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.

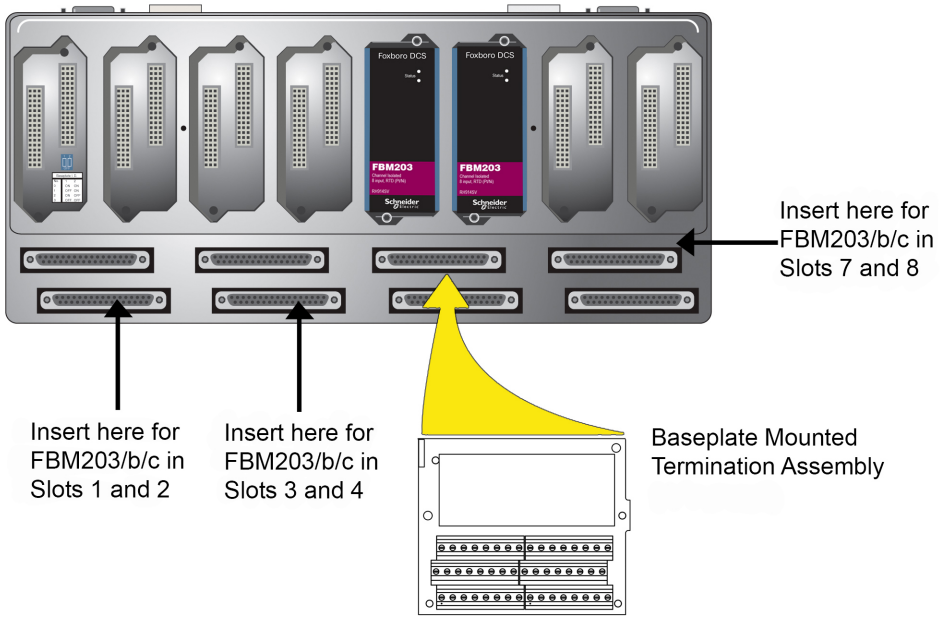
The modules perform the signal conversion required to interface the electrical input signals from the field sensors to the optionally redundant fieldbus.

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.