Foxboro Evo™ Process Automation System

Product Specifications

Foxboro by Schneider Electric

PSS 31H-2S206

FBM206 Pulse Input Module

Measurement of a machine's rotational speed is often accomplished using a device that transmits high speed pulses. The FBM206 provide the means to accept up to eight of these pulse signals (up to 25kHz) and provide the values to the Foxboro Evo™ system. The FBM206b accepts up to four pulse inputs and provides up to four 0 to 20 mA outputs for associated controls.

OVERVIEW

The FBM206 contains eight pulse input channels and the FBM206b, provides four pulse input channels and four 0 to 20 mA analog output channels. Each input channel accepts a 2-wire, pulse input signal from a sensor. Input devices include vortex and turbine meters, solid state or electromechanical contacts, and other sensors with similar pulse outputs.

The modules perform the signal conversion required to interface the electrical input signals from the field sensors to the redundant fieldbus.

FEATURES

Key features of the FBM206/206b modules are:

- For the FBM206, eight 7 to 27 V DC, configurable, pulse input channels
- For the FBM206b, four 7 to 27 V DC, configurable, pulse input channels and four 0 to 20 mA analog output channels
- Each input channel accepts a pulse input with a maximum rate of 25 kHz

- Each channel is galvanically isolated from the other channels and ground
- Rugged design suitable for enclosure in Class G3 (harsh) environments
- Execution of the pulse input application program with configurable options for Pulse Rate Totalization and Resolution (on a per module basis) and Meter Scaling Factor
- Termination Assemblies (TAs) for locally or remotely connecting field wiring to the FBM206/206b
- Termination Assemblies for per channel internally and/or externally loop powered devices.

STANDARD DESIGN

The FBM206/206b module 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 status indications of Fieldbus Module (FBM) functions.

EASY REMOVAL/REPLACEMENT

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

FIELDBUS COMMUNICATION

A Fieldbus Communication Module or a Control Processor interfaces the 2 Mbps module Fieldbus used by the FBMs. FBM206 accepts communication from either path (A or B) of the redundant 2 Mbps Module Fieldbus – should one path fail or be switched at the system level, the module continues communication over the active path.

MODULAR MODULE MOUNTING

The modules mount 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 I/O signals connect to the FBM subsystem via DIN rail mounted TAs. The TAs used with FBM206 are described in “FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES” on page 7.

FUNCTIONAL SPECIFICATIONS

Process I/O Communications
Communicates with its associated FCM or FCP via the redundant 2 Mbps module Fieldbus

Input Channels
FBM206
8 isolated independent pulse input channels
FBM206b
4 isolated independent pulse input channels

Input Pulse Rate
10 Hz to 25 kHz

Input Channels (4 or 8)
ACCURACY
Pulse Count
No missing pulses for pulse rate 0 to 25 kHz
Pulse Rate
0.01% of reading, independent of rate

FIELD DEVICE CABLING DISTANCE
Maximum distance of the field device from the FBM is a function of compliance voltage (22.8 V DC), wire resistance, and voltage drop at the field device.

INPUT PULSE CHARACTERISTICS
See Figure 1.

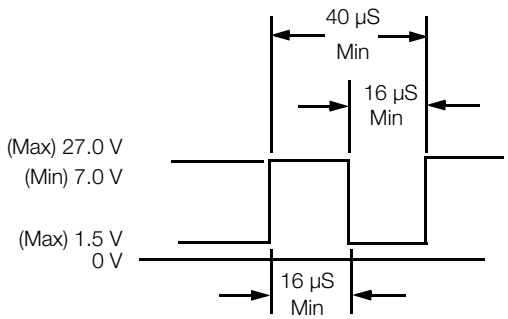


Figure 1. Input Pulse Characteristics

INPUT DUTY CYCLE
Minimum pulse width on/off (see Figure 1)

INPUT CHANNEL IMPEDANCE
10 KΩ

Input Channels (4 or 8) (Cont.)
LOOP POWER SUPPLY PROTECTION
Each channel is channel-to-channel galvanically isolated, current limited, and voltage regulated.

CHANNEL POWER SUPPLY INPUT
24 V DC ±10% at 30 mA maximum to field device

Output Channels (4 - FBM206b Only)
OUTPUT RANGE (EACH CHANNEL)
4 isolated independent 0 to 20.4 mA DC analog output channels

OUTPUT LOAD (MAXIMUM)
735 Ohms

COMPLIANCE VOLTAGE
18.6 V nominal at 20 mA DC at I/O field terminals

ACCURACY
±0.05% of span (@25°C)

OUTPUT TEMPERATURE COEFFICIENT
100 ppm/°C

COMMUNICATION
Via a redundant Fieldbus.

SETTLING TIME
100 ms to settle within a 1% band of steady state for a 10 to 90% input step change.

LINEARITY ERROR
±0.025% of span (monotonic)

RESOLUTION
12 bits

Input and Output Channel Isolation
For the FBM206 and FBM206b, each input channel is galvanically isolated from all other channels and earth (ground). The module/TA withstands, without damage, a potential of 600 V AC applied for one minute between any channel and ground, or between a given channel and any other channel.

FUNCTIONAL SPECIFICATIONS (CONTINUED)

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.

Power Requirements

INPUT VOLTAGE RANGE (REDUNDANT)
24 V DC +5%, -10%

CONSUMPTION
7 W (maximum)

HEAT DISSIPATION
5 W (maximum)

Calibration Requirements

Calibration of the module and termination assembly is not required.

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 7.

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

ENVIRONMENTAL SPECIFICATIONS(1)

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

PHYSICAL SPECIFICATIONS

Mounting

MODULE

FBM206/206b 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, FBM206b can be mounted on a 100 Series conversion mounting structure as a direct replacement for a 100 Series FBM06. Refer to *Standard 200 Series Modular 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
Ring Lug
249 g (0.55 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 9.

Part Numbers

FBM206 MODULE

RH916CQ (supersedes P0916CQ)

FBM206b MODULE

RH927AB (supersedes P0927AB)

TERMINATION ASSEMBLIES

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

(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 (CONTINUED)

Termination Cables

CABLE LENGTHS
Up to 30 m (98 ft)

CABLE MATERIALS
Polyurethane or Low Smoke Zero Halogen (LSZH)

TERMINATION CABLE TYPE
Type 1 – See Table 2 on page 8.

BASEPLATE TO MAIN TA CABLE CONNECTION

FBM Baseplate End
37-pin D-subminiature

Termination Assembly End
25-pin D-subminiature

Construction – Termination Assembly

MATERIAL
Polyamide (PA), compression or ring lug

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

RING-LUG TYPE ACCEPTED WIRING SIZES
#6 size connectors (0.375 in (9.5 mm))
0.5 to 4 mm^2/22 AWG to 12 AWG

TERMINATION ASSEMBLIES AND CABLES

Field input signals connect to the FBM subsystem via DIN rail mounted Termination Assemblies, which are electrically passive. TAs for the FBM206 are available in the following forms:

- Compression screw type using Polyamide (PA) material
- Ring lug type using Polyamide (PA) material

See “FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES” on page 7 for a list of TAs used with the FBM206.

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 FBM206 and FBM206b.

FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES

FBM Type	Input Signal	TA Part Number [a] PA	Termination Type [b]	TA Cable Type[c]	TA Certification Type[d]
FBM206	Eight channels, pulse input, passive feedthrough with FBM206 channel isolation	RH916XM (supersedes P0916XM, P0916JQ)	C	1	1,2
		P0917JQ (supersedes P0916PG)[e]	RL		
FBM206b	Four pulse input channels, Four 0 to 20 mA analog output channels, passive feedthrough with FBM206b channel isolation	RH924QN (supersedes P0924QN)	C	1	1,2
		RH924QP[f] (supersedes P0924QP)	C		

(a) PA is polyamide rated from -20 to +70°C (-4 to +158°F).
(b) C = TA with compression terminals; RL = TA with ring lug terminals.
(c) See Table 2 for cable part numbers and specifications.
(d) See Table 1 for Termination Assembly certification definitions.
(e) Polyamide RL supersedes the PVC RL, note this is not a RoHS part
(f) RH924QP/P0924QP includes output bypass jacks.

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

(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)

Use of Termination Assemblies in 100 Series Upgrade Subsystem

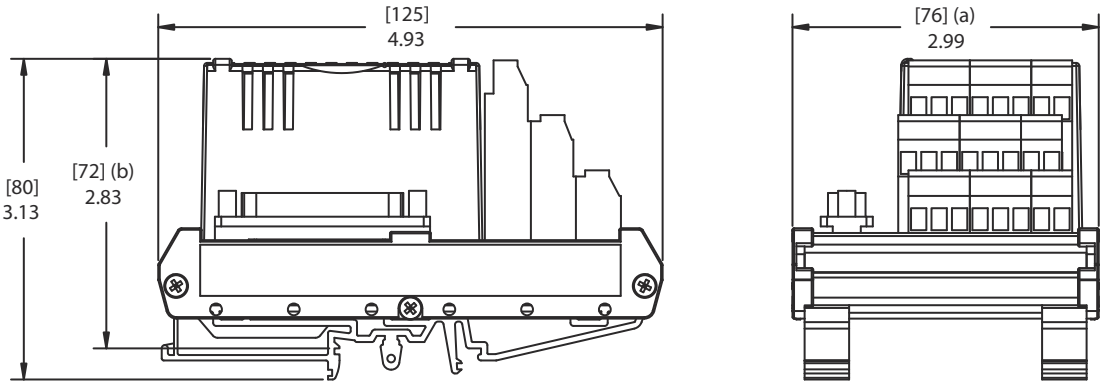
When an FBM206b is used to replace the 100 Series FBM06, it may use any of the appropriate termination assemblies listed above for the FBM06's field I/O wiring.

Alternatively, the FBM206b 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).

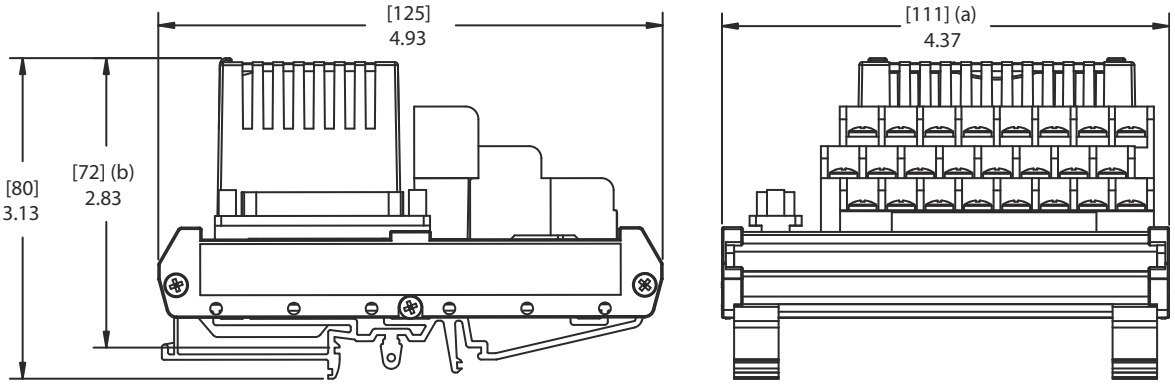
DIMENSIONS – NOMINAL

[mm]
in

Compression Termination Assembly - RH916XM (supersedes P0916XM, P0916JQ), RH924QN (supersedes P0924QN), RH924QP (supersedes P0924QP) (with Output Bypass Jacks)



Ring Lug Termination Assembly - , P0917JQ (supersedes P0916PG)[1]



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

[1]Polyamide RL supersedes the PVC RL, note this is not a RoHS part

RELATED PRODUCT SPECIFICATION SHEETS (PSS)

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

Foxboro®

by Schneider Electric

Invensys Systems, Inc.
38 Neponset Avenue
Foxborough, MA 02035-2037
United States of America
www.schneider-electric.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424
Website: https://support.ips.invensys.com

MB 031 0816