hazardous location types comply with ATEX directive for II 3 G use. They also comply with the requirements of the European Low Voltage Directive. All listings/certifications require installation and use within the constraints specified in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA) and the conditions stated in UL and DEMKO reports.

Table 2 - Termination Cable Types and Part Numbers

Cable Length m (ft)	Type 1 P/PVC[a]	Type 1 LSZH[b]
0.5 (1.6)	RH916DA	RH928AA
1.0 (3.2)	RH916DB	RH928AB
2.0 (6.6)	RH931RM	RH928AC
3.0 (9.8)	RH916DC	RH928AD
5.0 (16.4)	RH916DD	RH928AE
10.0 (32.8)	RH916DE	RH928AF
15.0 (49.2)	RH916DF	RH928AG
20.0 (65.6)	RH916DG	RH928AH
25.0 (82.0)	RH916DH	RH928AJ
30.0 (98.4)	RH916DJ	RH928AK

(a) P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation. Temperature range: -20 to +80°C (-4 to +176°F).

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

Table 3 - Termination Cable Types and Part Numbers

Cable Length m (ft)	Type 4 P/PVC[a]	Type 4 LSZH[b]
0.5 (1.6)	RH916FG	RH928BA
1.0 (3.2)	RH916FH	RH928BB
2.0 (6.6)	RH931RQ	RH928BC
3.0 (9.8)	RH916FJ	RH928BD
5.0 (16.4)	RH916FK	RH928BE
10.0 (32.8)	RH916FL	RH928BF
15.0 (49.2)	RH916FM	RH928BG
20.0 (65.6)	RH916FN	RH928BH
25.0 (82.0)	RH916FP	RH928BJ
30.0 (98.4)	RH916FQ	RH928BK

(a) P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation. PVC is rated from -20 to +50°C (-4 to 122°F).

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

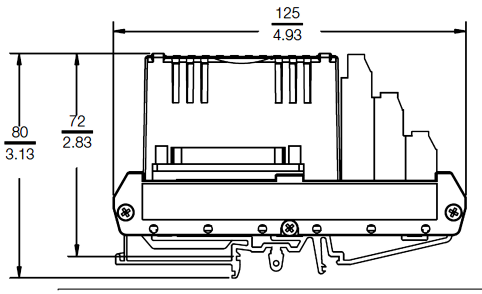
Use of Termination Assemblies in 100 Series Upgrade Subsystem

When an FBM203/c/d is used to replace a 100 Series FBM, it may use any of the appropriate termination assemblies listed above for the FBM's field I/O wiring. Alternatively, the FBM203/c/d can accept this field wiring through a Termination Assembly Adapter (TAA) instead of a termination assembly. This is discussed in the *Termination Assembly Adapter Modules for 100 Series Upgrade* Product Specification (PSS 31H-2W4).

Dimensions - Nominal

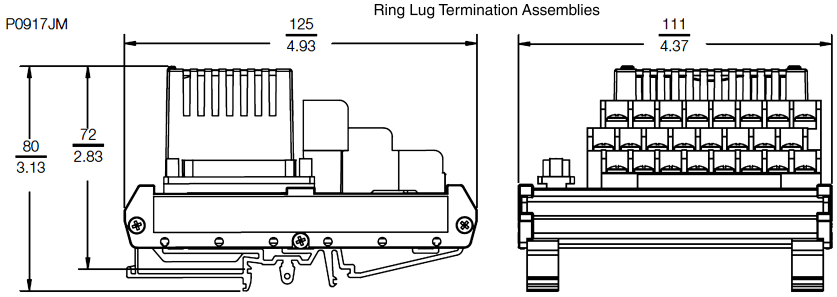
RH916XJ

Compression Termination Assemblies



Ring Lug Termination Assemblies

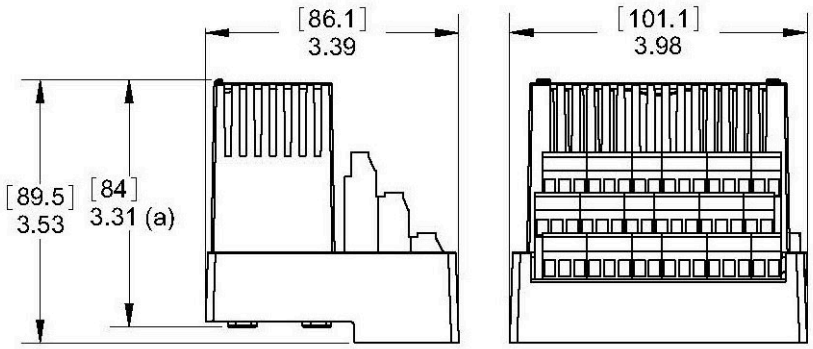
P0917JM



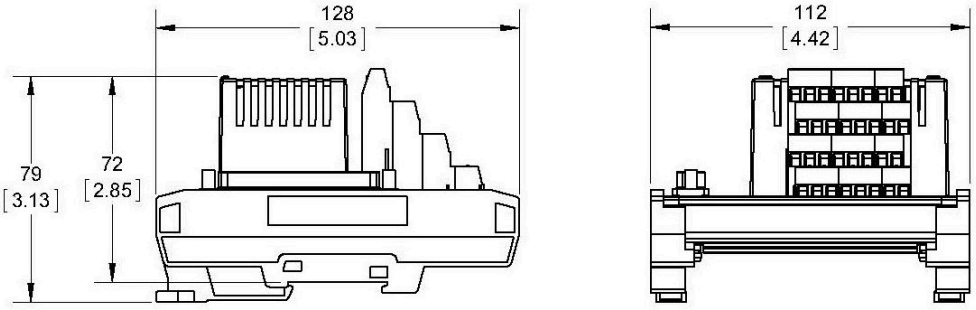
[mm]
in

Baseplate Mounted Termination Assemblies

RH924WN



RH924EX Termination Assembly



Related Documents

Document Number	Description
PSS 41H-2SOV	*Standard 200 Series Subsystem Overview*
PSS 41H-2W100	*100 Series FBM Upgrade Subsystem Overview*
B0400FA	*Standard and Compact 200 Series Subsystem User's Guide*
PSS 41H-2CERTS	*Standard and Compact 200 Series I/O - Agency Certifications*
PSS 41H-2W4	*Termination Assembly Adapter Modules for 100 Series Upgrade*
PSS 41H-2SBASPLT	*Standard 200 Series Baseplates*
PSS 41H-2W8	*100 Series Conversion Mounting Structures*
PSS 41S-3FCPICS	*Field Control Processor 280 (CP280) 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-2S203, Rev B