EcoStruxure™

Foxboro™ DCS

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

PSS 41H-2C203

Product Specification

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Legal Information

Overview

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

Each input channel of the Compact FBM203/c modules accepts a 2- or 3-wire RTD sensor input, within a 0 to 320 ohm (FBM203), or 0 to 30 ohm (FBM203c) resistance range. Each input channel of the Compact FBM203d accepts a 4-wire RTD sensor input, within a 0 to 320 ohm resistance range. Each analog input is galvanically isolated from other channels and ground. It is part of the Compact 200 Series I/O subsystem described in *Compact 200 Series I/O Subsystem Overview* (PSS 41H-2COV).

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

The Compact FBM203/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.

TAs are available for FBM203c, which support the functionality of the 100 Series FBM33A when used with a 3-wire RTD input.

TAs are available for FBM203d, which support the functionality of the 100 Series FBM03B or FBM33B when used with a 2-wire or 4-wire RTD input.

Features

- 8 resistance temperature detector (RTD) input channels
- Each analog input is galvanically isolated
- Compact, 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 Compact FBM203/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 Fieldbus Module (FBM) converts each analog input to a digital value, averages these values over the time period, and provides the averaged value to the controller.

Compact Design

The Compact FBM203/c/d'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 can 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 modules mount on a Compact 200 Series baseplate. Two screws on the FBM fix each module to the baseplate.

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

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.

Fieldbus Communication

A Fieldbus Communications Module or a Control Processor interfaces to the redundant 2 Mbps module Fieldbus used by the FBMs. The Compact FBM203/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 via DIN rail mounted TAs, which are available in the following forms:

- Compression screw type using Polyamide (PA) material
- Ring lug type using Polyamide (PA) 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 the following materials:

- Polyurethane
- Low Smoke Zero Halogen (LSZH)

Termination 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.

Functional Specifications

Input Channels	8 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. Maximum overrange value is 327.675 ohms at a count of 65535. • FBM203C: 0 to 30 ohms. 30 ohms equals 64000 counts. Maximum overrange value is 30.72 ohms at a count of 65535.
Sensor Current	• FBM203/203D: 0.19 mA dc nominal • FBM203C: 0.54 mA dc nominal
Lead Resistance	• FBM203: 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): ◦ FBM203/203d: ±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: 235 ohms nominal at 0°C ◦ Nickel: 235 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 through the redundant 2 Mbps module fieldbus.
Input Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The TA/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. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.** • Input Voltage Range (Redundant): 24 V dc +5%, -10% • Consumption: 2.5 W • Heat Dissipation: 2.5 W
Calibration Requirements	Calibration of the module and termination assembly 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.
Marine Certification	ABS Type Approved and Bureau Veritas Marine certified for Environmental Category EC31.

Environmental Specifications

	Operating	Storage
Temperature	• Module: -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)
Vibration	7.5 m/s^2 (0.75 g) 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. Refer to the applicable Product Specification Sheet (PSS) that describes the specific type of enclosure that is to be used.

Physical Specifications

Mounting	• Compact FBM203/C/D: The Compact FBM203/c/d 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. See *Compact 200 Series 16-Slot Horizontal Baseplate* (PSS 41H-2C200) for details. • Termination Assemblies: The TAs mount on a DIN rail and accommodates multiple DIN rail styles including 32 mm (1.26 in) and 35 mm 1.38 in).
Weight	• Module: 185 g (6.5 oz) approximate • Termination Assemblies: ◦ Compression Type(Approximate): 181 g (0.40 lb) ◦ Ring Lug Type (Approximate): 249 g (0.55 lb)
Dimensions - Compact FBM203	• 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)
Dimensions - Termination Assemblies	Refer to *Dimensions - Nominal, page 14*.
Part Numbers	• Module: ◦ Compact FBM203: RH101DC ◦ Compact FBM203c: RH101GA ◦ Compact FBM203d: RH101GB • Termination Assemblies: ◦ Compression Screw TAs: Polyamide: RH916XJ ◦ FBM203d Compression Screw TA: Polyamide: RH924EX ◦ Ring Lug TA: Polyamide: P0917JM

Termination Cables	• Cable Lengths: Up to 30 m (98 ft) • Cable Materials: Low Smoke Zero Halogen (LSZH) • Termination Cable Type: ◦ FBM203/c: Type 1 — Refer to *Termination Cable Types and Part Numbers - Type 1, page 12*. ◦ FBM203d: Type 2 — Refer to *Termination Cable Types and Part Numbers - Type 4, page 13*. • Cable Connection: ◦ FBM Baseplate End: 37-pin D-subminiature ◦ Termination Assembly End: – Compact FBM203/c: 25-pin D-subminiature – Compact FBM203d: 37-pin D-subminiature
Construction - Termination Assembly	Material: • Compression: Polyamide (PA) ◦ Ring Lug: Polyamide (PA)
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

Functional Specifications - Termination Assemblies

FBM Type	Input Signal	TA Part Number[a]	Termination Type[b]	TA Cable Type[c]	TA Cert. Type[d]
		PA			
FBM203	8 channels, 0 to 320 ohm, passive feedthrough with FBM203 channel isolation	RH916XJ	C	1	1, 2
		P0917JM	RL		
FBM203c	8 channels, 0 to 30 ohm, passive feedthrough with FBM203c channel isolation	RH916XJ	C	1	1, 2
		P0917JM	RL		
FBM203d	8 channels, 0 to 320 ohm, 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 = 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.

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 CENELEC (DEMKO) certified Ex nA IIC T4 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 V dc, 30 V ac, 100 VA or less) if customer-supplied equipment meets Class 2.
[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 - Type 1

Cable Length m (ft)	Type 1 P/PVC[a]	Type 1 LSZH[b]
0.5 (1.6)	RH100BY	RH100BC
1.0 (3.2)	RH100BZ	RH100BD
1.5 (4.9)	RH100EP	RH100EL
2.0 (6.6)	RH100CA	RH100BE
3.0 (9.8)	RH100CB	RH100BF
5.0 (16.4)	RH100CC	RH100BG
10.0 (32.8)	RH100CD	RH100BH
15.0 (49.2)	RH100CE	RH100BJ
20.0 (65.6)	RH100CF	RH100BK
25.0 (82.0)	RH100CG	RH100BL
30.0 (98.4)	RH100CH	RH100BM
[a] P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation. Temperature range; -20 to +70°C (-4 to +158°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).		

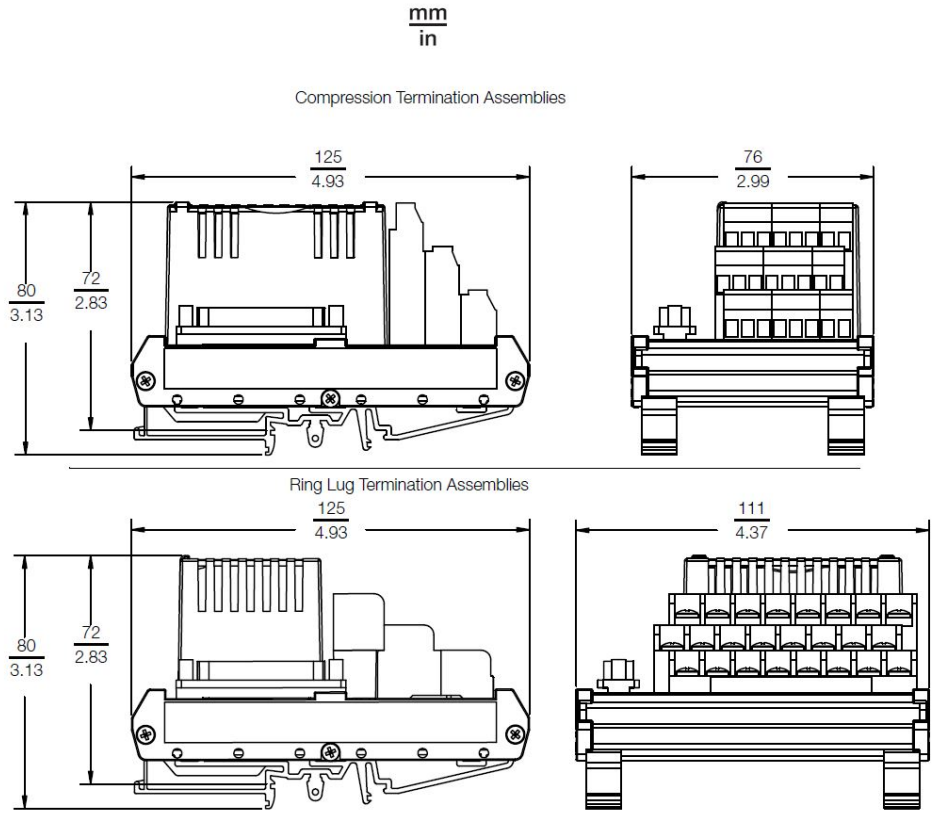
Table 3 - Termination Cable Types and Part Numbers - Type 4

Cable Length m (ft)	Type 4 P/PVC[a]	Type 4 LSZH[b]
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	RH100BT
15.0 (49.2)	RH100CQ	RH100BU
20.0 (65.6)	RH100CR	RH100BV
25.0 (82.0)	RH100CS	RH100BW
30.0 (98.4)	RH100CT	RH100BX

[a] P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation. PVC is rated from -20 to +70°C (-4 to 158°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).

Dimensions - Nominal



Related Product Documents

Document Number	Description
PSS 41H-2COV	*Compact 200 Series I/O Subsystem Overview*
PSS 41H-2C200	*Compact 200 Series 16-Slot Horizontal Baseplate*
B0400FA	*Standard and Compact 200 Series Subsystem User's Guide*
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*

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.

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