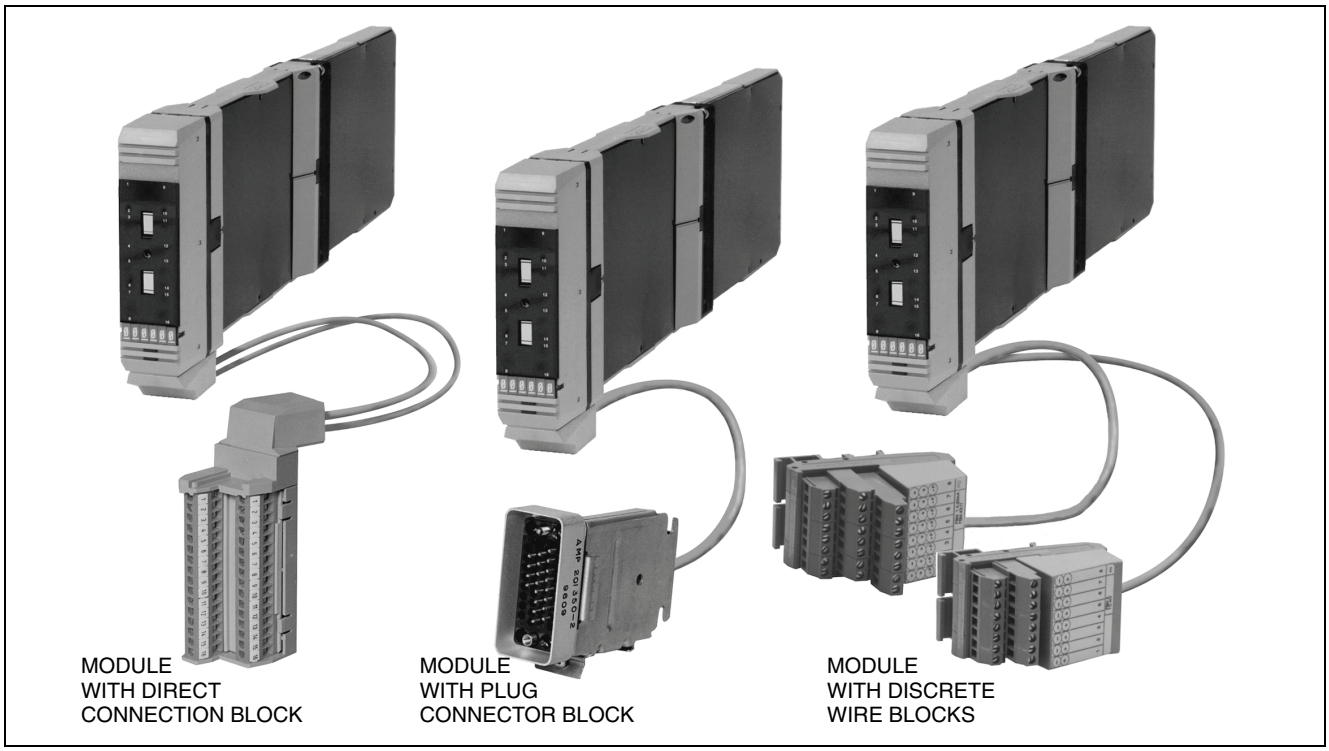
I/A Series® Hardware
0 to 10 V dc, Contact/dc Input/Output Interface Module (FBM17)



The 0 to 10 V dc, Contact/dc Input/Output Interface Module is a main module that provides the following input and output functions for analog and digital field signals.

Analog Signals

INPUT FUNCTIONS – 4 channels used collectively for either:

- dc voltage measuring only, or
- slidewire (position) sensing only.

OUTPUT FUNCTIONS – 2 channels used for driving positioners, controllers or remote indicators.

Digital Signals

INPUT FUNCTIONS – 4 channels used collectively for either:

- contact sensing only, or
- dc voltage monitoring only.

OUTPUT FUNCTIONS – 4 channels used collectively for either:

- dc output switching with an external source only (e.g. to control powering of various external loads), or
- dc output switching with an internal source only (e.g. to power external solid state relays or other similar devices).

The module performs the signal conversion required to interface these analog and digital (i.e. on/off state) electrical input/output signals from/to the field sensors/actuators to/from the redundant Fieldbus. In addition, it executes either the Analog I/O or Digital I/O application program.

The configurable options for each analog program are Input Resolution, Fail-safe Configuration (Hold/Fallback) and Output Fail-safe Fallback Data. The configurable options for each digital program are Input Filter Time, Fail-safe Configuration, Fail-safe Fall Back and Sustained or Momentary Outputs.

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If the Momentary Output configuration is selected, then Pulse Output Interval is also configurable.

Configurable options for inputs are exercised on a per module basis; those for outputs are exercised on a per channel basis..

FUNCTIONAL SPECIFICATIONS

Common Characteristics

ISOLATION

The module withstands, without damage, a potential of 600 V ac on the analog channels or 1250 V ac on the digital channels (see notes below) applied for one minute between the following points.

Analog Input to Earth (Ground)
600 V ac

Analog Output to Earth (Ground)
600 V ac

Analog Input to Output
600 V ac

Digital Input Pair to Input Pair[a]
1250 V ac

Digital Output Pair to Output Pair[A]
1250 V ac

Digital Input Pair to Output Pair[A]
1250 V ac

NOTE

This does not imply that these channels are intended for prolonged connection to voltages of these levels. Connection of channels to voltages in excess of those specified under the “Input Functions” and “Output Functions” sections of this specification violates electrical safety code requirements and may expose users to electric shock.

NOTE

Digital inputs are isolated in pairs (e.g., channels 1 and 2 are isolated from channels 3 and 4). When inputs are used with hazardous voltages (greater than 60 V dc), both channels of a pair must be used with hazardous voltages. Hazardous and nonhazardous voltages must not be mixed within a channel pair.

POWER REQUIREMENTS

Input Voltage Range (redundant)
26 to 42 V dc

Consumption
11 W (maximum)

HEAT DISSIPATION
9 W (maximum)

INDICATORS (mounted on termination assembly)

Operational Status
2 light-emitting diodes (LEDs)
(1 red and 1 green)

Digital Input Channel Status
4 LEDs (1 per channel)

Digital Output Channel Status
4 LEDs (1 per channel)

FIELD TERMINATION CONNECTIONS[b]

Discrete Wire Blocks
32 screw-clamp terminals (2 blocks using 16 terminals per block)

Plug Connector Block
34-pin connector. Mates with:

-Burndy MSD 34 PM 118
(plug with bar-type cable clamp)
-Burndy MSD 34 PM 124
(plug with clamshell hood)
-Burndy MSD 34 PM 824
(plug with suitcase hood)
-or equivalent

Direct Connection Block
32 screw-clamp terminals

COMMUNICATION
Via the redundant Fieldbus

Analog Signals

INPUT FUNCTIONS

Capacity
4 independent channels

Configurable Specifications
See Table 1.

Voltage Measuring
See Figure 1 (Analog Input Configurations)

Range (each channel)
-0.2 to 10.2 V dc

Rated Mean Accuracy (each channel)
±0.025% of span

Slidewire (Position) Sensing
See Figure 1 (Analog Input Configurations)

Excitation Reference Voltage
10 V dc ±2%

Excitation Reference Current
10 mA (maximum)

Slidewire Resistance
1 k Ω to 100 k Ω (nominal)

(a) Within the digital channel pairs, each of the two channels shares a common power supply and return.
(b) The discrete wire or plug connector block is available on termination cable assemblies for all enclosures excluding the Field Enclosure 4 and Multiple (Bridged) Industrial Enclosure 32. The direct connection block is available only on the termination cable assembly for the Field Enclosure 4. Multiple (Bridged) Industrial Enclosure 32 uses the plug connector block only.

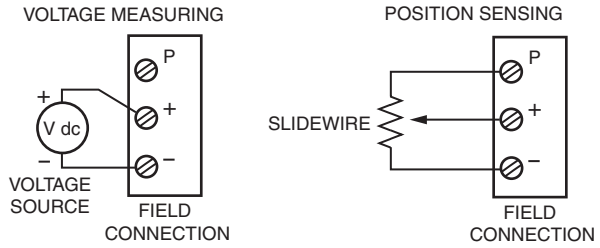

Figure 1. Analog Input Configurations

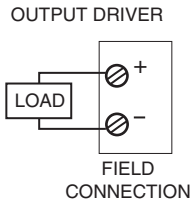

Figure 2. Analog Output Configuration

Table 1. Configurable Specifications for Analog Input Channels

Conversion Time (Seconds)	Settling Time[a] (Seconds)	Linearity Error[b] (% of Range)	Resolution (Bits)
0.1	0.3	0.013	12
0.2	0.5	0.008	13
0.5	1.1	0.005	14
1.0	2.1	0.005	15

(a) Output value settles within a 1% band of steady state for a 10 to 90% input step change.
(b) Monotonic (signal used for Fieldbus communications either increases or remains the same for increasing analog input signals).

FUNCTIONAL SPECIFICATIONS (Cont.)

Analog Signals (Cont.)

OUTPUT FUNCTIONS (Output Drivers)

See Figure 2 (Analog Output Configuration)

Capacity
2 independent channels

Range (each channel)
-0.2 to 10.2 V dc

Current (each channel)
2 mA (maximum)

Rated Mean Accuracy
±0.05% of span

Settling Time
150 ms maximum (to 1% of final value for 10 to 90% step change)

Linearity Error
±0.025% of span

Resolution
12 bits

Digital Signals

INPUT FUNCTIONS

Capacity
4 independent channels

Filter Time
Configurable (4, 8, 16, or 32 ms)

Digital Signals (Cont.)

INPUT FUNCTIONS (CONT.)

Contact Sensor

See Figure 3 (Digital Input Configurations)

Range (each channel)
Contact open (off) or closed (on)

Open-Circuit Voltage
24 V dc ±10%

Short-Circuit Current
2.5 mA (maximum)

ON-State Resistance
1 k Ω (maximum)

OFF-State Resistance
100 k Ω (minimum)

Voltage Monitor

See Figure 3 (Digital Input Configurations)

ON-State Voltage
15 to 130 V dc

OFF-State Voltage
0 to 5 V dc

Current
2.2 mA (typical) at 5 to 130 V dc

Source Resistance Limits (ON-State)
1 k Ω (maximum) at 15 V dc

Source Resistance Limits (OFF-State)
100 k Ω (minimum) at 130 V dc

FUNCTIONAL SPECIFICATIONS (Cont.)

Digital Signals (Cont.)

OUTPUT FUNCTIONS

Capacity

4 independent channels

Output Switch (with external source)

See Figure 4 (Digital Output Configurations)

Applied Voltage
60 V dc (maximum)

Load Current
0.5 A (maximum)

Shorted-Load Duration
Indefinite (duty cycle current limit on overload)

ON-State Current Limit
0.75 A (typical)

OFF-State Leakage Current
< 100 µA (typical)
1.0 mA (maximum)

Inductive Loads
Require a protective diode connected across the load (see Figure 4 diagram with protective diode). Diode must be capable of conducting maximum expected load current and have a voltage rating greater than 1.3 times the supply voltage.

Output Switch (with internal source)

See Figure 4 (Digital Output Configurations)

Output Voltage (no load)
11 V dc ±2 V dc

Source Resistance
660 Ω (nominal)

Shorted-Output (ON-State) Duration
Indefinite

OFF-State Leakage Current
< 100 µA (typical)
0.5 mA (maximum)

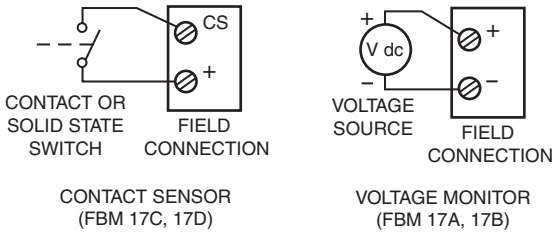

Figure 3. Digital Input Configurations

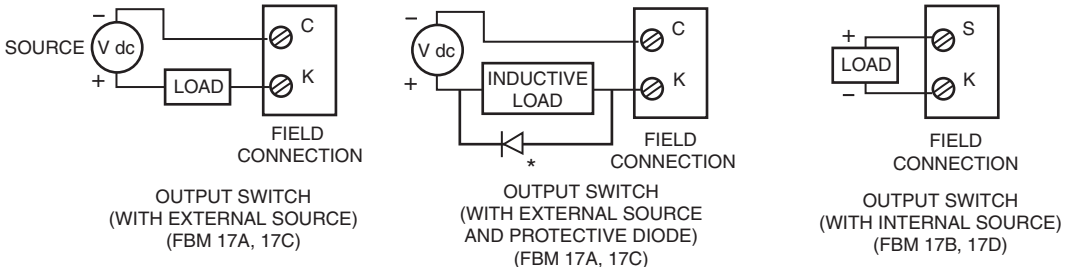

Figure 4. Digital Output Configurations

ENVIRONMENTAL SPECIFICATIONS[a]

Operating
TEMPERATURE
0 to 60°C (32 to 140°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
Class G3 (Harsh) as defined in ISA Standard S71.04

(a) The environmental ranges can be extended by the type of enclosure containing the module. {Refer to the Product Specification Sheet (PSS) applicable to the enclosure that is to be used.}

PHYSICAL SPECIFICATIONS

Mounting
WITH Y-ADAPTER
Installable in the 1x8 Mounting Structure, I/A Series Industrial Enclosures and Field Enclosure 8
WITHOUT Y-ADAPTER
Installable in I/A Series Field Enclosure 4 and the 1x8 FBM Mounting Structure.

Mass
1 kg (2.2 lb)

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