Overview

Each FBM201/b/c/d Analog Input Module contains eight analog input channels, each channel accepting a 2-wire, DC input from an analog sensor such as a 4 to 20 mA or 0 to 5 V transmitter, or a self-powered 20 mA source.

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

The FBM201 is electrically compatible with standard HART signals.

Features

- 8 channels for input of analog sensor signals:
  - 0 to 20 mA DC – FBM201
  - 0 to 100 mVDC – FBM201b
  - 0 to 5 VDC – FBM201c
  - 0 to 10 VDC – FBM201d
- Each analog input channel is galvanically isolated from other channels and ground
- 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 integration time and 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 FBM201/b/c/d modules
- TAs for per channel internally and/or externally loop powered transmitters

Standard Design

The FBM201/b/c/d modules have a rugged extruded aluminum exterior for physical protection of the circuits. Enclosures specially designed for mounting the fieldbus modules (FBMs) provide various levels of environmental protection, up to harsh environments of Class G3 as defined in ISA Standard S71.04.

High Accuracy

For high accuracy, the modules incorporate sigma-delta data conversion on a per-channel basis, which can provide a new analog input reading every 25 ms, and a configurable integration period to remove any process and/or electromagnetic noise.

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.

Easy Removal/Replacement

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

Visual Indicators

Light-emitting diodes (LEDs) incorporated into the front of the modules provide visual status indications of Fieldbus Module functions.

Modular Baseplate Mounting

The modules mount on a modular baseplate (see Figure 1, page 5), 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.

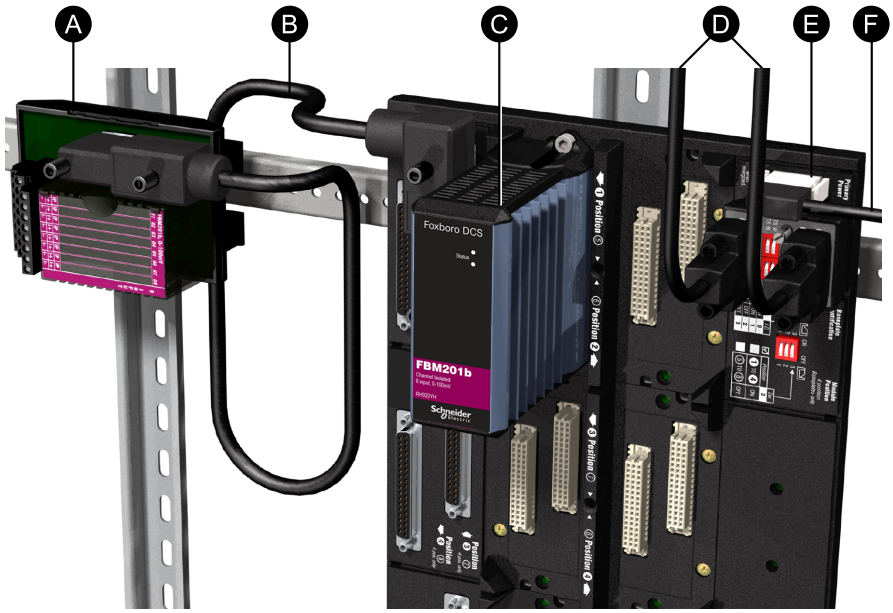
Fieldbus Communication

A Fieldbus Communication Module or a Control Processor interfaces the redundant 2 Mbps module Fieldbus used by the FBMs. The FBM201/b/c/d modules accept 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 Termination Assemblies (TAs). The TAs used with the FBM201/b/c/d modules are described in Termination Assemblies and Cables, page 11.

Figure 1 - FBM201 Subsystem – Typical



Legend	
A	Termination Assembly
B	Termination Cable
C	FBM201 RH914SQ
D	Fieldbus Cables
E	FBM Baseplate
F	Power Cable

Functional Specifications

Process I/O Communications	Communicates with its associated FCM or FCP via the redundant 2 Mbps module Fieldbus
Input Channels	8 isolated and independent channels
Input Range (each channel)	FBM201: 0 to 20 mA DC FBM201b: 0 to 100 mVDC FBM201c: 0 to 5 VDC FBM201d: 0 to 10 VDC
Input Channels (8)	• Analog Accuracy (includes linearity): ±0.03% of span Accuracy temperature coefficient: ±50 ppm/ºC • Field Device Cabling Distance: Maximum distance of the field device from the FBM is a function of compliance voltage (22.8 VDC), wire resistance, and voltage drop at the field device. • Input Channel Impedance: FBM201: 61.5 Ω nominal FBM201b: 10 MΩ FBM201c: 10 MΩ FBM201d: 10 MΩ • Input Signal A/D Conversion: Each channel performs A/D signal conversion using an independent Sigma-Delta converter. • Integration Period: Software configurable • Common Mode Rejection: >100 dB at 50 or 60 Hz • Normal Mode Rejection: >95 dB at 50 or 60 Hz • Loop Power Supply Protection Each channel is channel-to-channel galvanically isolated, current limited, and voltage regulated. All analog inputs are limited by their design to less than 30 mA. If the current limit circuit shorted out, the current is limited to about 100 mA. • Input Channel Isolation Each channel is galvanically isolated from all other channels and earth (ground). The module/TA 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.**
Power Requirements	• Input Voltage Range (Redundant): 24 VDC +5%, -10% • Consumption: 7 W • Heat Dissipation: 3 W (maximum)
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/UL-C 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	• FBM201/b/c/d: -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)	
Altitude	-300 to +3,000 m (-1,000 to +10,000 ft)	-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	0.75g from 5 to 500 Hz	

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 type of enclosure to be used.

Physical Specifications

Mounting	• FBM201/b/c/d: The modules mount on a modular baseplate. The baseplate can be mounted on a DIN rail (horizontally or vertically), or horizontally on a 19-inch rack using a mounting kit. Alternatively, the modules mount on a 100 Series conversion mounting structure. See *Standard 200 Series Baseplates* (PSS 41H-2SBASPLT) or *100 Series Conversion Mounting Structures* (PSS 41H-2W8) for details. • Termination Assembly (TA): The 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	• FBM201/b/c/d: 284 g (10 oz) approximate • Termination Assembly: ◦ Compression: 181 g (0.40 lb) approximate ◦ Ring Lug: 249 g (0.55 lb) approximate
Dimensions	• FBM201/b/c/d: ◦ Height: 102 mm (4 in) 114 mm (4.5 in) with mounting lugs ◦ Width: 45 mm (1.75 in) ◦ Depth: 104 mm (4.11 in) • Termination Assembly: See Dimensions - Nominal, page 15.
Part Numbers	• FBM201: RH914SQ • FBM201b: RH922YH • FBM201c: RH922YJ • FBM201d: RH922YK • Termination Assemblies: See Functional Specifications - Termination Assemblies, page 12.

Termination Cables	• Cable Lengths: Up to 30 m (98 ft) • Cable Materials: Polyurethane or Low Smoke Zero Halogen (LSZH) • Termination Cable Type: Type 1 – See Table 2, page 13 • Baseplate to Main TA 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-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 • Ring-Lug Type Accepted Wiring Sizes: ◦ #6 size connectors (0.375 in (9.5 mm)) ◦ 0.5 to 4 mm^2 /22 AWG to 12 AWG