Eco☰truxure™

Foxboro™ DCS

FBM229 DeviceNet™ Communication Module

PSS 41H-2S229

Product Specification

April 2019

Schneider Electric

Legal Information

The Schneider Electric brand and any trademarks of Schneider Electric SE and its subsidiaries referred to in this guide are the property of Schneider Electric SE or its subsidiaries. All other brands may be trademarks of their respective owners.

This guide and its content are protected under applicable copyright laws and furnished for informational use only. No part of this guide may be reproduced or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), for any purpose, without the prior written permission of Schneider Electric. Schneider Electric does not grant any right or license for commercial use of the guide or its content, except for a nonexclusive and personal license to consult it on an "as is" basis.

Schneider Electric products and equipment should be installed, operated, serviced, and maintained only by qualified personnel.

As standards, specifications, and designs change from time to time, information contained in this guide may be subject to change without notice.

To the extent permitted by applicable law, no responsibility or liability is assumed by Schneider Electric and its subsidiaries for any errors or omissions in the informational content of this material or consequences arising out of or resulting from the use of the information contained herein.

Overview

DeviceNet is a digital, multi-drop network linking scanners and I/O devices. Each device and each scanner is a node on the network. DeviceNet systems can be configured to operate in a master-slave architecture. DeviceNet has power on the network, enabling devices with limited power requirements to be powered directly from the bus and simplifying building the network.

The FBM229 DeviceNet Communication Interface Module provides a high-capacity interface between DeviceNet devices and EcoStruxure™ Foxboro™ DCS. The FBM229 supports a network of up to 63 additional modules (including the Fieldbus Module (FBM) itself, the slave I/O modules, and a third-party configuration workstation).

The FBM229 is a master/scanner node on the DeviceNet bus communicating with the devices on the segment with both I/O and explicit messaging. The FBM229 supports all I/O modes - polled, cyclic, bit strobe, and change-of-state. The module uses explicit messaging to extract status, diagnostics, and asset management data from device parameters.

With the FBM229, you can use standard Foxboro DCS System Manager, FoxView™, and Control HMI displays, as well as custom process displays, to monitor the operating status of individual I/O devices and the health of the DeviceNet bus, including power supply status on the bus.

Per DeviceNet specifications, the FBM229 can be configured to operate at one of three different data transfer rates depending on the total cable length of the DeviceNet segment. Table 1 shows the maximum cable lengths for the three selectable transfer rates. DeviceNet supports the use of repeaters to extend the network beyond the maximums shown in Table 1.

Table 1. Maximum DeviceNet Bus Segment Length at Selectable Data Transfer Rates

Data Transfer Rate	500 kbit/s	250 kbit/s	125 kbit/s
Maximum Segment Length[a]	100 m(328 ft)	250 m(820 ft)	500 m(1640 ft)

[a] Maximum Length is before the addition of repeaters.

Features

Key features of the FBM229 are:

- Integrates DeviceNet devices into Foxboro DCS.
- Supports a single 64-device network, with data transfer rates up to 500 kbit/s.
- Conforms to the Open Device Vendors Association (ODVA) specification for DeviceNet networks, and is DeviceNet conformance tested.
- Provides all applications operating on Foxboro DCS control workstations access to I/O data and explicit message parameters.
- Enables the development of an integrated control database.
- Communicates with devices in polled, cyclic, bit strobe, and change of state I/O modes.
- Uses explicit messaging to access device parameters for status, diagnostics, and asset management data.
- Integrates device data into Foxboro DCS format for consistent operator displays of alarms, trends, and device status that are independent of the protocol/ communication bus used to bring the data into the system.
- Enables robust Foxboro DCS control of variable frequency drives, overload relays and contactors, starters, and other motor control center devices.
- Monitors individual device status and network health, including power supply status on the DeviceNet bus.
- Allows replacement of field devices without shutting down the network.
- Helps ensure that the DeviceNet segment is 100 percent galvanically isolated from the Foxboro DCS fieldbus.
- Suitable for installation in Class 1, Division 2, and Zone 2 locations.

Control Stations

The FBM229 provides the interface to field devices for either the DIN rail mounted FCP270/FCP280 Field Control Processors or the rack mounted ZCP270 Z–Form Control Processor. When deployed for use with an FCP270 or FCP280 (as shown in Figure 1), the module is installed in the same baseplate or in an adjacent baseplate, and communicates with the control station over a 2 Mbps Fieldbus. The FCP270 or FCP280, in turn, is connected over a 100 Mbps switched network to other control stations, supervisory applications, system management stations, and other Foxboro DCS control resources.

When the control station is a ZCP270, the FBM229 is installed in a 200 Series FBM system consisting of a Fieldbus Communications Module 100 (FCM100), the FBM229, and other FBM types.

The subsystem is connected to the ZCP270 via a 100 Mbps Ethernet network. For additional information on this subsystem, refer to *Standard 200 Series Subsystem Overview* (PSS 31H-2SOV).

Modular Baseplate Mounting

In addition to the four-position baseplate shown in *Figure 1*, the FBM can be mounted on any of the baseplates described in *Standard 200 Series Baseplates* (PSS 31H-2SBASPLT).

The 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.

The FBM229 is not powered by the DeviceNet segment. Rather, it sources power from the baseplate for its own operation and communication with the host control station. The FBM229 conforms to IEC 61158-2 and ISA S50.02 Physical Layer Standards as referenced to define, as a minimum, the signaling and electrical properties of a fieldbus device's Physical Layer interface.

The baseplate power is isolated from the voltage on the DeviceNet bus, which the FBM229 and other modules use for communication.

> **NOTE:** The Foxboro DCS power supply is not used to power the DeviceNet segment. You will need to install one or more ODVA-compliant power supplies to power the DeviceNet segment. See ODVA publication PUB00027R1, *Planning and Installation Manual: DeviceNet Cable System* for details.
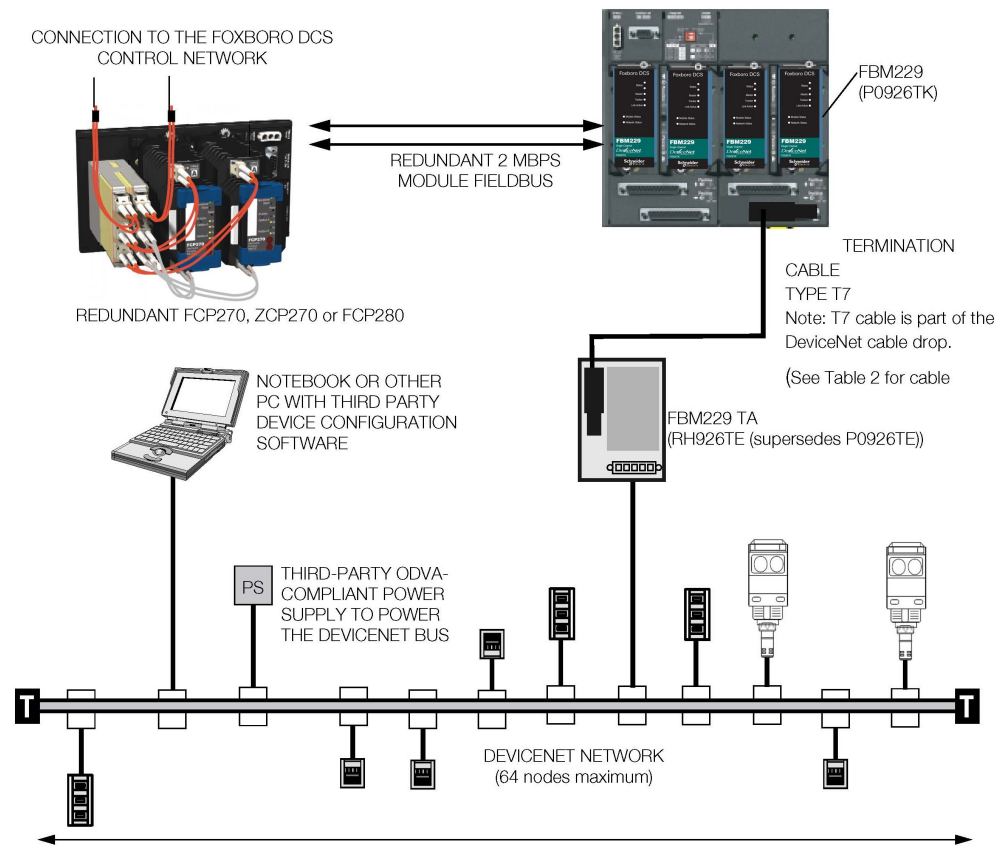
DeviceNet Drop

The FBM229 is connected to the DeviceNet segment via a DeviceNet specific termination cable (Type 7) and a termination assembly (TA), as shown in Figure 1. With this drop, the FBM229 operates as a scanner node on the network and complies with the DeviceNet Communication Adapter profile. See *Termination Assembly, page 8* for a description of the Type 7 cable and the TA.

DeviceNet Topologies

A basic DeviceNet topology is shown in Figure 1. However, numerous other topologies can be employed. Refer to ODVA's publication PUB00027R1, *Planning and Installation Manual: DeviceNet™ Cable System* (available at www.odva.org).

Figure 1. Typical FBM229 Configuration

See *Table 1* for maximum network cable length per transfer.

Device Configuration

Electronic Data Sheet

An Electronic Data Sheet (EDS) file, provided by the device manufacturer, is available for each DeviceNet module type. The file contains information specific to the device and specifies parameters such as supported connection modes, data types and length, and diagnostics.

Communications Configuration

Two different editors can be used to configure communications between the FBM229 and the I/O devices:

- A standalone DeviceNet Configurator is used with the Integrated Control Configurator (ICC).
- The Field Device Editor for DeviceNet plug-in is used with Foxboro DCS Control Editors.

Both editors extract device information from the EDS file, and enable you to specify I/O mode and data lengths for each device type to be used in the system. The configuration data is then downloaded to the FBM229 for each device instance.

Refer to *Implementing a DeviceNet Network* (B0750CH) for additional information on tools and editors for configuring and maintaining DeviceNet segments.

Device Parameter Configuration

The system requires a third-party configuration tool for device parameterization. Rockwell Automation's RSNetWorx™ for DeviceNet (Version 8.x) was used in the development and testing of the FBM229. However, any ODVA-compliant configuration tool can be used.

FBM Capacity

Per ODVA specifications, the DeviceNet segment can have up to 64 drops, including the FBM229 master, slave I/O devices, and a workstation with third-party configuration software.

For each device on the network, the FBM229 supports up to 250 bytes of I/O input data and up to 250 bytes of I/O output data.

The host FCP270/ZCP270 can make up to 1,000 connections to the I/O data being accessed (read or written) by each FBM229 over its DeviceNet segment. 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 digital input or output values (packed in groups of up to 32 digital points per connection)

A Foxboro DCS control station can access up to 1,000 analog I/O values, or 32,000 digital I/O values, or a combination of digital, analog, and string I/O, via the FBM229.

The FBM229 supports the Distributed Control Interface (DCI) block set that enables the control station to access device I/O data and explicit messaging for periodic parameter access.

For the complete specification of the number of devices supported versus maximum I/O per device, refer to the following documents:

- *Field Control Processor 270 (FCP270) Sizing Guidelines and Excel® Workbook* (B0700AV)
- *Z-Module Control Processor 270 (ZCP270) Sizing Guidelines and Excel Workbook* (B0700AW)
- Field Control Processor 280 (FCP280) Sizing Guidelines and Excel® Workbook (B0700FY)
- *Implementing a DeviceNet Network* (B0750CH)

    NOTE: The performance numbers presented in this section relate only to the capability of the FBM229 itself, and do not take into account loading on the control station from other FBMs.

Standard Design

The FBM229 has 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 on the DeviceNet bus. The indicators include the two standard DeviceNet green/red LEDs that indicate module and network status. Additionally, green and red LEDs indicate the operational status of the FBM229 itself and an intermittent amber LED shows communication activity on the DeviceNet bus.

Termination Assembly

Field I/O signals connect to the FBM229 via the DIN rail mounted passive Termination Assembly (TA) (p/n RH962TE and P0962TE). The TA's base is constructed of a rugged fire-retardant Polyamide material.

The TA and its associated termination cable provide feed-through connection between DeviceNet compliant field devices and the FBM229.

The TA includes two LEDs. A green one indicates there is CAN/network power and the polarity is correct. A red LED indicates that there is CAN/network, but that the polarity is incorrect.

The DIN rail mounted TA connects to the Modular Baseplate by means of a removable termination cable. The cable is available in a variety of lengths (*Table 2*), up to 5.0 meters (16.4 feet). The maximum TA-to-FBM cable length is limited so that the FBM drop on the DeviceNet segment is within the 6.0 meter maximum specified in the DeviceNet standard.

Key features include:

- Combination foot that supports 32 or 35 mm DIN rail mounting
- Standard open 5-pin connector for connection to the DeviceNet segment
- Type 7 cable and the TA form a DeviceNet compliant drop on the segment
- LEDs indicate CAN/network power and polarity

Table 2. Type 7 Cable Types and Part Numbers

Cable Length m (ft)	Type 7 LSZH[a]
0.5 m (1.6 ft)	RH928GU (supersedes P0928GU)
1.0 m (3.2 ft)	RH928GV (supersedes P0928GV)
3.0 m (9.8 ft)	RH928GW (supersedes P0928GW)
5.0 m (16.4 ft)	RH928GX (supersedes P0928GX)

[a] 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).

Functional Specifications

DeviceNet Communications	The FBM229 operates as a DeviceNet master/scanner using DCI blocks and I/O messaging in polled, cyclic, bit strobe, and change of state modes for control data. The DCI blocks can also be used with explicit messaging to read device parameters for status, diagnostics, and asset management.
	Bus Characteristics
	• General:
	Controller Area Network (CAN) protocol as specified by ODVA for DeviceNet networks
	• Data Transfer Rate (Baud Rate):
	Three selectable speeds: 125, 250 and 500 kbit/sec depending on network length (see *Table 1*)
	• Maximum Allowable Bus Length:
	Up to 500 m (1,640 ft) at 125 kbit/sec without repeaters (see *Table 1*)
	• Maximum TA Cable Length, FBM229 to TA:
	5.0 m (16.4 ft). As a DeviceNet drop, maximum cable length between the FBM229 and the DeviceNet trunk is 6.0 meters, per ODVA specifications
	• Maximum Number of Devices on a Bus:
	64, including the FBM229, slave I/O devices and a workstation with a third-party configuration tool, per ODVA specifications
	NOTE: The TYPE 7 cable between the FBM229 and the TA is a permanently attached drop-line, and needs to be taken into account when calculating the complete drop-line from the DeviceNet trunk and the FBM229 module.
FBM229 Bus Isolation	The FBM's fieldbus connection to the host CP270 or CP280 is galvanically isolated from the DeviceNet bus. The fieldbus is referenced to earth (ground). The FBM229 can withstand, without damage, a potential of 600 V ac applied for one minute between the network and earth.
	⚠⚠⚠ DANGER
	HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH
	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.
	Failure to follow these instructions will result in death or serious injury.
Conformance to DeviceNet Standards	The FBM229 conforms to the Open Device Vendors Association (ODVA) specification for DeviceNet networks, and is DeviceNet conformance tested.
FBM229 Power Requirements	• Input voltage range:
	24 V dc +5%, -10%
	• Consumption:
	6.0 W (maximum)
	• Heat Dissipation:
	6.0 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/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).
Calibration Requirements	Calibration of the module and termination assembly is not required.

Environmental Specifications

	Operating	Storage
Temperature	FBM229: -20 to +70°C (-4 to +158°F) Termination Assembly: -20 to +70°C (-4 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)	
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	

Physical Specifications

Mounting	- Module: The FBM229 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 *Standard 200 Series Baseplates* (PSS 31H-2SBASPLT) 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
Dimensions	- Module: - Height: 102 mm (4.0 in); 114 mm (4.5 in) including mounting lugs - Width: 45 mm (1.75 in) - Depth: 104 mm (4.11 in) - Termination Assembly - See *Figure 2*
Part Numbers	- FBM229 Module: P0926TK - Termination Assembly: RH926TE (supersedes P0926TE)
Indicators Mounted on the Front of the FBM	- Operational Status: Red and green light-emitting diodes (LEDs) - DeviceNet Link Status: 1 intermittent amber LED indicates communications activity - DeviceNet Module Status: Green/red LED indicates FBM229 status as a DeviceNet module - DeviceNet Network Status: Green/red LED indicates the status of DeviceNet bus - Other: 2 amber LEDs (Master and Tracker) are reserved for future use
Indicators Mounted on TA	Green LED indicates when there is CAN/network power and correct polarity Red LED indicates when there is CAN/network power and incorrect polarity
Termination Cables	- Cable Lengths: Up to 5.0 m (16.4 ft) Refer to *Table 2* - Termination Cable Type: Type 7 DeviceNet Compliant - Cable Connection: - Termination Assembly: 25-pin male D-subminiature - Modular Baseplate: 37-pin male D-subminiature

Termination Assembly Construction Material	Fire retardant Polyamide
Termination Assembly DeviceNet Connection	5-pin open style screw connector per DeviceNet specifications

Dimensions - Nominal

Figure 2. Termination Assembly (RH926TE (supersedes P0926TE))
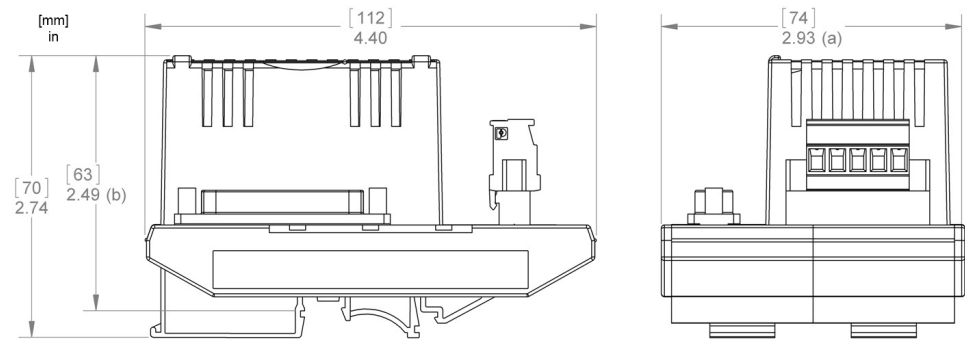
(a) Overall width — for determining DIN rail loading.

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

Related Product Specification Sheets

PSS Number	Description
PSS 31H-2SOV	Standard 200 Series Subsystem Overview
PSS 31H-2CERTS	Standard and Compact 200 Series I/O - Agency Certifications
PSS 31H-2SBASPLT	Standard 200 Series Baseplates
PSS 31S-10DEVNET	Field Device Editor for DeviceNet

Recommended Open Device Vendor Association (ODVA) Documents

Publication Number	Title
PUB00026R1	DeviceNet Technical Overview
PUB00027R1	Planning and Installation Manual: DeviceNet Cable System
PUB00147R0	Plant Floor Troubleshooting Guide

⚠ **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/.

PSS 41H-2S229, Rev A