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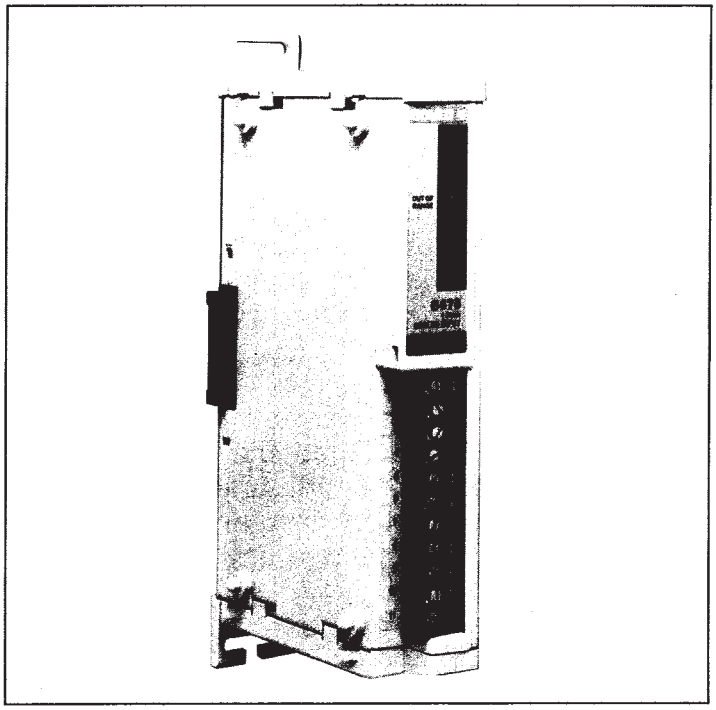
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B375-001 4-20 mA Analog Input Module
DATA SHEET

The B375-001, 4-20 mA Analog Input Module converts two 4-20 mA, or two 1-5 VDC analog signals, or one of each to numerical values that range from 0 to 999 and applies these values to the *Micro 84*[tm] controller.

FEATURES

- Two isolated channels
- Both channels 4-20 mA and 1-5 VDC compatible
- Differential inputs
- High accuracy
- 10-bit resolution
- Self-contained power supply
- Optional Fanning Strip permits module removal without disturbing field wiring
- Designed for harsh industrial environments
- UL listed



GENERAL DESCRIPTION

The B375-001 4-20 mA Analog Input is an input module for the *Micro 84* controller. It converts two 4-20 mA, or two 1-5 VDC analog signals, or one of each to numerical values that range from 0 to 999. These values are directly proportional to the input. For example, if the input current or voltage increases 10 percent, the numerical output also increases 10 percent.

The Analog Input Module transfers these numerical values to input registers 3001 through 3004. Once in the registers, these values can be used to control timers, counters, sequencers; or it can be manipulated by arithmetic functions. Typically, the B375 is used in data acquisition and set point applications.

The varying current/voltage, which are inputs to the B375, represent parameters such as pressure, level, temperature, humidity, weight and position. These inputs come from transmitters or transducers that may be located several hundred feet from the Input Module. You simply connect these inputs to a front-mounted, screw terminal strip. This strip is compatible with an optional Fanning Strip (P/N 0212-012), which allows quick module replacement without disturbing field wiring.

To simplify installation, the terminals on the strip are clearly marked so that you can connect either the 4-20 mA current loop or the varying d-c voltage (1-5 V) operation to each channel. (The voltage input is actually a differential input to achieve high accuracy and significant noise immunity.) Moreover, you can make the connections without adding more electronic components.

To further simplify installation, the B375 is factory configured in the current loop mode using shorting bar between terminals 1 and 2 and 7 and 8, as shown on the terminal

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numbering and connections diagram. For voltage operation, simply remove this shorting bar.

Besides the terminal strip, an OUT OF RANGE diagnostic indicator for troubleshooting is also located on the front of the B375 module. It flashes whenever the input is out of its prescribed range (4 to 20 mA or 1 to 5 V). This indicator will also show that one of the input wires is either shorted to ground or open.

Both channel 1 and channel 2 inputs are isolated from each other. In addition, the inputs are isolated from all I/O modules connected to the *Micro 84* and from the *Micro 84* controller itself.

The B375 is easy to install. First it is housed in a light-weight, shielded, durable Lexan case. It contains mounting brackets at the rear of the case which simplify installation. Next, it can be mounted anywhere in the I/O structure. Connectors located on the left- and right-rear sides of the case plug into similar connectors on adjacent modules.

This plugging action automatically connects the Analog Input Module to the data bus of the *Micro 84*. If the B375 is the rightmost module in the I/O structure, you plug a termination connector into the connector located on the right-rear side. This termination connector is shipped with the *Micro 84* controller. To minimize installation costs, the *Micro 84* provides the B375 with all operating voltages, thus eliminating the need for a separate power supply.

The B375 meets the stringent requirements of both IEEE and ANSI standards for radiated surge withstand capability (SWC). The B375 also withstands the severe voltage transients, electromagnetic interference, and magnetic fields commonly encountered in an industrial environment.

SPECIFICATIONS

Electrical Characteristics

Input Range	4-20 mA or 1-5 VDC
Resolution	1 of 999 counts
current mode	16 μA per count
voltage mode	4 mV per count
Accuracy	± 0.1%/1 count @ 25°C
	± 0.3%/3 counts @ 0-60°C*

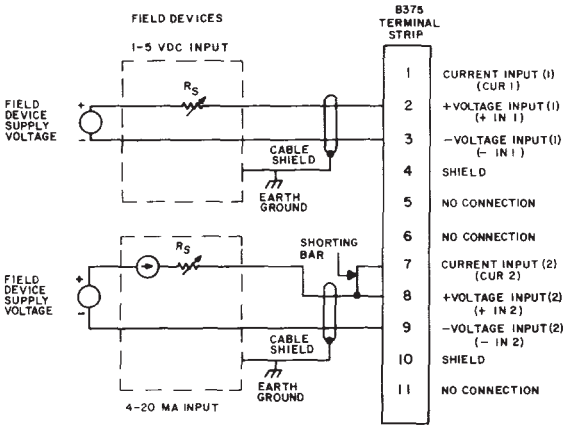
*(You can recalibrate to ± 0.15% at a particular temperature betwen 0-60°C.)

Linearity	0.1% of full scale
Input Impedance	
current mode	250 ohms
voltage mode	1 Megohm, differential 0.5 megohm each input to shield
Input Protection	240 VRMS
Channel Isolation	20 V/-9.5 V (with respect to module shield terminal)
Module Isolation	1500 VRMS for one minute
Common Mode Rejection	– 86 dB @ 50/60 Hz
Input Filter	– 3 dB down @ 18 Hz; rolloff 20 dB per decade

Circuit Characteristics

Topology	2 channels
Operating Modes	Independently selectable current or voltage
Register Format	Nos. 3001 & 3002 or Nos. 3003 & 3004
Data Format	0 to 999 counts linear to inputs
Throughput Rate	1.25 samples per second (each channel)

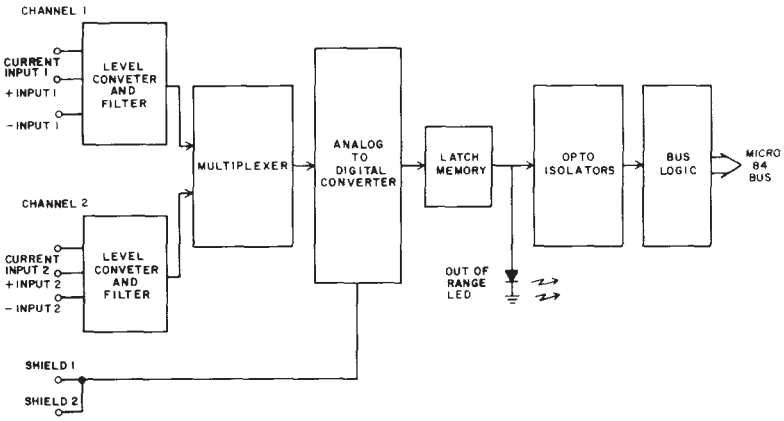
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NOTES:

1. If earth ground is unavailable at field device, connect cable shield to shield terminal on module. DO NOT connect at both ends of cable.
2. For one voltage input connect Channels 1 & 2 in parallel; for one current input connect Channels 1 & 2 in series.

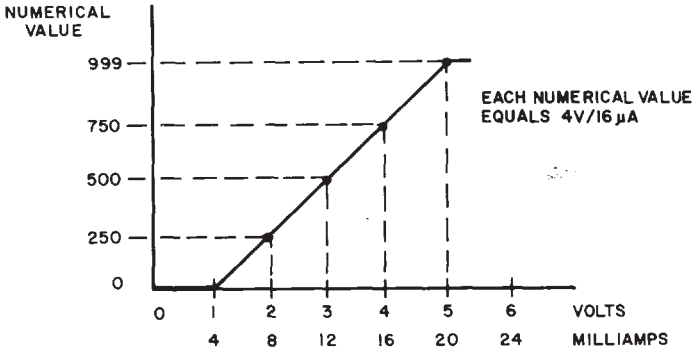
B375, 4-20 mA Analog Input Module Terminal Numbering and Input Connections



B375, 4-20 mA Analog Input Module Block Diagram

Environment

Operating Temperature	0 to 60°C
Humidity	0 to 95% (non-condensing)
Shock	15 G for 11 ms
Vibration	0.625 G, 50-500 Hz
EMI	MIL-STD-461B
MI	Helmholtz coil (20 Gauss)
RFI	FCC Class A
Surge withstand capability (SWC)	IEEE STD 472-1974 and ANSI C37.90-1974 (2500 V, 1.5 mHz for 6 μs) Coupled

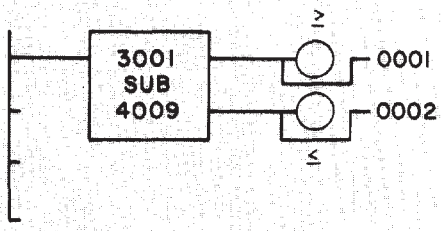


Relationship Between Numerical Value and Voltage/Current Inputs

Dimension (W x H x D)	1.63 in x 10.50 in x 5.50 in (41.40 mm x 266.70 mm x 139.70 mm)
Weight	1 lb (0.45 kg)
Termination	Screw Terminals; Fanning Strip Compatible
Wire Size	Two #14 AWG (max)
Construction	Lexan
Indicator	OUT OF RANGE

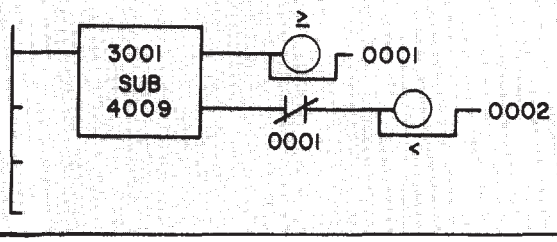
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Network No. 1 - Simple Set Point Control



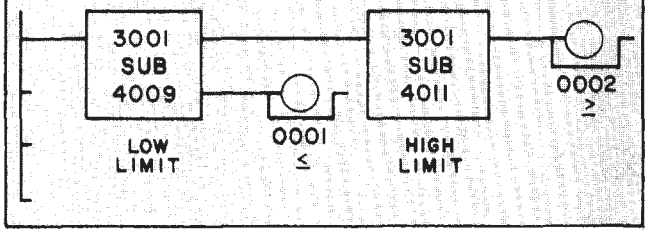
Network #1 compares the value from an analog input in register 3001 with a preset value in register 4009. If the input value is greater than or equal to the preset value, coil 0001 is ON. Conversely, if the input is less than or equal to the preset value, coil 0002 is ON. This comparison is performed on every *Micro-84*™ scan.

Network No. 2 - Set Point Control



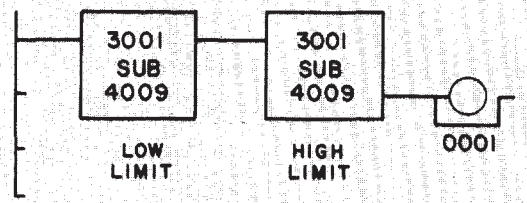
Network #2 performs a similar set point function as Network #1, but both coils do not go ON when the input value in register 3001 is equal to the preset value in register 4009. Coil 0002 is ON only when the input is less than the preset value. Greater than or equal input values turn on coil 0001. Alternatively, a normally closed 0002 contact positioned prior to coil 0001 (while removing contact 0001) will prevent equal values from turning ON coil 0001.

Network No. 3 - "Dead Band" Set Point Control



Network #3 will turn ON coil 0001 when the analog input value is less than or equal to the preset value in register 4009. Coil 0002 is ON when the input value is greater than or equal to the preset in register 4011. The preset value in register 4011 is greater than the preset value in register 4009. Values between these will turn both coils OFF.

Network No. 4 - "Pass Band" Set Point Control



Network #4 performs the inverse of Network #3. Coil 0001 is ON only when the analog input is between or equal to preset values in registers 4009 and 4011. The preset value in register 4011 is greater than the preset value in register 4009.

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