Isolated, Field Configurable Analog Input

6B13 / 6B13HV

FEATURES

Single-channel isolated signal-conditioning modules.
Accepts outputs from platinum, nickel and copper RTD sensors.
Complete microcomputer-based data acquisition systems.
Can be remotely reconfigured for various sensor types and input ranges.

APPLICATIONS

Process Monitoring & Control
Test Stand Automation
Machine Monitoring
Material Testing
Remote Energy Mangement
Laboratory Data Acquisition

PRODUCT OVERVIEW

The 6B Series delivers sensor-to-host signal-conditioning for remote applications. Software-configurable for a wide variety of sensor types, including: analog input, analog output, and digital I/O, the 6B Series is intended for remote data acquisition, machine monitoring, remote energy management and process monitoring and control applications.

Including transformer-based isolation, ranging, linearization, A/d conversion and RS-232C/RS-485 serial communication for up to 256 channels per serial port, the 6B Series modules and boards are a complete, low-cost interface between computers and analog signals.

All 6B Series input/output modules are fully encapsulated and identical in pin-out and size, facilitating their ability to be mixed and matched with all other 6B Series modules on the same backplane. The 6B Series is fully rated over the industrial temperature range of -25°C to +85°C.

Each 6B Series module and board is a complete microcontroller-based process monitoring and control system, with all calibration, address and linearizing parameters stored in non-volatile memory. Being microcontroller-based, 6b Series modules can be configured for various sensor types, including RTD and thermocouple, and a wide variety of input ranges. This reduces the number of different modules that need to be used in a given application and carried in inventory.

FUNCTIONAL BLOCK DIAGRAM

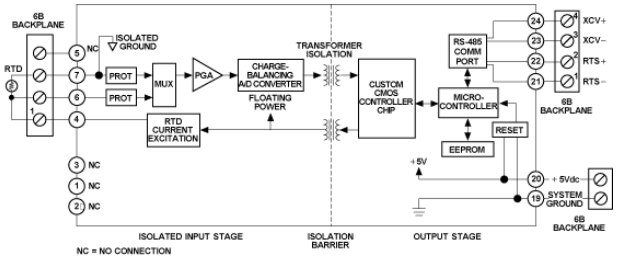

Figure 1. 6B13 & 6B13HV Functional Block Diagram

Designed for industrial applications, the 6B Series modules incorporate transformer-based isolation with surface-mount manufacturing technology – providing increased reliability at low cost. The compact, rugged 6B Series analog modules can be mixed and matched on a 16-channel backplane for high density, remote process monitoring and control.

Communications between backplanes, modules and host is in ASCII over an RS-232C link or RS-485 bi-directional serial bus. Circuitry to convert RS-232C to RS485 is built into the 6B backplane. Baud rates are software programmable, with speeds up to 19.2 K Baud.

The 6B Series digital subsystem communication is compatible with the overall 6B Series communication protocol. Each digital I/O board can be configured for its address, baud rate and checksum status. Connection to the 16 and 24-channel solid state relay backplanes is by a 50-conductor ribbon cable. This enables interfacing with input and outputs from 4 V to 240 V. Power control modules are also available that can switch up to 3A and come with a variety of ratings for low voltage DC up to 280 VAC.

Rev. 0

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GENERAL DESCRIPTION

The 6B13 and 6B13HV are single-channel isolated signal-conditioning modules which accept outputs from platinum, nickel and copper RTD sensors. Unlike conventional signal conditioners, the 6B13 and 6B13HV are complete microcomputer-based data acquisition systems. A major advantage of the on-board microcontroller is its ability to be remotely reconfigured for various sensor types and input ranges.

Software Configuration – The 6B13 and 6B13HV linearize 100Ω platinum RTDs (alphas of 0.00385 and 0.003916), 120Ω nickel RTDs and 10Ω copper RTDs. Software is used to configure the 6B13 and 6B13HV modules for address, input range, baud rate, data format, checksum status and integration time. All programmable parameters are stored in the nonvolatile memory of the module.

RTD sensor excitation current of 250 uA (2.25 mA for copper RTDs) is supplied by a tracking pair of current sources. The resulting analog input signal is conditioned and scaled by a programmable-gain amplifier and digitized by a 16-bit integrating converter under microprocessor control. The digitized value is passed serially across a magnetically isolated barrier (1500 V rms – Model 6B12; 2500 V rms – Model 6B13HV) and clocked in by a custom controller chip. The on-board microprocessor then converts the data into engineering units or as a percentage of full scale, as determined by the channel parameters. In between conversions, the microprocessor auto zeros the offset and gain by monitoring the on-board temperature and compensating for reference drift. The 6B13 and 6B13HV use compensation factors to ensure the highest accuracy possible.

Figure 2

Models 6B13 and 6B13HV

Range Description (Software Configurable)	Accuracy (Typical)	Error (Maximum)	Noise (Peak-to-Peak)
Pt, -100°C to +100°C, α = 0.00385	±0.02°C	±0.15°C	0.03°C
Pt, 0°C to +100°C, α = 0.00385	±0.03°C	±0.15°C	0.04°C
Pt, -100°C to +200°C, α = 0.00385	±0.03°C	±0.15°C	0.04°C
Pt, -100°C to +600°C, α = 0.00385	±0.05°C	±0.15°C	0.05°C
Pt, -100°C to +100°C, α = 0.003916	±0.03°C	±0.15°C	0.03°C
Pt, 0°C to +100°C, α = 0.003916	±0.05°C	±0.15°C	0.03°C
Pt, 0°C to +200°C, α = 0.003916	±0.03°C	±0.15°C	0.04°C
Pt, 0°C to +600°C, α = 0.003916	±0.04°C	±0.15°C	0.05°C
Ni, -80°C to +100°C	±0.05°C	±0.15°C	0.02°C
Ni, 0°C to +100°C	±0.03°C	±0.15°C	0.02°C
Cu, (0 °C @ +25°C), 0°C to +120°C	±0.13°C	±1.4°C	0.04°C
Cu, (10 °C @ +25°C), 0°C to +120°C	±0.11°C	±1.4°C	0.04°C

6B13 and 6B13HV Specifications
(typical @ +25°C and V_s = +5 V dc)

Description	Model 6B13 and 6B13HV
Inputs, Software Selectable	
RTD Types	Platinum, 100 Ω, α = 0.00385 or 0.003916 Nickel, 120 Ω Copper, 10 Ω
Temperature Ranges	Refer to Model Table
Communications	
Protocol	RS-485
Baud Rates, Software Selectable	300 K, 600 K, 1.2 K, 2.4 K, 9.6 K, 19.2 K
Accuracy	
Initial @ +25°C	Refer to Model Table
Input Offset vs. Temperature	±0.005°C/°C[1]
Span vs. Temperature	±0.005°C/°C[1]
Sensor Excitation Current	
100 Ω Pt; 120 Ω Ni	0.25 mA
10 Ω Cu	2.25 mA
Lead Wire Resistance, each lead	10 Ω maximum
Lead Resistance Effect	
100 Ω Pt; 120 Ω Ni	±0.0007°C/Ω
10 Ω Cu	±0.01°C/Ω

Bandwidth, -3 dB	4 Hz
Conversion Rate	9 samples/second
Common-Mode Voltage (CMV)	
Input-to-Output and Power	
Model 6B13	1500 V rms, continuous
Model 6B13HV	2500 V rms, continuous
Common Mode Rejection (CMR)	
1 kΩ Source Imbalance @ 50/60 Hz	160 dB
Normal Mode Rejection (NMR)	
1 kΩ Source Imbalance @ 50/60 Hz	56 dB
Input Protection	240 V dc, continuous
Input Transient Protection	ANSI/IEEE C376.90.1-1989
Power Supply	
Voltage, Operating	+5 V dc ±5%
Voltage, maximum safe limit	+6.5 V dc
Current	+100 mA
Mechanical Dimensions	2.3" x 3.1" x 0.79" (58.4 mm x 78.7 mm x 19.1 mm)
Environmental	
Temperature Range	
Rated Performance	-25°C to +85°C
Operating	-25°C to +85°C
Storage	-40°C to +85°C
Relative Humidity, 24 hours	0 to 95% @ +60°C non-condensing

[1] Combined effect of zero drift and span drift.
Specifications subject to change without notice.

PIN CONFIGURATIONS AND FUNCTIONAL DESCRIPTIONS

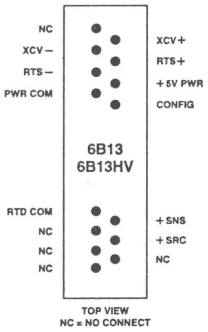

Figure 3 . Model 6B Series Module, with pin-out assignments.

Table 1. Pin Function Descriptions—

Pin No.	Description
1	N/C
2	HI
3	LO
4	N/C

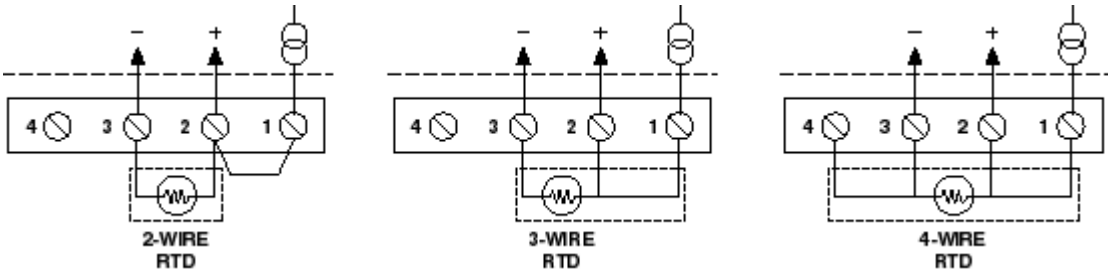

Figure 4 6B13 & 6B13HV Input Field Connections

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

OUTLINE DIMENSIONS

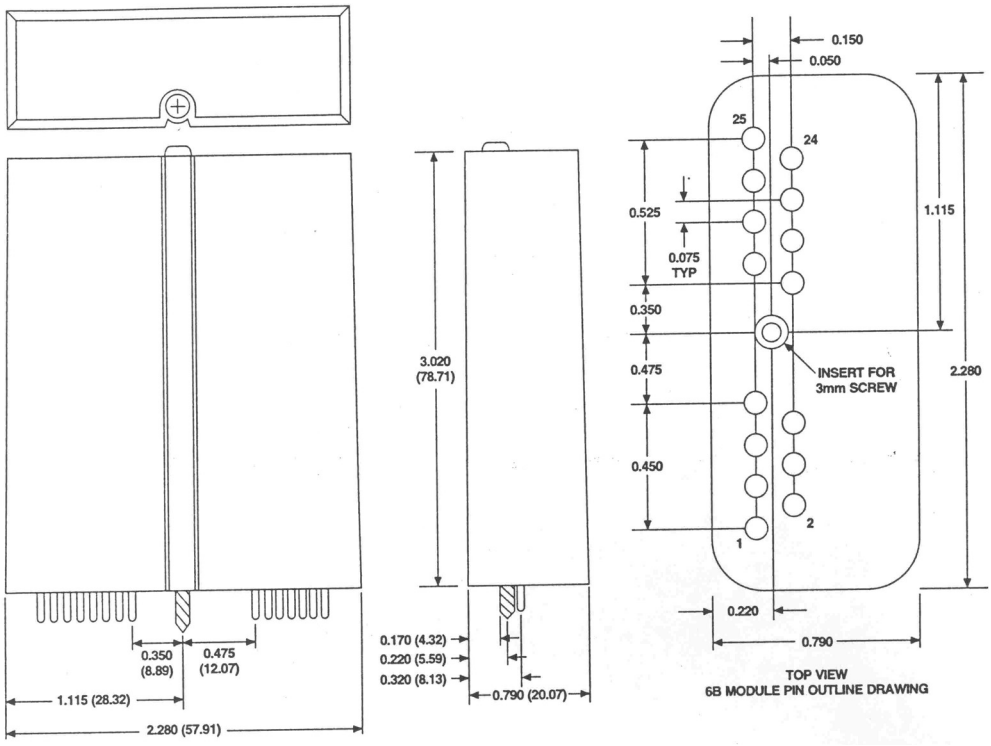

Figure 5. Outline Dimensions

NOTES

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