I/A Series® HARDWARE
Product Specifications

PSS 21H-2Z14 B4

FBM214 HART® Communication Input Interface Module



The FBM214 HART® Communication Input Interface Module provides eight input channels, each accepting a 4 to 20mA analog signal or a digital HART signal superimposed on a 4 to 20 mA analog input signal.

FEATURES

Key features of the FBM214 module are:

- Eight analog input channels, each accepting one of the following inputs:
  - Standard 4 to 20 mA analog sensor signal
  - Digital HART Frequency Shift Keying (FSK) signal superimposed on a 4 to 20 mA analog input signal.
- FSK modem dedicated to each input channel for bi-directional digital communications with a HART field device
- Analog to digital conversion of each of the 4 to 20 mA input signals from the HART devices
- Support for the HART universal commands necessary to interface the field device with the I/A Series® system database
- Galvanic isolation of the group of 8 input channels from ground and module logic
- Compact, rugged design suitable for enclosure in Class G3 (harsh) environments
- High accuracy achieved by sigma-delta data conversions for each channel
- Termination Assemblies (TAs) for locally or remotely connecting field wiring to the FBM214
- Termination Assemblies for per channel internally and/or externally loop powered transmitters.

FUNCTIONAL SPECIFICATIONS

Field Device Channels

VERSION SUPPORTED
HART Protocol v6

INTERFACE
8 group-isolated channels

COMMUNICATION 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.

SPEED
2 messages per second

FASTEST ALLOWED ECB BLOCK PERIOD
500 msec

MAXIMUM DISTANCE (FBM214 TO FIELD DEVICE)
Meets HART FSK physical layer specification HCF_SPEC-54, Revision 8.1 [up to 3030 m (10000 ft)](1).

COMPLIANCE VOLTAGE
18 V dc minimum at 20.5 mA

CURRENT INPUTS

Sense Resistor
61.9 Ω nominal

Total Input Resistance
280 Ω minimum

Accuracy (Includes Nonlinearity)
±0.03% of full scale

Temperature Coefficient
50 ppm/°C

Resolution
15 bits

Update Rate
100 ms

Integration Time
500 ms

Common Mode Rejection
>100 db at 50 or 60 Hz

Normal Mode Rejection
>35 db at 50 or 60 Hz

MAXIMUM LOOP RESISTANCE
280 Ω (not including the field device)(2)

LOOP POWER SUPPLY PROTECTION
Each channel is galvanically group isolated, current limited and voltage regulated. All inputs are limited by their design to less than 30 mA. If the current limit circuit shorts out, the current is limited to about 85 mA.

FBM INPUT IMPEDANCE
280 Ω minimum

FBM INTERNAL POWER FOR FIELD DEVICE
24 V dc ±10% common power supply for all channels. Loop load limited to one device per channel.

ISOLATION
The channels are not galvanically isolated from each other, but are galvanically isolated (both optical and transformer isolation) as a group from ground and module logic. Inputs use an internal FBM isolated power supply for field power. The module withstands, without damage, a potential of 600 V ac applied for one minute between the group-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

HEAT DISSIPATION
4 W (maximum)

(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, wire gauge and voltage drop at the device.

(2) In an intrinsic safety application, if a zener barrier is used between the FBM and the field device, the power supply must be set at 24V dc +5%, -1%. There are no specific constraints with the use of galvanic barriers.

FUNCTIONAL SPECIFICATIONS (CONTINUED)

Power Requirements

INPUT VOLTAGE RANGE (REDUNDANT)
24 V dc ±5%

CONSUMPTION
7 W (maximum)

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

PRODUCT SAFETY (FBM AND CABLE BALUN)

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 *I/A Series DIN Rail Mounted Subsystem User's Guide* (B0400FA). Where power is supplied by the FBM, 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 *I/A Series DIN Rail Mounted Subsystem User's Guide* (B0400FA).

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). Also, see Table 1 on page 9.

Calibration Requirements

Calibration of the module or termination assembly is not required.

ENVIRONMENTAL SPECIFICATIONS(3)

Operating

TEMPERATURE

Module

-20 to +70°C (-4 to +158°F)

Termination Assembly

PVC

-20 to +50°C (-4 to +122°F)

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

(3) 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
FBM214 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. Refer to PSS 21H-2W6 B4 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).

Mass

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 10.

Part Numbers

FBM214 MODULE
P0922VT

TERMINATION ASSEMBLIES
See “FUNCTIONAL SPECIFICATIONS – TERMINATION ASSEMBLIES” on page 8.

Termination Cables

CABLE LENGTHS
Up to 30 m (98 ft)

CABLE MATERIALS
Polyurethane or Hypalon®/XLP

TERMINATION CABLE TYPE
Type 1 – See Table 2 on page 9.

CABLE CONNECTION – TA
25-pin male D-subminiature

Construction – Termination Assembly

MATERIAL
Polyvinyl Chloride (PVC), compression
Polyamide (PA), compression
PVC, ring lug

FAMILY GROUP COLOR
Green – communication

TERMINAL BLOCKS
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

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