Foxboro Evo™ Process Automation System

Product Specifications

Foxboro® by Schneider Electric

PSS 31H-2C202

Compact FBM202, Thermocouple/mV Input Module

The Compact FBM202 Thermocouple/mV Input Interface contains eight thermocouple input channels, and one isolated RTD reference junction compensation channel.

OVERVIEW

The Compact FBM202 Thermocouple/mV Input Interface contains eight thermocouple input channels, and one isolated RTD reference junction compensation channel (for terminal temperature sensing). Each thermocouple/mV channel accepts standard thermocouples for various temperature ranges, and each provides thermocouple burnout detection (up-scale). The inputs are galvanically isolated from other channels and ground.

The Compact FBM202 is part of the Compact 200 Series I/O subsystem described in *Compact 200 Series I/O Subsystem Overview* (PSS 31H-2COV).

The module performs the signal conversion required to interface the electrical input signals from the field sensors to the FCP or ZCP. It executes an Analog Input application program, which provides integration time and Rate of Change Limits configurable options.

FEATURES

Key features of the Compact FBM202 are:

- Eight channels for input of thermocouple signals
- One isolated RTD reference junction compensation channel (for terminal temperature sensing)
- Each input channel 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 FBM202.

HIGH ACCURACY

For high accuracy, the module incorporates Sigma-Delta data conversion on a per-channel basis, which can provide new analog input readings 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 FBM202'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

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

EASY REMOVAL/REPLACEMENT

The module mounts on a Compact 200 Series baseplate. Two screws on the FBM secure the module to the baseplate.

The module can be removed/replaced without removing field device 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 FBM accepts communication from either path (A or B) of the 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. The TAs used with the Compact FBM202 are described in "FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES" on page 7.

FUNCTIONAL SPECIFICATIONS

Input Channels
Eight isolated and independent thermocouple/mV input channels. One isolated reference junction temperature compensation channel.

Input Range
–10.5 to +69.5 mV dc (–10.5 to +69.5 mV dc equals 0 to 64000 raw counts. Input of 71.419 mV equals 65535 raw counts (full range of module))

Reference Junction
Reference junction temperature compensation is provided by a 4-wire 100 ohm platinum RTD (IEC 751, Class B) at the termination assembly.

Accuracy
MILLIVOLT INPUT
±0.03% of span (±24 μV) at 25°C

RTD CHANNEL
±0.03% of span

RTD REFERENCE JUNCTION CONFORMITY
±0.25°C

THERMOCOUPLE CONFORMITY
±0.25°C

ACCURACY TEMPERATURE COEFFICIENT
±50 ppm/°C

RTD REFERENCE JUNCTION MEASUREMENT ACCURACY
±0.50°C (When using the RTD internal to the Foxboro supplied termination assemblies)

DIFFERENTIAL INPUT IMPEDANCE
10 MΩ

COMMON MODE VOLTAGE
Up to 30 V ac or 60 V dc

Integration Period
Software configurable

Input Open Circuit Voltage
250 mV dc through 10 M ohms (mV channels)

Input Signal A/D Conversion
Each channel performs A/D signal conversion using an independent Sigma-Delta converter.

Typical Thermocouple Types
B, E, J, K, N, R, S, T and other millivolt signals

Thermocouple Burnout Detection
Full upscale value

Input Channel 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.

CAUTION

This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock.

Communication
Communicates with its associated FCM or FCP via the redundant 2Mbps module Fieldbus.

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

CONSUMPTION
2 W

HEAT DISSIPATION
2 W

Calibration Requirements
Calibration of the module and termination assembly is not required.

FUNCTIONAL SPECIFICATIONS (CONTINUED)

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.

ENVIRONMENTAL SPECIFICATIONS(1)

Operating

TEMPERATURE

Module
-20 to +60°C (-4 to +140°F)
Termination Assembly
PA and PC/ABS
-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

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

PHYSICAL SPECIFICATION

Mounting

COMPACT FBM202

The Compact FBM202 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 ASSEMBLY

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)

Weight

COMPACT FBM202

185 g (6.5 oz) approximate

TERMINATION ASSEMBLIES

Compression (Approximate)
159 g (0.35 lb)
Ring Lug
204 g (0.45 lb)

Dimensions

COMPACT FBM202

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 ASSEMBLY

Refer to page 9.

Part Numbers

COMPACT FBM202 MODULE

RH101DB

TERMINATION ASSEMBLIES

See “FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES” on page 7.

(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 SPECIFICATION (CONTINUED)

Termination Cables

CABLE LENGTHS
Up to 30 m (98 ft)

CABLE MATERIALS
Polyurethane or Low Smoke Zero Halogen (LSZH)

TERMINATION CABLE TYPE
Type 2 - Refer to Table 2.

CABLE CONNECTION
FBM Baseplate End
37-pin D-subminiature
Termination Assembly End
25-pin D-subminiature

Construction - Termination Assembly

MATERIAL
Polyamide (PA), compression
PA ring lug

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 ASSEMBLIES AND CABLES

Field input signals connect to the FBM subsystem via DIN rail mounted Termination Assemblies, which are electrically passive. TAs for the Compact FBM202 modules are available in the following forms:

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

Each TA and its associated termination cable provides a feedthrough connection between eight 2-wire thermocouple/mV analog input signals and a Compact FBM202 module.

Reference junction temperature compensation is provided by an isolated resistance temperature detector (RTD) that is integral to the termination assembly.

See “FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES” on page 7 for a list of TAs used with the Compact FBM202 module.

A removable termination cable connects the 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. See Table 2 for a list of termination cables used with the TAs for the Compact FBM202 module.

FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES

FBM Type	Input Signal	TA Part Number [a]	Termination Type[b]	TA Cable Type [c]	TA Certification Type [d]
		PA			
Compact FBM202	Eight isolated and independent thermocouple/mV channels, passive feedthrough with Compact FBM202 channel isolation with one 4-wire 100 ohm platinum RTD (IEC 751, Class B)	RH916XH (supersedes P0916AC P0916XH)	C	2	1
		P0917JL (supersedes P0916AD)	RL		

(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 for cable part numbers and length.
(d) See Table 1 for Termination Assembly certification definitions.

Table 1. Certification 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 CENELEC (DEMKO) certified Ex nA IIC T4 for use in Zone 2 potentially explosive atmospheres.

Table 2. Cables Types and Part Numbers

Cable Length m (ft)	Type 2 P/PVC [a]	Type 2 LSZH[b]
0.5 (1.6)	RH100FC	RH100ER
1.0 (3.2)	RH100FD	RH100ES
1.5 (4.9)	RH100FE	RH100ET
2.0 (6.6)	RH100FF	RH100EU
3.0 (9.8)	RH100FG	RH100EV
5.0 (16.4)	RH100FH	RH100EW
10.0 (32.8)	RH100FJ	RH100EX
15.0 (49.2)	RH100FK	RH100EY
20.0 (65.6)	RH100FL	RH100EZ
25.0 (82.0)	RH100FM	RH100FA
30.0 (98.4)	RH100FN	RH100FB

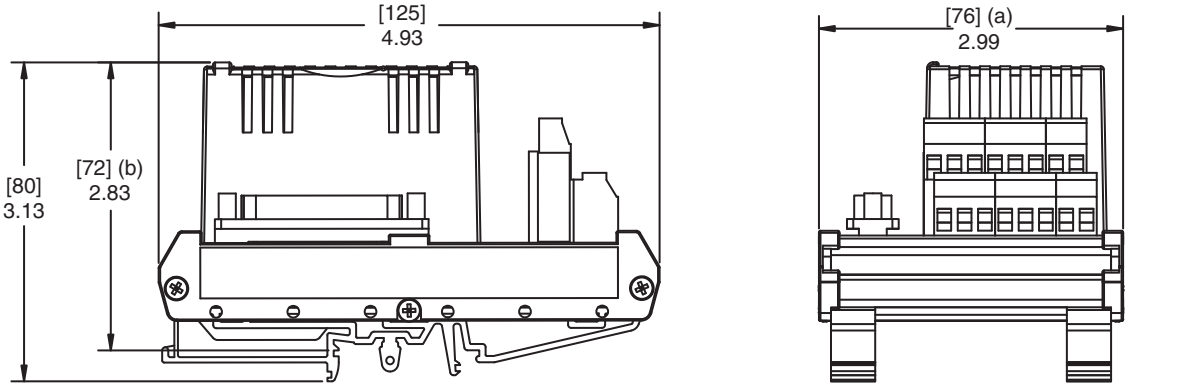
(a) P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation. Temperature range; -20 to +80°C (-4 to +176°F)

(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)

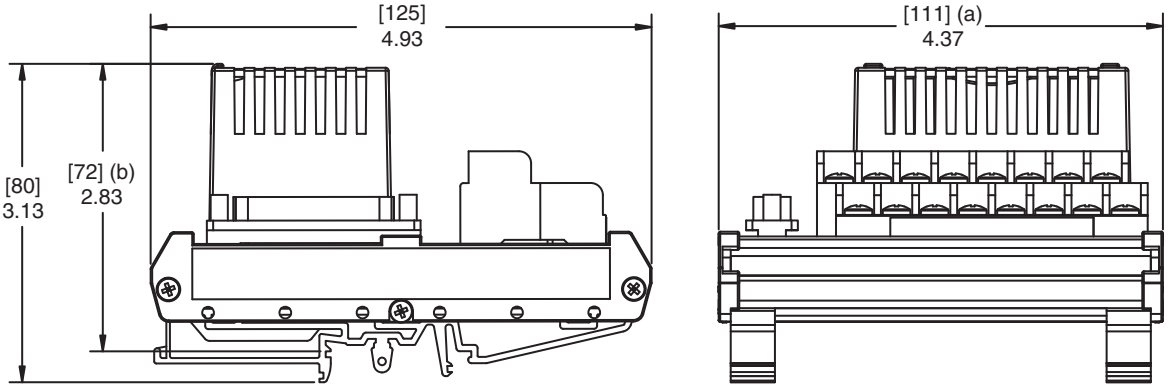
DIMENSIONS – NOMINAL

[mm]
in

Compression Termination Assembly



Ring Lug Termination Assembly



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

RELATED PRODUCT DOCUMENTS

Table 3. 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-2S200	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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