

I/A Series® Hardware

PSS 21H-2Z46 B4

FBM246, FoxCom™ Redundant Dual Baud Rate, Intelligent Device Interface Module



The FBM246 consists of a pair of Fieldbus Modules that contain eight individual channels, each providing digital communication capabilities to a Foxboro® Intelligent Field Device.

FEATURES

Key features of the FBM246 are:

- ▶ Eight individual digital communication channels
- ▶ Receives messages ten times per second at 4800 baud, and two times per second at 600 baud, and contains:
 - Up to three measured variables in IEEE 32-bit floating-point format
 - Security information
 - Diagnostics
 - Message checking.
- ▶ Redundant modules increase reliability
- ▶ Allows use of an external power supply or the FBM246 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 FBM246
- ▶ TAs for non-intrinsically safe or intrinsically safe applications.

OVERVIEW

The FBM246, FoxCom™ Dual Baud Rate Intelligent Device Interface to Intelligent Field Devices consists of a pair of Fieldbus Modules that contain eight individual channels, each providing 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 FBM246 is channel isolated. The module also allows 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 requires the use of a Cable Balun Module to maintain digital communication line balance.). A redundant pair of the modules combine to provide redundancy at the Fieldbus Module (FBM) level, with field I/O wired to one common termination assembly (see Figure 1). The baud rate is determined by the configuration of the field device connected to each channel, independently of the other channels. The module provides 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 module while allowing a simultaneous 4 to 20 mA analog signal to an emergency shutdown system.

The module 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, and contains:

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

This information is available to all elements of the system.

Since the 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 the 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.

HIGH RELIABILITY

The redundancy of the module pair, coupled with the high coverage of faults, provides a very high subsystem availability time.

The microprocessor of each module executes the I/O application program, plus diagnostic routines that validate the health of the FBM.

Either module may be replaced without upsetting field input or output signals to the good module. The module can be removed/replaced without removing field device termination cabling, power, or communications cabling.

NOTE

For safety reasons always consider the possible impact on plant operations before removing the module.

COMPACT DESIGN

FBM246 has a compact design, with 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.

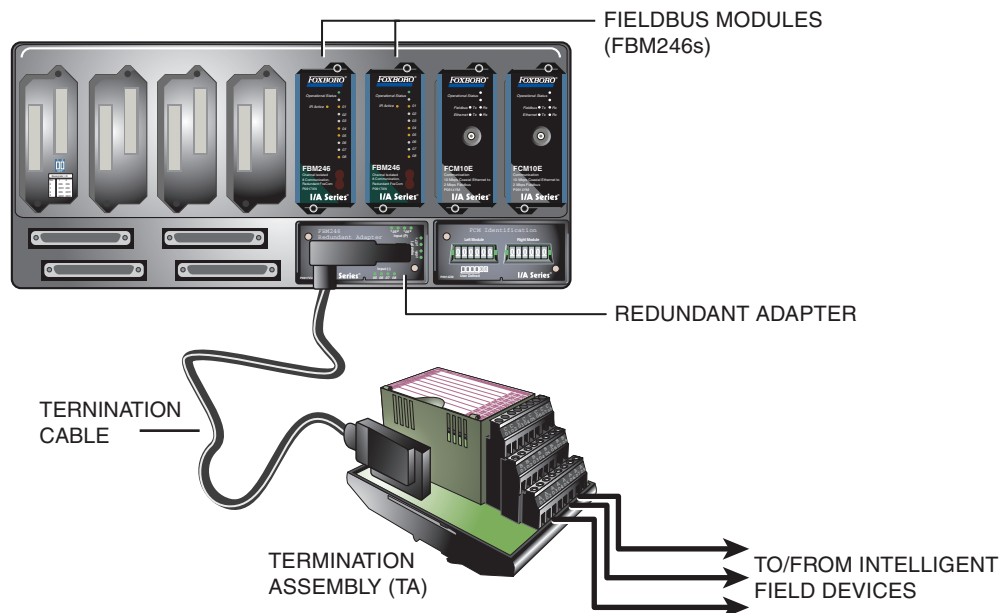


Figure 1. Redundant I/O Configuration

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 channels.

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 FBM246 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.

MODULAR BASEPLATE MOUNTING

The FBM246 module mounts on a DIN rail mounted Modular Baseplate, 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.

Redundant modules must be located in adjacent positions on the baseplate (positions 1 and 2, 3 and 4, 5 and 6, or 7 and 8). To achieve redundancy, a redundant adapter module is placed on the two adjacent baseplate termination cable connectors to provide a single termination cable connection (see Figure 1). A single termination cable connects from the redundant adapter to the associated termination assembly (TA).

TERMINATION ASSEMBLIES

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

Termination Assemblies (P0916BA and P0931KJ) contain a 51 ohm resistor in series with each channel for use in non- intrinsically safe applications.

Termination Assembly (P0917XW) is a direct channel for use in intrinsically safe applications. An intrinsic safety barrier must be connected to each channel of this TA providing the necessary resistance for each channel.

TAs P0916BA and P0917XW are available in Polypropylene (PVC) material, while TA P0931KJ is available in Polyamide material.

A redundant adapter connects the redundant FBMs baseplate input/output connectors together. The redundant adapter provides a single termination connection to a single TA (see Figure 1).

The DIN rail mounted TAs connect to the redundant adapter 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 the following materials:

- ▶ Polyurethane
- ▶ Hypalon® XLP (fire retardant)

Refer to Table 1 on page 9.

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 required for loops that use internal power sourcing (powered from the FBM).

The Cable Balun Module (Foxboro Part Number P0903SV) 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	P0903SV	4

FUNCTIONAL SPECIFICATIONS

Field Device Channel

INTERFACE

8 isolated and independent 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 mm² (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

19 V dc minimum at 20.5 mA
Includes voltage drop across 51 Ω resistor in Termination Assembly and 136 Ω resistor and diodes in Redundancy Adapter.

MAXIMUM LOOP RESISTANCE

Up to 400 Ω with Intrinsic Safety Barrier installed.
Up to 330 Ω with Intrinsic Safety Barrier not installed.

FBM INPUT IMPEDANCE

200 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 earth (ground) and any channel.

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.

FIELD DEVICE INTERNAL POWER

23.1 to 25.3 V dc, source resistance 200 Ω (includes 51 Ω resistor in Termination Assembly and 136 Ω in Redundancy Adapter)

Fieldbus Communication

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

Power Requirements

INPUT VOLTAGE RANGE (REDUNDANT)

24 V dc +5%, -10%

CONSUMPTION

10 W (maximum) per pair

HEAT DISSIPATION

6 W (maximum) per pair

FUNCTIONAL SPECIFICATIONS (CONTINUED)

Regulatory Compliance

ELECTROMAGNETIC COMPATIBILITY (EMC)

European EMC Directive 89/336/EEC

Meets: EN 50081-2 Emission standard
EN 50082-2 Immunity standard
EN 61326 Annex A (Industrial Levels)

CISPR 11, Industrial Scientific and Medical (ISM) Radio-frequency Equipment - Electromagnetic Disturbance Characteristics - Limits and Methods of Measurement

Meets: Class A Limits

IEC 61000-4-2 ESD Immunity

Contact 4 kV, air 8 kV

IEC 61000-4-3 Radiated Field Immunity

10 V/m at 80 to 1000 MHz

IEC 61000-4-4 Electrical Fast Transient/Burst Immunity

2 kV on I/O, dc power and communication lines

IEC 61000-4-5 Surge Immunity

2 kV on I/O, dc power and communication lines

IEC 61000-4-6 Immunity to Conducted Disturbances Induced by Radio-frequency Fields

10 V (rms) at 150 kHz to 80 MHz on I/O, dc power and communication lines

IEC 61000-4-8 Power Frequency Magnetic Field Immunity

30 A/m at 50 and 60 Hz

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. These modules are also UL and UL-C listed as associated apparatus for supplying non-incendive communication circuits for Class I, Groups A-D hazardous locations when connected to specified I/A Series® processor modules as described in the *I/A Series DIN Rail Mounted 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 *I/A Series DIN Rail Mounted Subsystem User's Guide* (B0400FA).

European Low Voltage Directive 73/23/EEC and Explosive Atmospheres (ATEX) Directive 94/9/EC

CENELEC (DEMKO) certified as EEx nA IIC T4 for use in CENELEC certified Zone 2 enclosure certified as associated apparatus for supplying non-incendive field circuits for Zone 2, Group IIC, potentially explosive atmospheres when connected to specified I/A Series processor modules as described in the *I/A Series DIN Rail Mounted Subsystem User's Guide* (B0400FA).

Calibration Requirements

Calibration of the module and termination assembly is not required.

ENVIRONMENTAL SPECIFICATIONS⁽¹⁾**Operating****TEMPERATURE*****FBM246***

-20 to +70°C (-4 to +158°F)

Termination Assembly

-20 to +50°C (-4 to +122°F)

RELATIVE HUMIDITY

5 to 95% (noncondensing)

ALTITUDE

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

Storage**TEMPERATURE**

-40 to +70°C (-40 to +158°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.

Vibration7.5 m/S² (0.75 g) from 5 to 500 Hz

(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

Mounting

MODULE

The FBM246 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. Redundant modules must be located in odd and adjacent even positions on the baseplate (positions 1 and 2, 3 and 4, 5 and 6, or 7 and 8). Refer to PSS 21H-2W6 B4 for details.

TERMINATION ASSEMBLY

The TA accommodates multiple DIN styles including 32 mm (1.26) and 35 mm (1.38 in) rails.

Mass

MODULE

284 g (10 oz) approximate (each module)

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)

TERMINATION ASSEMBLIES

See page 10

Part Numbers

FBM246 MODULE

P0914XN

TA - COMPRESSION SCREW

P0916BA and P0931KJ for use with non-intrinsic safety applications

P0917XW for use with intrinsic safety applications

REDUNDANT ADAPTER

P0917VU

Indicators (mounted on front of each 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 Hypalon XLP

TERMINATION CABLE TYPE

Type 1 - Refer to Table 1 on page 9

CABLE CONNECTION

Termination Assembly

25-pin male D-subminiature

Modular Baseplate

37-pin male D-subminiature

Termination Assembly Construction Material

MATERIAL

P0916BA and P0917XW

Polypropylene (PVC) Material, compression

P0931KJ

Polyamide Material, compression

FAMILY GROUP COLOR

Green - communication

TERMINAL BLOCKS

Inputs and Outputs - 3 tiers, 8 positions

Field Termination Connections

COMPRESSION-TYPE ACCEPTED WIRING SIZES

Solid/Stranded/AWG

0.2 to 4 mm²/0.2 to 2.5 mm²/24 to 12 AWG

Stranded with Ferrules

0.2 to 2.5 mm² with or without plastic collar

PHYSICAL SPECIFICATIONS (CONTINUED)**Table 1. Termination Cable Types and Part Numbers**

Cable Length m (ft)	Type 1 P/PVC ^(a)	Type 1 H/XLPE ^(b)	Cable Length m (ft)	Type 1 P/PVC ^(a)	Type 1 H/XLPE ^(b)
0.5 (1.6)	P0916DA	P0916VA	15.0 (49.2)	P0916DF	P0916VF
1.0 (3.2)	P0916DB	P0916VB	20.0 (65.6)	P0916DG	P0916VG
3.0 (9.8)	P0916DC	P0916VC	25.0 (82.0)	P0916DH	P0916VH
5.0 (16.4)	P0916DD	P0916VD	30.0 (98.4)	P0916DJ	P0916VJ
10.0 (32.8)	P0916DE	P0916VE			

(a) P/PVC is polyurethane outer jacket and semi-rigid PVC primary conductor insulation.

Temperature range; -20 to +80°C (-4 to +176°F).

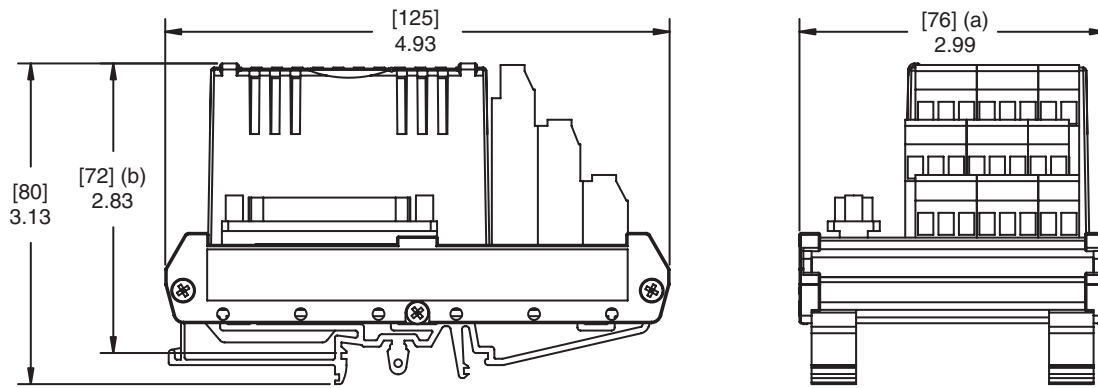
(b) H/XLPE is Hypalon outer jacket and XLPE (cross-linked polyethylene) primary conductor insulation.

Temperature range; -40 to +90°C (-40 to +194°F).

DIMENSIONS-NOMINAL

[mm]
in

Termination Assemblies



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

RELATED PRODUCT SPECIFICATION SHEETS

PSS Number	Description
PSS 21H-2W1 B3	DIN Rail Mounted Subsystem Overview
PSS 21H-2W2 B3	DIN Rail Mounted Equipment, Agency Certifications
PSS 21H-2W6 B4	DIN Rail Mounted Modular Baseplates

MEASUREMENT AND INSTRUMENT PRODUCTS

Invensys Foxboro provides a broad range of measurement and instrument products, including solutions for pressure, flow analytical, positioners, temperature, controlling and recording.

For a listing of these offerings, visit the Invensys Foxboro web site at:

www.foxboro.com/instrumentation



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