EcoStruxure™

Foxboro™ DCS

FBM243/243b, FoxCom Dual Baud Rate, Intelligent Device Modules

PSS 41H-2S243

Product Specification

August 2019

Schneider Electric™

www.schneider-electric.com

Legal Information

Overview

The FBM243, FoxCom Dual Baud Rate, Intelligent Device Module contains eight individual channels. The FBM243b, FoxCom Dual Baud Rate, Intelligent Device Module contains four individual input channels and four 0 to 20 mA analog output channels.

Each input provides internal isolated power and digital communication capabilities to a Foxboro Intelligent Field Device. Each channel communicates over a single twisted pair of wires and each channel of the FBM243/243b is channel isolated.

The modules also allow the use of an external power supply to power the Intelligent Field Device. (The use of an external power supply common to two or more loops needs the use of a cable balun module to maintain digital communication line balance). The baud rate is determined by the configuration of the field device connected to each channel, independently of the other channels. The modules provide bidirectional digital communication at 4800 baud rate between the Intelligent Field Device and the system redundant Fieldbus, or provides bidirectional digital communication at 600 baud rate between the field device and the modules while allowing a simultaneous 4 to 20 mA analog signal from the field device to an emergency shutdown system.

The FBM243/243b is an Intelligent Field Device host, enabling the system to receive digital messages from the field device in engineering units. Each message is received ten times per second at 4800 baud, and two times per second at 600 baud. Each message contains:

- Up to three measured variables in IEEE 32-bit floating-point format
- Security information
- Diagnostics
- Message checking

This information is available to each of the elements of the system.

Since communication is bidirectional, the system can display the output, transmitter temperature (°C and °F), and the results of continuous self-diagnostics. In addition, the following information can be displayed or reconfigured from a console, a Field Communicator, or PC-Based Configurator:

- Output in engineering units
- Fail-safe information
- Tag number, name and location
- Device name (letterbug)
- Last calibration date
- Two levels of upload/download capabilities

When connected to the appropriate TAs, the FBM243/243b modules provide functionality formerly provided by the 100 Series FBM I/O subsystem. TAs are available for the FBM243 that support the functionality of the 100 Series FBM18 and FBM43.

TAs are available for the FBM243b that support the functionality of the 100 Series FBM39 and FBM44.

Features

- For the FBM243, 8 individual digital communication channels
- For the FBM243b, 4 individual dual baud, FoxCom communication channels and four 0 to 20 mA analog output channels
- Receives messages 10 times per second at 4800 baud, or 2 times per second at 600 baud, and contains:
  - Up to 3 measured variables in IEEE
  - 32-bit floating-point format
  - Security information
  - Diagnostics
  - Message checking
- Allows use of an external power supply or the FBM243 internal isolated power to power the Intelligent Field Device
- Digital communication capabilities to a Foxboro Intelligent Field Device over a single twisted pair of wires
- Allows a simultaneous 4 to 20 mA analog signal from the field device to an emergency shutdown system
- Termination Assemblies (TAs) for locally or remotely connecting field wiring to the FBM243
- Termination Assemblies (TAs) for non-intrinsically safe or intrinsically safe applications

Standard Design

The FBM243/243b has a rugged extruded aluminum exterior for physical protection of the circuits. Enclosures specially designed for mounting of the FBMs provide various levels of environmental protection, up to harsh environments per ISA Standard S71.04.

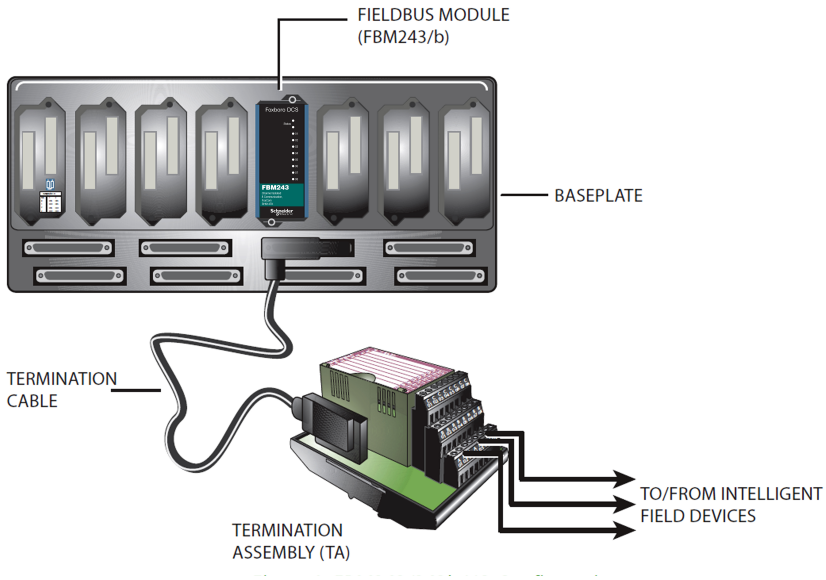
Visual Indicators

Light-emitting diodes (LEDs) incorporated into the front of the module provide visual indication of the module operational status, and communication activity of the input channels.

Easy Removal/Replacement

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

Figure 1 - FBM243/243b I/O Configuration



Fieldbus Communication

The Fieldbus Communications Module (FCM) or the Field Control Processor (FCP) interfaces to the redundant 2 Mbps module Fieldbus used by the FBMs. The FBM243/243b accepts communication from either path (A or B) of the 2 Mbps Fieldbus. If one path is unsuccessful or is switched at the system level, the module continues communication over the active path.

Modular Baseplate Mounting

The FBM243/243b mounts on a Standard 200 Series Modular Baseplate (see *Figure 1*), which accommodates up to four or eight Fieldbus Modules. The Modular Baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for redundant Module Fieldbus, redundant independent dc power, and termination cables.

Termination Assemblies

Field I/O signals connect to the FBM subsystem via DIN rail mounted termination assemblies (TAs).

For the FBM243, TA RH931KJ contains a 51 ohm resistor in series with each channel for use in non-intrinsically safe applications.

TA RH917XW is a direct channel for use in intrinsically safe applications. An intrinsic safety barrier needs to be connected to each channel of this TA providing the necessary resistance for each channel.

TAs RH931KJ, RH917XW, and RH931KJ are available in Polyamide material.

For the FBM243b, TAs RH924QQ and RH924QY are available for use in non-intrinsically safe applications. TA RH924QY has output bypass jacks that help remove FBMs from service during system maintenance. An Output Bypass Station provides manually driven milliamp output signals through the bypass jacks to deter interruption of the process output signals.

The DIN rail mounted TAs connect to the FBM subsystem baseplate by means of a removable termination cable. The cable is available in a variety of lengths, up to 30 meters (98 feet), allowing the TA to be mounted in either the enclosure or in an adjacent enclosure.

Termination cables are available in these materials:

- Polyurethane
- Low Smoke Zero Halogen (LSZH)

Refer to *Table 1*.

Cable Balun Module

A Cable Balun Module maintains digital communication line balance for Intelligent Field Devices connected in FBM loops that are powered from a common external power supply. This powering method effectively connects one line of each loop to a single point. (Without the baluns, the multiple common connections at the external power source cause communication cross-talk between the loops.) Baluns are not needed for loops that use internal power sourcing (powered from the FBM). The Cable Balun Module (RH903SV) contains four baluns, with one balun used for each loop powered from the external power supply. Each balun adds 28 ohms of resistance to its associated loop.

Cable Balun Module		
Module Model	**Module Part No.**	**No. of Baluns in the Module**
CBM-4	RH903SV	4

Functional Specifications

Field Device Channel	• Interface: ◦ FBM243: 8 isolated and independent channels ◦ FBM243b: 4 channel isolated, dual baud, FoxCom communication channels and four 0 to 20 mA analog output channels • Communications: Non-redundant, point-to-point, master/slave, asynchronous, half-duplex communication, at a software selectable baud rate of 600 or 4800 baud. Each channel baud rate may be independently set. • Error Checking: CCITT 2-byte CRC • Speed: 10 messages per second at 4800 baud, or 2 messages per second at 600 baud. • Maximum Distance (Interface to Field Device): [Shielded twisted pair, or at minimum, twisted pair with overall shield using 0.50 mm^2 (22 AWG) wire] 600 m (2000 ft) (shielded twisted pair) at 4800 baud, or 1800 m (6000 ft) at 600 baud The maximum allowable distance decreases when the loop is operated through an intrinsic safety barrier. See MI 020-350. • Compliance Voltage: ◦ FBM243/b Rev. A: 19 V dc minimum at 20.5 mA Includes voltage drop across 51 Ω resistor in TA and 136 Ω resistor and diodes in Redundant Adapter ◦ FBM243/b Rev. B or Later: 21 V dc minimum at 20.5 mA Includes voltage drop across 51 Ω resistor in Termination Assembly and 182 Ω resistor in the module. • Maximum Loop Resistance: ◦ FBM243/b Rev. A: Up to 400 Ω cumulative resistance external to module ◦ FBM243/b Rev. B or later: Up to 600 Ω cumulative resistance external to the module • FBM Input Impedance: ◦ FBM243/b Rev. A: 200 Ω nominal ◦ FBM243/b Rev. B or Later: 250 Ω nominal • Isolation: Each channel is galvanically isolated and referenced to ground, and the card itself is referenced to ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground and between channels.

	⚠⚠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.** • Field Device Internal Power: ◦ FBM243/b Rev. A: 23.1 to 25.3 V dc, source resistance 200 Ω (includes 51 Ω resistor in Termination Assembly and 136 Ω in Module) ◦ FBM243/b Rev. B or later: 25.6 to 27.0 V dc, source resistance 250 Ω (includes 51 Ω resistor in Termination Assembly and 182 Ω in Module)
FBM243b Output Channels (Four) - Specifications	• Accuracy - Analog (includes linearity): ±0.05% of Span Accuracy temperature coefficient: ±50 ppm/°C • Output Load: 750 Ω maximum • Output Processing Delay: 30 ms maximum • Resolution: 13 bits • Field Device Cabling Distance: Maximum distance of the field device from the FBM is a function of compliance voltage, wire gauge, and voltage drop at the field device: ◦ FBM243/b Rev. A: 19.6 V dc at 20.4 mA input ◦ FBM243/b Rev. B or Later: 21 V dc at 20.4 mA input • Loop Power Supply Protection: Each channel is channel-to-channel galvanically isolated, current limited, and voltage regulated. Each of the analog outputs are limited by their design to about 25 mA. If the output FET shorts, the output current could increase up to 35 mA. In normal operation the FBM outputs a constant current into a 0 to 750 ohm load.
Fieldbus Communication	Communicates with its associated FCM via the redundant 2 Mbps module Fieldbus
Power Requirements	• Input Voltage Range (Redundant): 24 V dc, +5%, -10% • Consumption: 8 W (maximum) • Heat Dissipation: 3 W (maximum)

Regulatory Compliance: Electromagnetic Compatibility (EMC):	• *European EMC Directive 2014/30/EU*: 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 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 2014/35/EU and Explosive Atmospheres (ATEX) directive 2014/34/EU*: 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.
Calibration Requirements	Calibration of the module and termination assembly is not required.

Environmental Specifications

	Operating	Storage
Temperature	*FBM243/243b*: -20 to +70°C (-4 to +158°F) *Termination Assembly*: -20 to +50°C (-4 to +122°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	• Module: The FBM243/243b mounts on a Modular Baseplate. The Modular Baseplate can be mounted on a DIN rail (horizontally or vertically), or horizontally on a 19-inch rack using a mounting kit. Alternatively, FBM243/243b mounts on a 100 Series conversion mounting structure. Refer to *Standard 200 Series Baseplates* (PSS 41H-2SBASPLT) or *100 Series Conversion Mounting Structures* (PSS 41H-2W8) for details. • Termination Assembly: The TA accommodates multiple DIN styles including 32 mm (1.26 in) and 35 mm (1.38 in) rails.
Weight	• Module: 284 g (10 oz) approximate • TA – Compression Screw: 363 g (0.8 lb) approximate
Dimensions - Module	• Height: 102 mm (4 in),114 mm (4.5 in) including mounting lugs • Width: 45 mm (1.75 in) • Depth: 104 mm (4.11 in)
Dimensions - Termination Assemblies	Refer to *Dimensions - Nominal, page 15*.
Part Numbers	• FBM243 Module: RH914TK • FBM243 TA - Compression Screw: RH931KJ for non-intrinsic safety applications and RH917XW for intrinsic safety applications • FBM243b Module: RH927AD • FBM243b TA - Compression Screw RH924QQ and RH924QY (with output bypass jacks) for non-intrinsic safety applications

Indicators (mounted on front of module)	• Operational Status: Red and green light-emitting diodes (LEDs) • Channel Communication Activity: 8 amber LEDs, one per channel
Termination Cables	• Cable Lengths: Up to 30 m (98 ft) • Cable Materials: Polyurethane or Low Smoke Zero Halogen (LSZH) • Termination Cable Type: Type 1 - Refer to *Table 1* • Cable Connection: ◦ FBM Baseplate End: 37-pin D-subminiature ◦ Termination Assembly End: 25-pin D-subminiature
Termination Assembly Construction Material	Polyamide Material, compression
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

Table 1 - Termination Cable Types and Part Numbers

Cable Length m (ft)	Type 1 P/PVC[a]	Type 1 LSZH[b]
0.5 (1.6)	RH916DA	RH928AA
1.0 (3.2)	RH916DB	RH928AB
2.0 (6.6)	RH931RM	RH928AC
3.0 (9.8)	RH916DC	RH928AD
5.0 (16.4)	RH916DD	RH928AE
10.0 (32.8)	RH916DE	RH928AF
15.0 (49.2)	RH916DF	RH928AG
20.0 (65.6)	RH916DG	RH928AH
25.0 (82.0)	RH916DH	RH928AJ
30.0 (98.4)	RH916DJ	RH928AK

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

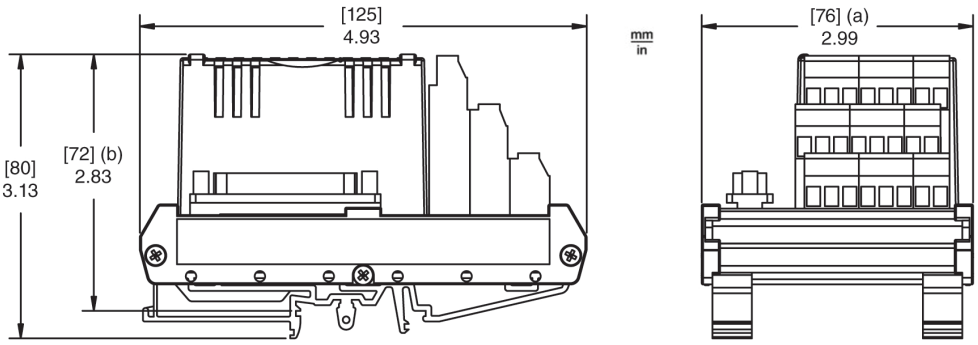
[b] Low smoke zero halogen or low smoke free of halogen (LSZH) is a material classification used for cable jacketing. LSZH is composed of thermoplastic or thermoset compounds that emit limited smoke and no halogen when exposed to high sources of heat. Temperature range: -40 to +105°C (-40 to +221°F).

Upgrade Use of Termination Assemblies

When an FBM243/243b is used to replace the 100 Series FBM, it may use any of the appropriate termination assemblies listed in this PSS for the 100 Series FBM's field I/O wiring. Alternatively, the FBM243/243b can accept this field wiring through a Termination Assembly Adapter (TAA) instead of a termination assembly. This is discussed in *Termination Assembly Adapter Modules for 100 Series Upgrade* (PSS 41H-2W4).

Dimensions - Nominal

Figure 2 - Termination Assemblies



(a) Overall width — for determining DIN rail loading.

(b) Height above DIN rail (add to DIN rail height for total).

Related Product Documents

Document Number	Description
PSS 41H-2SOV	*Standard 200 Series Subsystem Overview*
B0400FA	*Standard and Compact 200 Series Subsystem User's Guide*
PSS 41H-2W100	*100 Series Fieldbus Module Upgrade Subsystem Overview*
PSS 41H-2CERTS	*Standard and Compact 200 Series I/O, Agency Certifications*
PSS 41H-2W4	*Termination Assembly Adapter Modules for 100 Series Upgrade*
PSS 41H-2SBASPLT	*Standard 200 Series Baseplates*
PSS 41H-2W8	*100 Series Conversion Mounting Structures*
PSS 41S-3FCPICS	*Field Control Processor 280 (CP280) 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/.

Schneider Electric Systems USA, Inc.
38 Neponset Avenue
Foxborough, Massachusetts 02035–2037
United States of America

Global Customer Support: https://pasupport.schneider-electric.com

As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

PSS 41H-2S243, Rev A