Foxboro™ DCS

FBM233 Field Device System Integrator Module, 10/100 Mbps Ethernet, Redundant

PSS 41H-2S233

Product Specification

May 2023

https://www.se.com

Legal Information

Overview

The FBM233 Redundant Field Device System Integrator (FDSI) module provides an Ethernet interface between single or dual-ported field I/O devices and the EcoStruxure™ Foxboro™ DCS.

Each FBM233 has a single RJ-45 connector (10/100Mbps copper Ethernet connection) on the front of the module that can be used to connect to dual-ported Ethernet devices. The FBM233 is connected to Ethernet switches or hubs in order to communicate with one external device or up to 64 external devices.

A pair of modules combine to provide redundancy at the Fieldbus Module (FBM) level. In this configuration, one FBM233 is the Master, and the other is the Tracker module. Input points on the control station are updated from the device inputs received on the network connected to the Master. Device output points, depending on the I/O driver, are written by both the Master and Tracker module. Role switching is automatic if problems are detected (for example, loss of heartbeat from any device) by the I/O driver, or the user can switch the roles at any time via SMDH. The general network configuration is shown in Figure 1, page 5.

Features

Key features of the FBM233 include:

- Redundant 10 Mbps or 100 Mbps Ethernet network transmission rate to/from field devices
- Communicates with up to 64 field devices
- I/O software driver is downloadable from a library of available protocols
- Up to 2000 DCI block connections
- Integrates field device data into a Foxboro DCS control database using Ethernet connectivity
- Field mounted
- Class G3 (harsh) environments.

I/O Drivers

This FBM is a generic Ethernet hardware module in which different software drivers can be loaded. These drivers configure the FBM to recognize a particular protocol used by the device. Several of these software drivers are a standard product offerings. Other custom drivers can be developed to meet specific needs. These drivers are dynamically downloaded to the FBM233 with software code specifically designed to interface with the third party device's protocol.

The configuration procedures and the software requirements for each driver are unique to the device(s) being integrated into the system.

Ethernet Link Setup

Data communication between the FBM233 and field devices are through the RJ-45 connector located on the front of the FBM233 module. The RJ-45 connector of the FBM233 can be connected through hubs, or through Ethernet switches to the field devices (see Ethernet Switches for Use with FBM233, page 12). The FBM233 is connected to Ethernet switches or hubs in order to communicate with one external device or up to 64 external devices.

Configurator

The FDSI configurator sets up the FBM233 port and XML based device configuration files. The port configurator allows for easy setup of the communication parameters for each port (such as, Dynamic Host Configuration Protocol (DHCP), IP addresses). The device configurator is not needed for all devices, but when needed it configures device specific and point specific considerations (such as, scan rate, address of the data to be transferred, and the amount of data to be transferred in one transaction).

Operations

Each FBM233 pair can access up to 64 devices to read or write data.

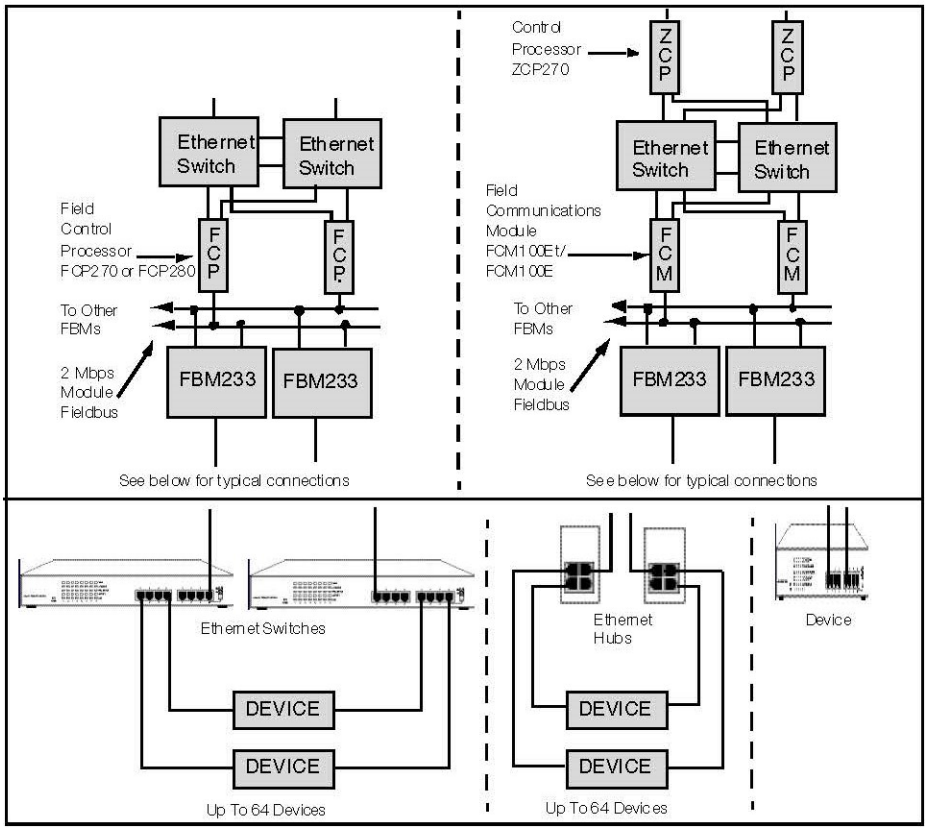
From the Foxboro DCS control station to which the FBM233 is connected (see this figure), up to 2000 Distributed Control Interface (DCI) data connections can be made to read or write data. Supported data types are determined by the particular driver loaded on the FBM233, which converts the data to the DCI data types listed below:

- An analog input or output value (integer or IEEE single-precision floating point)
- 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 a FBM233 control station can access up to 2000 analog I/O values, or up to 64000 digital I/O values, or a combination of digital and analog values using the FBM233 up to the maximum capacity a user allows within the sizing guidelines of the control processor. The frequency of access to the FBM233 data by a control station can be as fast as 500 ms. The performance depends on each device type and the layout of data in the device.

The FBM233 collects the required data from the devices, performs the necessary conversions, and then stores the converted data in its database for incorporation into the Foxboro DCS plant management functions and operator displays. Data can also be written out to the individual devices from the Foxboro DCS system.

FBM233 Redundant Module Configuration



Fieldbus Communication

The Fieldbus Communication Module (FCM100Et or FCM100E) or the Field Control Processor (FCP270 or FCP280) interface the redundant 2 Mbps module Fieldbus used by the FBMs. The FBM233 accepts communication from either path of the 2 Mbps module Fieldbus - should one path fail or be switched at the system level, the module continues communication over the active path.

Control Block Support

The FBM233 offers control block support for the following standard Foxboro DCS Distributed Control Interface (DCI) block types:

BIN	Binary Input
BINR	Binary Input Redundant
BOUT	Binary Output
IIN	Integer Input
IOUT	Integer Output
PAKIN	Packed Input
PAKOUT	Packed Output
PLSOUT	Pulse Output
RIN	Real Input
RINR	Real Input Redundant
ROUT	Real Output
STRIN	String Input
STROUT	String Output

The DCI blocks are configured the same as other Foxboro DCS control blocks. The DCI blocks address and read/write data from or to the addressed field device.

Standard, Rugged Design

The FBM233 has a rugged extruded aluminum exterior for physical and electrical protection of the circuits. Enclosures, specially designed for mounting the FBMs, provide various levels of environmental protection, up to Class G3 harsh environments per ISA Standard S71.04.

High Reliability

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

Either module can be replaced without upsetting field input or output signals to the other module. A module can be removed or replaced without removing power to the other FBM modules in the Modular Baseplate.

Modular Baseplate Mounting

The module mounts on a Modular Baseplate, which accommodates up to four or eight FBMs. The Modular Baseplate is either DIN rail mounted or rack mounted. The Modular Baseplate includes signal connectors for the FBMs, provides connections for independent DC power supplies, I/O cable connections, 2 Mbps Module Fieldbus connections.

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).

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 (Transmit or Receive) of the Ethernet ports. Two additional LEDs provide the master or tracker status of the modules.

Functional Specifications

Communications	Bus Characteristics • Communication Type Ethernet • Communication Transmission Rate 10 or 100 Mbps • Communication Protocol UDP/IP or TCP/IP • IP Address Fixed or DHCP **NOTE:** For driver specific limitations on I/O Capacity and Data Types Transferred, see the corresponding driver PSS or user's guide. I/O Capacity • Up to 64 devices per FBM233 maximum (number of actual devices is performance dependent) with up to 2000 DCI connections. Data Types Transferred • 2-byte or 4-byte signed or unsigned integers, 4-byte IEEE single-precision floating values, or binary values. Automatic conversion for other types as implemented in the downloadable driver. Fastest Allowed ECB Block Period • 500 msec
Module Fieldbus Communication	Communicates with its associated FCM100Et, FCM100E, FCP280, or FCP270 via the redundant 2 Mbps module Fieldbus.
FBM233 Power Requirements	• Input Voltage Range (Redundant) 24 VDC +5%, -10% • Consumption 7 W (maximum), each module • Heat Dissipation 7 W (maximum), each module
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 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). • *Marine Certification* ABS Type Approved and Bureau Veritas Marine certified for Environmental Category EC31.
Calibration Requirements	Calibration of the module is not required.

Environmental Specifications

	Operating	Storage
Temperature	Rev A to J: -20 to +70°C (-4 to +158°F) Rev K and later: 0 to +70°C (32 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)
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 (5 to 500 Hz)	

Physical Specifications

Mounting	The FBM233 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. For details, see *Standard 200 Series Baseplates* (PSS 41H-2SBASPLT).
Dimensions	• 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)
Part Number	P0926GX
Weight	284 g (10 oz) approximate, per module
Cables	• From Module to Hub/Switch/Device 1 m (3.3 ft) to 100 m (330 ft) • Connectors RJ-45 • Null Hub Adapter P0971PK

Ethernet Switches for Use with FBM233

DIN Rail Mounted 5-Port 10/100 Base TX Switch

The 5-port 10/100 base TX Ethernet switch (P0972WE) is DIN rail mounted and available for use with the FBM233. You can connect up to four Ethernet devices using this 5-port switch. Additionally, multiple switches can be interconnected to connect up to 64 devices to a single FBM233.

For detailed physical and electrical specifications, see *Model SFNB 5TX 2891001* at www.phoenixcontact.com/us/products.

5-Port 10/100 Base TX DIN Rail Mounted Ethernet Switch (P0972WE)

Rack and Chassis Mounted Fast Ethernet Switches

For information on the Fast Ethernet switches, see *The Foxboro DCS Control Network Ethernet Equipment* (PSS 41H-7NWEQUIP).

Related Documents

Document Number	Description
PSS 31H-2SOV	*Standard 200 Series Subsystem Overview*
PSS 31H-2CERTS	*Standard and Compact 200 Series I/O - Agency Certifications*
PSS 41H-7NWEQUIP	*The Foxboro DCS Control Network Ethernet Equipment*

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/.

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

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