Apter Power

PRODUCT SPECIFICATIONS

I/A Series® Hardware

PSS 21H-2Z23 B4

FBM223 PROFIBUS-DP™ Communication Interface Module



The FBM223 PROFIBUS-DP™ Communication Interface Module provides an interface between PROFIBUS-DP slave devices and the I/A Series® system.

FEATURES

Key features of the FBM223 module are:

- Conforms to PROFIBUS-DP Fieldbus specifications
- Provides full support for all device variables and diagnostic messages
- Integrates PROFIBUS slave device data into an I/A Series control database
- The FBM223 and its associated termination assembly (TA) are suitable for installation in Class 1, Division 2 and Zone 2 locations.

OVERVIEW

The PROFIBUS-DP Communication Interface Module (FBM223) provides an interface between PROFIBUS-DP slave devices — such as motor drives, I/O modules, and field I/O devices — and the I/A Series system.

PROFIBUS is a vendor-independent, open fieldbus standard for a wide range of applications in process automation and manufacturing. Vendor independence and openness are guaranteed by the PROFIBUS Fieldbus standard EN 50170, which specifies the functional, electrical, and mechanical characteristics for a serial transmission bus.

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Table 1. Maximum PROFIBUS-DP Bus Segment Length (No Repeaters Used)

Data Transfer Rate, in kbit/s	9.6	19.2	45.45	93.75	187.5	500	1500	3000	6000	12000
Maximum Segment Length, in Meters	1200	1200	1200	1200	1000	400	200	100	100	100

NETWORK EXPANSION

Without the use of repeaters (non-expanded bus configuration) up to 31 slave stations can exist on a PROFIBUS-DP bus. Depending on the selected data transfer rate, cabling distances up to 1200 m (3960 ft) are possible without the use of repeaters (see Table 1).

The use of repeaters provides for expansion of the bus, allowing a greater number of slave devices per FBM223 port, up to 91.

For a given system, with the use of repeaters the maximum number of slave devices supported on an FBM223 port is dependent on the amount of I/O that is configured per device for access by the FBM223.

FBM CAPACITY

For the complete specification of number of devices supported versus maximum I/O per device, refer to the *PROFIBUS-DP Communication Interface Module (FBM223) User's Guide* (B0400FE).

From the I/A Series control station to which the FBM223 is connected (refer to Figure 1), up to 100 connections per FBM223 port can be made to the I/O data being accessed (read or written) by the FBM223 over PROFIBUS.

A connection may be to:

- An analog input or output value (integer or floating point)
- A string input or output
- A single digital input or output value
- Multiple (packed) digital input or output values (packed in groups of up to 32 digital points per connection).

Thus an I/A Series control station can access up to 100 analog I/O values, or 3200 digital I/O values, or a combination of digital, analog, and string I/O, via each of the two ports of the FBM223. The frequency of access to FBM223 data by a control station may be as fast as 500 ms.

With regard to cabling distances in an expanded bus configuration (repeaters used), Table 1 applies in determining the maximum length of each bus segment.

COMPACT DESIGN

The FBM223 (see Figure 3) has a compact design, with a rugged extruded aluminum exterior for physical and electrical 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.

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

VISUAL INDICATORS

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

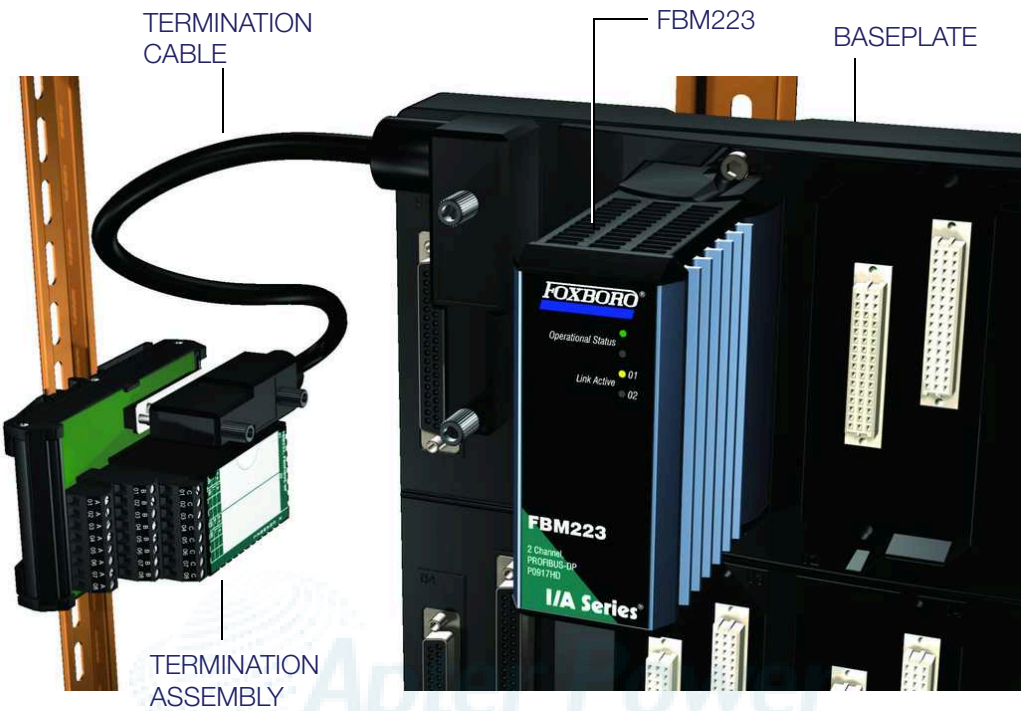

Figure 3. FBM223 I/O Connections

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 FBM223 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 module mounts on a Modular Baseplate (see Figure 3), which accommodates up to four or eight FBMs. The Modular Baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for the FBMs, redundant independent dc power connections, and I/O cable connections.

TERMINATION ASSEMBLY

Features

Key features include:

- Combination foot that supports 32 or 35 mm DIN rail mounting
- Distinct family group color
- Three-tier termination
- Switch-selectable termination resistors.

Overview

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

Each FBM223 PROFIBUS-DP Termination Assembly and its associated termination cable provide feed-through connection between PROFIBUS-DP compliant field devices and the FBM223 PROFIBUS-DP Communication Input Interface Module.

The TA is available in Polypropylene (PVC) material.

The DIN rail mounted TAs connect to the Modular 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 the following materials:

- Polyurethane
- Hypalon® XLP (fire retardant).

Refer to Table 2 on page 11.

FUNCTIONAL SPECIFICATIONS

PROFIBUS-DP Communications

INTERFACE

2 communication channels provide interface to 2 isolated PROFIBUS-DP buses

BUS CHARACTERISTICS

General

Electronic Industrial Association (EIA) RS-485 communications. The physical communication medium consists of twisted-pair shielded copper cable containing a single conductor pair.

Data Transfer Rate (Baud Rate)

Selectable, 9.6 to 12,000 kbit/sec (see Table 1)

Maximum Allowable Bus Length

The maximum allowable length of a PROFIBUS-DP bus segment is a function of the user selected data transfer rate (see Table 1)

Maximum Cable Length, FBM223 to TA

30 m (90 ft) which is to be included in the bus segment length

Maximum Number of Devices (Total) on a Bus

Per EN 50170, for a non-expanded bus (repeaters not used), one master and up to 31 slaves are supported. For an expanded bus, the number of slave devices allowed is a function of the allowable input/output data processed per slave device (refer to the *PROFIBUS-DP Communication Interface Module (FBM223) User's Guide* (B0400FE)). The maximum number supported per port is 91.

Maximum Number of Devices on a Bus Segment

Per EN 50170, a bus segment (in an expanded network) supports up to 32 active devices. An active device can be a master, slave, or repeater.

FASTEST ALLOWED ECB BLOCK PERIOD

500 msec

FBM223 CHANNEL ISOLATION

Each communication channel is galvanically isolated and referenced to earth (ground). The module can withstand, without damage, a potential of 600 V ac applied for one minute between either channel and earth.

CAUTION

This does not imply that the 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.

Conformance to PROFIBUS-DP Standards

PROFIBUS-DP bus topologies and communications are in accordance with specifications presented in the following standards:

- PROFIBUS Fieldbus standard EN 50170
- EIA standard RS-485.

FBM223 Power Requirements

INPUT VOLTAGE RANGE (REDUNDANT)

24 V dc +5%, -10%

CONSUMPTION

6 W (maximum)

HEAT DISSIPATION

6 W (maximum)

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
2kV on ac and dc power lines; 1kV on I/O and communications 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

IEC 61000-4-11 Voltage Dips, Short Interruptions and Voltage Variations Immunity
Compliant

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 *PROFIBUS-DP Communication Interface Module (FBM223) User's Guide* (B0400FE). 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 *PROFIBUS-DP Communication Interface Module (FBM223) User's Guide* (B0400FE).

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

FBM223
-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)

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
7.5 m/S^2 (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 FBM223 mounts on a Modular Baseplate. The Modular Baseplate can be mounted horizontally or vertically on a DIN rail, or mounted horizontally in a 19-inch rack using a mounting kit. 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 ASSEMBLY
See page 12

Part Numbers

FBM223 MODULE
P0917HD

TA - COMPRESSION SCREW
P0917SY

Indicators (mounted on front of each module)

OPERATIONAL STATUS
Red and green light-emitting diodes (LEDs)

CHANNEL COMMUNICATION ACTIVITY
2 amber LEDs, one per port

Termination Cables

CABLE LENGTHS
Up to 30 m (98 ft).

CABLE MATERIALS
Polyurethane or Hypalon XLP

TERMINATION CABLE TYPE
Type 1 - Refer to Table 2 on page 11

CABLE CONNECTION

Termination Assembly
25-pin male D-subminiature

Modular Baseplate
37-pin male D-subminiature

Termination Assembly Construction Material

MATERIAL
Polypropylene (PVC) Material, compression screw

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 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