Foxboro Evo™ Process Automation System

Product Specifications

Foxboro®

by Schneider Electric

PSS 31H-2C203

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

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

OVERVIEW

Each input channel of the Compact FBM203/c modules accept 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 31H-2COV).

The modules perform the signal conversion required to interface the electrical input signals from the field sensors to the FCP or ZCP.

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.

FEATURES

Key features of Compact FBM203/c/d modules are:

- Eight 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 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 provide various levels of environmental protection, up to harsh environments, per ISA Standard S71.04.

EASY REMOVAL/REPLACEMENT

The modules mount on a Compact 200 Series baseplate. Two screws on the FBM secure each module to the baseplate.

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

VISUAL INDICATORS

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

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 — should one path fail or be 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 Channels (8) (Cont.)
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

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 earth (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.

FUNCTIONAL SPECIFICATIONS (CONTINUED)

CAUTION

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.

INPUT VOLTAGE RANGE (REDUNDANT)
24 V dc +5%, -10%

CONSUMPTION
2.5 W

HEAT DISSIPATION
2.5 W

Regulatory Compliance

ELECTROMAGNETIC COMPATIBILITY (EMC)
European EMC Directive 2004/108/EC (Prior to April 20, 2016) and 2014/30/EU (Beginning April 20, 2016)
Meets: EN61326-1:2013 Class A Emissions and Industrial Immunity Levels

RoHS COMPLIANCE
Complies with European RoHS Directive 2011/65/EU.

PRODUCT SAFETY

Underwriters Laboratories (UL) for U.S. and Canada
UL/UL-C listed as suitable for use in UL/UL-C listed Class I, Groups A-D; Division 2; temperature code T4 enclosure based systems when connected to specified Foxboro Evo processor modules as described in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). Communications circuits also meet the requirements for Class 2 as defined in Article 725 of the National Electrical Code (NFPA No.70) and Section 16 of the Canadian Electrical Code (CSA C22.1). Conditions for use are as specified in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

European Low Voltage Directive 2006/95/EC (Prior to April 20, 2016) and 2014/35/EU (Beginning April 20, 2016) and Explosive Atmospheres (ATEX) directive 94/9/EC (Prior to April 20, 2016) and 2014/34/EU (Beginning April 20, 2016)
DEMKO certified as Ex nA IIC T4 for use in certified Zone 2 enclosure when connected to specified I/A Series processor modules as described in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).

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

Calibration Requirements

Calibration of the module or termination assembly is not required.

ENVIRONMENTAL SPECIFICATIONS(1)

Operating

TEMPERATURE

Module
-20 to +60°C (-4 to +140°F)
Termination Assemblies - PA
-20 to +70°C (-4 to +158°F)

RELATIVE HUMIDITY

5 to 95% (noncondensing)

ALTITUDE

-300 to +3,000 m (-1,000 to +10,000 ft)

Storage

TEMPERATURE

-40 to +85°C (-40 to +185°F)

RELATIVE HUMIDITY

5 to 95% (noncondensing)

ALTITUDE

-300 to +12,000 m (-1,000 to +40,000 ft)

Contamination

Suitable for use in Class G3 (Harsh) environments as defined in ISA Standard S71.04, based on exposure testing according to EIA Standard 364-65, Class III.

Vibration

7.5 m/S^2 (0.75 g) from 5 to 500 Hz

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.
Refer to *Compact 200 Series 16-Slot Horizontal Baseplate* (PSS 31H-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
181 g (0.40 lb) approximate
Ring Lug Type
249 g (0.55 lb) approximate

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)

TERMINATION ASSEMBLIES

See page 10.

(1) 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) which describes the specific type of enclosure that is to be used.]

PHYSICAL SPECIFICATIONS (CONTINUED)

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 Table 2
FBM203d
Type 4 - Refer to Table 3

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

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 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 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

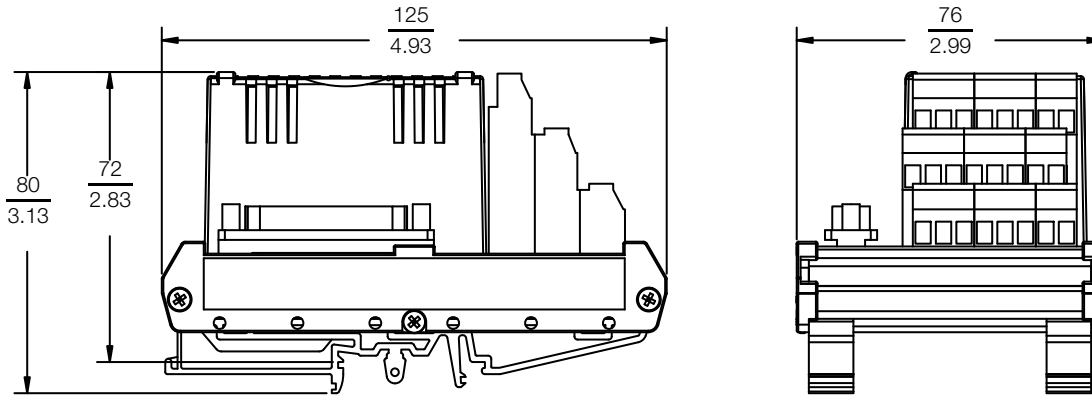
(a) P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation. PVC is rated from -20 to +70°C (-4 to 158°F).

(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)

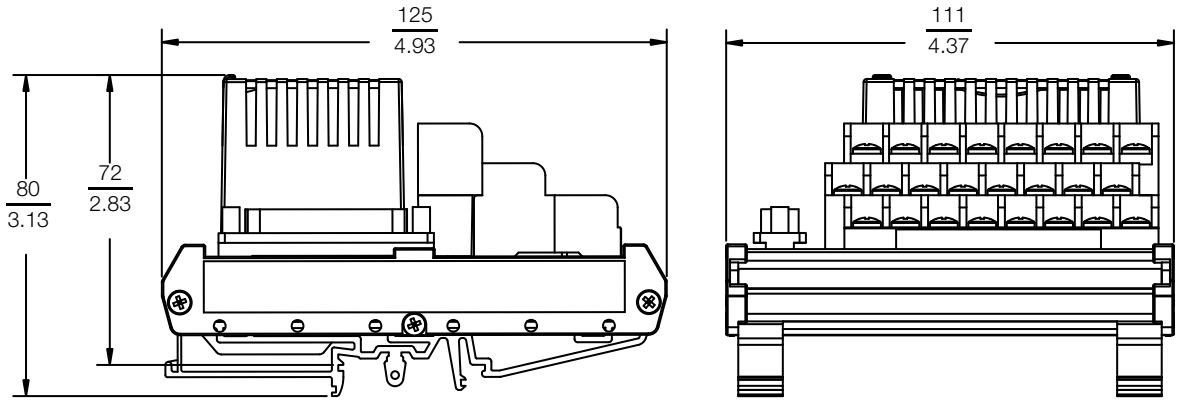
DIMENSIONS – NOMINAL

mm
in

Compression Termination Assemblies



Ring Lug Termination Assemblies



RELATED PRODUCT DOCUMENTS

Table 4. Other Related Documents

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

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