Foxboro Evo™ Process Automation System

Product Specifications

Foxboro® by Schneider Electric

PSS 31H-2S215

FBM215 HART® Communication Output Module

An FBM215 provides up to eight HART® output channels. HART outputs are electrically compatible with 4-20 mA signals, permitting the plant to upgrade field devices without the need to change the control system.

OVERVIEW

The HART Communication Output Module (FBM215) contains eight channel-isolated outputs. The FBM215 supports any mix of standard 4 to 20 mA devices and HART devices.

The FBM215 serves as a HART communications field device host, enabling the Foxboro Evo™ system to request and receive two digital messages per second from each field device. The message pass-through capability can be used to support HART universal, common practice, and device-specific commands, but not the burst communication mode.

These commands are implemented using the *Intelligent Field Device Configurator Foxcom™ and HART™ Protocols* (IFDC — refer to PSS 21S-8A3 B3 for details).

The FBM215 provides an isolated power supply for each channel.

FEATURES

Key features of the FBM215 module are:

- Eight channel-isolated output channels, each providing one of the following outputs:
  - Standard 4 to 20 mA analog output signal
  - Digital HART Frequency Shift Keying (FSK) signal superimposed on a 4 to 20 mA analog output signal
- FSK modem dedicated to each output channel for bi-directional digital communications with a HART field device
- Galvanic isolation of all output channels from each other, and from ground and module logic
- Support for HART universal commands necessary to interface the field device with the Foxboro Evo system database
- Rugged design suitable for enclosure in Class G3 (harsh) environments
- Termination Assemblies (TAs) for locally or remotely connecting field wiring to the FBM215.

STANDARD DESIGN

The FBM215 has a rugged extruded aluminum exterior for physical protection of the circuits. Enclosures specially designed for mounting 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's operational status, and communication activity of the channels.

EASY REMOVAL/REPLACEMENT

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

FIELDBUS COMMUNICATION

A Fieldbus Communication Module or a Control Processor interfaces the redundant 2 Mbps module Fieldbus used by the FBMs. The FBM215 module accepts communication from either path (A or B) of the redundant 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, which accommodates up to four or eight FBMs. The modular baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for redundant fieldbus, redundant independent DC power, and termination cables.

TERMINATION ASSEMBLIES

Field output signals connect to the FBM subsystem via DIN rail mounted TAs. The TAs used with the FBM215 are described in "TERMINATION ASSEMBLIES AND CABLES" on page 7.

FUNCTIONAL SPECIFICATIONS

Field Device Channels

SUPPORTED HART INSTRUMENT TYPES
HART instruments compliant to Version 5, 6, or 7 of the HART specifications may be used

INTERFACE
8 isolated output channels

COMMUNICATIONS TO THE DEVICE
Point-to-point, master/slave, asynchronous, half-duplex, at 1200 baud

ERROR CHECKING
Parity on each byte, and one CRC check byte on each message

SPEED
2 messages per second

FASTEST ALLOWED ECB BLOCK PERIOD
100 msec - However, it is recommended that you refer to the *Sizing Guidelines and Excel Workbook* appropriate for your Control Processor to determine the optimal loading for a 100 msec Block Processing Cycle (BPC).

MAXIMUM DISTANCE (FBM215 TO FIELD DEVICE)
Meets HART FSK physical layer specification HCF_SPEC-54, Revision 8.1 [up to 3030 m (10000 ft)](1)

CURRENT OUTPUTS

Analog Accuracy (Includes Linearity)
±0.05% of span (between 4 mA and 20 mA)

Output Load
750 Ω maximum

Maximum Rate of Change
20 mA in 60 milliseconds

Resolution
13 bits

LOOP POWER SUPPLY PROTECTION
Each channel is channel-to-channel galvanically isolated, current limited, and voltage regulated. All analog outputs are limited by their design to about 25 mA. If the output FET shorts, the output current could increase up to 100 mA.

In normal operation the FBM outputs a constant current into a 0 to 750 ohm load.

ISOLATION
The channels are galvanically isolated (both optical and transformer isolation) from each other, and from ground and module logic. The module withstands, without damage, a potential of 600 V AC applied for one minute between the isolated channels and earth (ground).

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.

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%

CONSUMPTION
7 W (maximum)

HEAT DISSIPATION
5 W (maximum)

Calibration Requirements

Calibration of the module and termination assembly is not required.

(1) The maximum allowable distance decreases when the loop is operated through an intrinsic safety barrier. The maximum distance of the field device from the FBM is a function of compliance voltage (19 V DC at 20.4 mA), wire and load resistance, and voltage drop at the field device.

FUNCTIONAL SPECIFICATIONS (CONTINUED)

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

RoHS COMPLIANCE

Complies with European RoHS Directive 2011/65/EU

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 Evo 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 2006/95/EC (Prior to April 20, 2016) and 2014/35/EU (Beginning April 20, 2016) and Explosive Atmospheres (ATEX) directive 94/9/EC (Prior to April 20, 2016) and 2014/34/EU (Beginning April 20, 2016)

DEMKO certified as Ex nA IIC T4 for use in certified Zone 2 enclosure when connected to specified I/A Series processor modules as described in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).
Also, see Table 1 on page 8.

MARINE CERTIFICATION

ABS Type Approved and Bureau Veritas Marine certified for Environmental Category EC31.

ENVIRONMENTAL SPECIFICATIONS(2)

Operating

TEMPERATURE

Module

-20 to +70°C (-4 to +158°F)

Termination Assembly - PA

-20 to +70°C (-4 to +158°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.

Vibration

7.5 m/S^2 (0.75 g) from 5 to 500 Hz

(2) 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 FBM215 mounts on a modular baseplate. The baseplate can be mounted on a DIN rail (horizontally or vertically), or horizontally on a 19-inch rack using a mounting kit. Alternatively, FBM215 mounts on a 100 Series conversion mounting structure. Refer to *Standard 200 Series Baseplates* (PSS 31H-2SBASPLT) or *100 Series Conversion Mounting Structures* (PSS 31H-2W8) for details.

TERMINATION ASSEMBLY

The TA mounts on a DIN rail and accommodates multiple DIN rail styles including 32 mm (1.26 in) and 35 mm 1.38 in).

Weight

MODULE

284 g (10 oz) approximate

TERMINATION ASSEMBLY

Compression

181 g (0.40 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 Assembly

See page 10.

Part Numbers

FBM215 MODULE

RH922VU (supersedes P0922VU)

TERMINATION ASSEMBLIES

See “FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES” on page 7.

Termination Cables

CABLE LENGTHS

Up to 30 m (98 ft)

CABLE MATERIALS

Polyurethane or Low Smoke Zero Halogen (LSZH)

TERMINATION CABLE TYPE

Types 1 – See Table 2 on page 8.

CABLE CONNECTION – TA

FBM Baseplate End

37-pin D-subminiature

Termination Assembly End

25-pin D-subminiature

Construction – Termination Assembly

MATERIAL

Polyamide (PA), 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

TERMINATION ASSEMBLIES AND CABLES

Field output signals connect to the FBM subsystem via DIN rail mounted Termination Assemblies, which are **electrically passive.** TAs for the FBM215 are available in the following forms:

- Compression screw type using Polyamide material

See the following "FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES" for a list of TAs used with the FBM215.

The FBM215 provides sufficient loop resistance to allow use of the HART Hand-Held Terminal, or *PC20 Intelligent Field Device Configurator* (PSS 2A-1Z3 E).

A removable termination cable connects the DIN rail mounted TA to the FBM via a field connector on the baseplate in which the FBM is installed. Termination cables are available in the following materials:

- Polyurethane
- Low Smoke Zero Halogen (LSZH).

Termination cables are available in a variety of lengths, up to 30 meters (98 feet), allowing the Termination Assembly to be mounted in either the enclosure or in an adjacent enclosure. See Table 2 for a list of termination cables used with the TAs for the FBM215.

FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES

FBM Type	Output Signal	TA Part Number	TA Part Number PA[a]	Termination Type[b]	TA Cable Type[c]	TA Certification Type[d]
FBM215	8 output channels, 4 to 20 mA analog signal, alone or with HART signal superimposed		RH926SP (supersedes P0926SP, P0917XV)	C	1	1, 2

(a) PA is polyamide rated from -20 to +70°C (-4 to +158°F).
(b) C = TA with compression terminals.
(c) See Table 2 for cable part numbers and specifications.
(d) See Table 1 for Termination Assembly certification definitions.

Table 1. Certification for Termination Assemblies

Type	Certification[a]
Type 1	TAs are UL/UL-C listed as suitable for use in Class I; Groups A-D; Division 2 temperature code T4 hazardous locations. They are DEMKO certified EEx nA IIC T4 for use in Zone 2 potentially explosive atmospheres.
Type 2	TAs are UL/UL-C listed as associated apparatus for supplying non-incendive field circuits Class I; Groups A-D; Division 2 hazardous locations when connected to specified 200 Series FBMs and field circuits meeting entity parameter constraints specified in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). They are also DEMKO certified as associated apparatus for supplying field circuits for Group IIC, Zone 2 potentially explosive atmospheres. Field circuits are also Class 2 limited energy (60 V DC, 30 V AC, 100 VA or less) if customer-supplied equipment meets Class 2 limits.

(a) All TAs are UL/UL-C listed to comply with applicable ordinary location safety standards for fire and shock hazards. Hazardous location types comply with ATEX directive for II 3 G use. They also comply with the requirements of the European Low Voltage Directive. All listings/certifications require installation and use within the constraints specified in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA) and the conditions stated in UL and DEMKO reports.

Table 2. Cables Types and Part Numbers

Cable Length m (ft)	Type 1 P/PVC[a]	Type 1 LSZH [b]
0.5 (1.6)	RH916DA (supersedes P0916DA)	RH928AA (supersedes P0928AA)
1.0 (3.2)	RH916DB (supersedes P0916DB)	RH928AB (supersedes P0928AB)
2.0 (6.6)	RH931RM (supersedes P0931RM)	RH928AC (supersedes P0928AC)
3.0 (9.8)	RH916DC (supersedes P0916DC)	RH928AD (supersedes P0928AD)
5.0 (16.4)	RH916DD (supersedes P0916DD)	RH928AE (supersedes P0928AE)
10.0 (32.8)	RH916DE (supersedes P0916DE)	RH928AF (supersedes P0928AF)
15.0 (49.2)	RH916DF (supersedes P0916DF)	RH928AG (supersedes P0928AG)

Table 2. Cables Types and Part Numbers (Continued)

Cable Length m (ft)	Type 1 P/PVC[a]	Type 1 LSZH [b]
20.0 (65.6)	RH916DG (supersedes P0916DG)	RH928AH (supersedes P0928AH)
25.0 (82.0)	RH916DH (supersedes P0916DH)	RH928AJ (supersedes P0928AJ)
30.0 (98.4)	RH916DJ (supersedes P0916DJ)	RH928AK (supersedes P0928AK)

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

Migration Use of Termination Assemblies

When an FBM215 is used to replace the 100 Series FBM37, it may use any of the appropriate termination assemblies listed above for the FBM37's field I/O wiring.

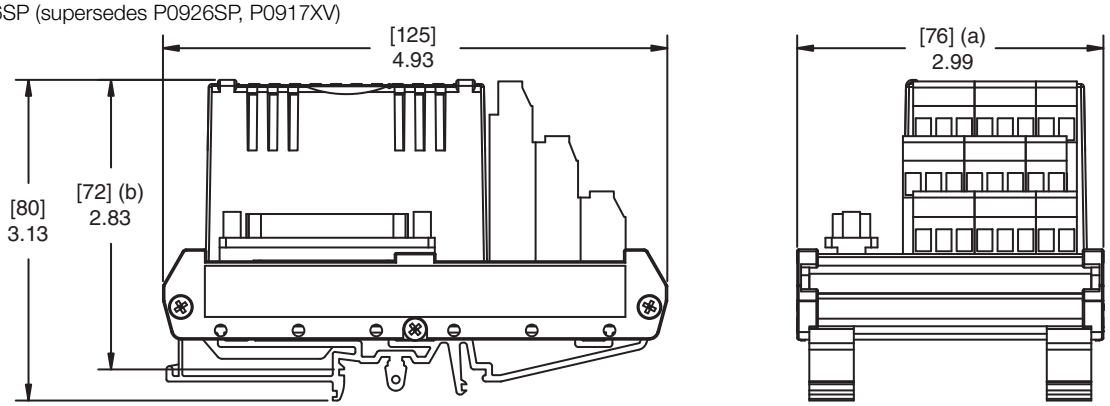
Alternatively, the FBM215 can accept this field wiring through a Termination Assembly Adapter (TAA) instead of a termination assembly. This is discussed in *Termination Assembly Adapter Modules for 100 Series Upgrade* (PSS 31H-2W4).

DIMENSIONS – NOMINAL

[mm]
in

Compression Termination Assembly

RH926SP (supersedes P0926SP, P0917XV)



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-2W100	100 Series Fieldbus Module Upgrade Subsystem Overview
PSS 31H-2CERTS	Standard and Compact 200 Series I/O - Agency Certifications
PSS 31H-2W4	Termination Assembly Adapter Modules for 100 Series Upgrade
PSS 31H-2SBASPLT	Standard 200 Series Baseplates
PSS 31H-2W8	100 Series Conversion Mounting Structures
PSS 21S-3CP270IC	Control Processor 270 (CP270) Integrated Control Software
PSS 31S-3FCPICS	Field Control Processor 280 (CP280) Integrated Control Software

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