MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

FOXBORO

FBM214

FIELDBUS I/O MODULE

Used with the applicable Foxboro I/A Series DCS configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Schneider Electric / Foxboro official product specification

Foxboro™ DCS

FBM214b HART® Communication Input Module

PSS 41H-2S214

Product Specification

May 2025



Overview

The FBM214b HART Communication Input Module contains eight 4 to 20 mA individually isolated analog input channels. It supports any mix of standard 4-20 mA devices and HART devices.

The FBM214b can serve as a HART communications field device host, enabling Foxboro™ DCS to request and receive two digital messages per second from the field device. The message pass-through capability can be used to support HART universal, common practice, and device-specific commands, but it cannot support the burst communication mode. These commands are implemented using the Foxboro DCS Field Device Expert for HART. For details, see *Field Device Expert for HART Devices Control and I/O* (PSS 41S-10FDMHRT).

The FBM214b provides individually isolated power supplies to power each of the eight channels.

Optionally, the input channels can be powered by an external power supply. However, when a common external power supply is used with two or more channels, a Cable Balun module is required to help prevent HART communication channel crosstalk.

Features

- 8 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 Foxboro DCS database
- Per channel galvanic isolation of each of the 8 input channels from each other, ground and module logic
- Rugged design suitable for enclosure in Class G3 (harsh) environments
- High accuracy achieved by sigma-delta data conversions for each channel
- Termination Assembly (TA) for locally or remotely connecting field wiring to the FBM214b
- TA for per channel internally and/or externally loop powered transmitters

Standard Design

The FBM214b has a rugged extruded aluminum exterior for physical protection of the circuits. Enclosures specially designed for mounting the Foxboro DCS Fieldbus Modules (FBMs) provide various levels of environmental protection, up to harsh environments per ISA Standard S71.04.

High Accuracy

For high accuracy, the module incorporates a Sigma- Delta converter which can provide new analog input values for each channel every 100 milliseconds.

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 on 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 FBM214b module accepts communication from either path (A or B) of the redundant 2 Mbps fieldbus. If one path is unsuccessful or is switched off at the system level, the module continues communication over the active path.

The use of an external power supply common to two or more loops requires a Cable Balun Module to maintain communication signal line balance.

Termination Assemblies

Field input signals connect to the FBM subsystem via DIN rail mounted Termination Assemblies (TAs). The TA used with the FBM214b is described in Termination Assemblies and Cables, page 11.

Configuration Tools

The Compact FBM214b provides sufficient loop resistance to allow use of the HART Hand-Held Terminal or PC20 Intelligent Field Device Configurator (IFDC).

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.

Cable Balun Module

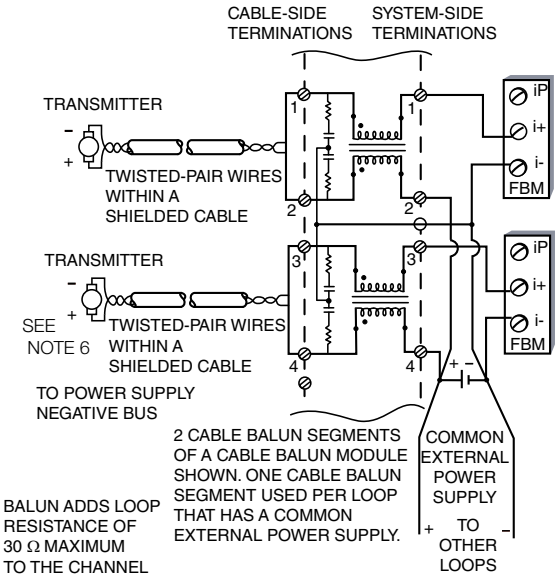
The Cable Balun module is used to maintain digital communication line balance for HART Transmitter to FBM loops that are powered from a common external power supply. This powering effectively connects one line of each loop together. Without the Baluns, in each loop so powered, the common connection at the external power supply would cause near end crosstalk at the system end of the loop wiring cable. Loops using FBM internal power source do not require Baluns.

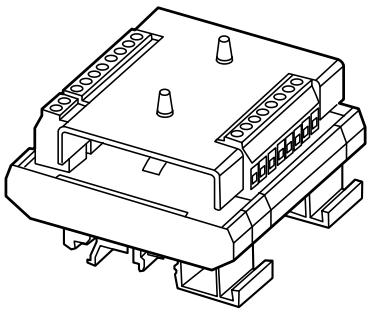
The Cable Balun module contains multiple Baluns. One Balun segment is interconnected in each externally powered loop (see Cable Balun Module). There is one Cable Balun module for four channels.

Cable Balun Module

Module Model	Module Part No.	No. of Baluns in the Module
CBM-4	RH903SV	4

Cable Balun Module





CABLE BALUN MODULE

NOTES:

1. For detailed information on balun use and installation, see *System Equipment Installation* (B0193AC).
2. Cable balun used only when multiple loops are connected to a common power supply. The FBM negative terminals connect directly to the minus (-) terminal of the power supply. The balun system side negative (-) terminals (2, 4, 6, and 8) connect to the power supply positive terminals when there are 4 (maximum) power loops.
3. For hazardous environments, install an intrinsic safety barrier such as an MTL 787S+ between the balun wiring to limit the amount of energy in the wiring.
4. A user-supplied capacitor can be installed across the external power supply(ies) to shunt AC power.
5. The external power supply can be redundant power supplies in parallel.
6. For this transmitter connection, use twisted-pair wiring inside a shielded cable with the shield grounded at the Foxboro DCS end.

Functional Specifications

Field Device Channels	• Supported HART Instruments: HART instruments compliant to Version 5, 6, or 7 of the HART specifications may be used • Interface: 8 individually isolated channels • Communication to the Device: Point-to-point, master/slave, asynchronous, half-duplex, at 1200 baud • Detected Error Checking: Parity on each byte, and one CRC check byte • Speed: 2 messages per second • Fastest Allowed ECB Block Period: 100 msec - However, we recommend that you see 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 (FBM214b to Field Device): Meets HART FSK physical layer specification HCF_SPEC-54, Revision 8.1 [up to 3,030 m (10,000 ft)] **NOTE:** 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. • Internal Loop Supply Compliance Voltage at Termination Assembly: 18.5 VDC minimum at 20.5 mA • Current Inputs: ◦ Sense Resistor: 61.5 Ω nominal ◦ Total Input Resistance: 280 Ω nominal ◦ Accuracy (Includes Nonlinearity): ±0.03% of full scale ◦ Temperature Coefficient: 50 ppm/ºC ◦ 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