6B13/6B13HV Isolated, Field Configurable Analog Input

Functional 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 100 Ω platinum RTDs (alphas of 0.00385 and 0.003916), 120 Ω nickel RTDs and 10 Ω 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.

Inside the 6B13 and 6B13HV

RTD sensor excitation current of 250 µA (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 6B13; 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.

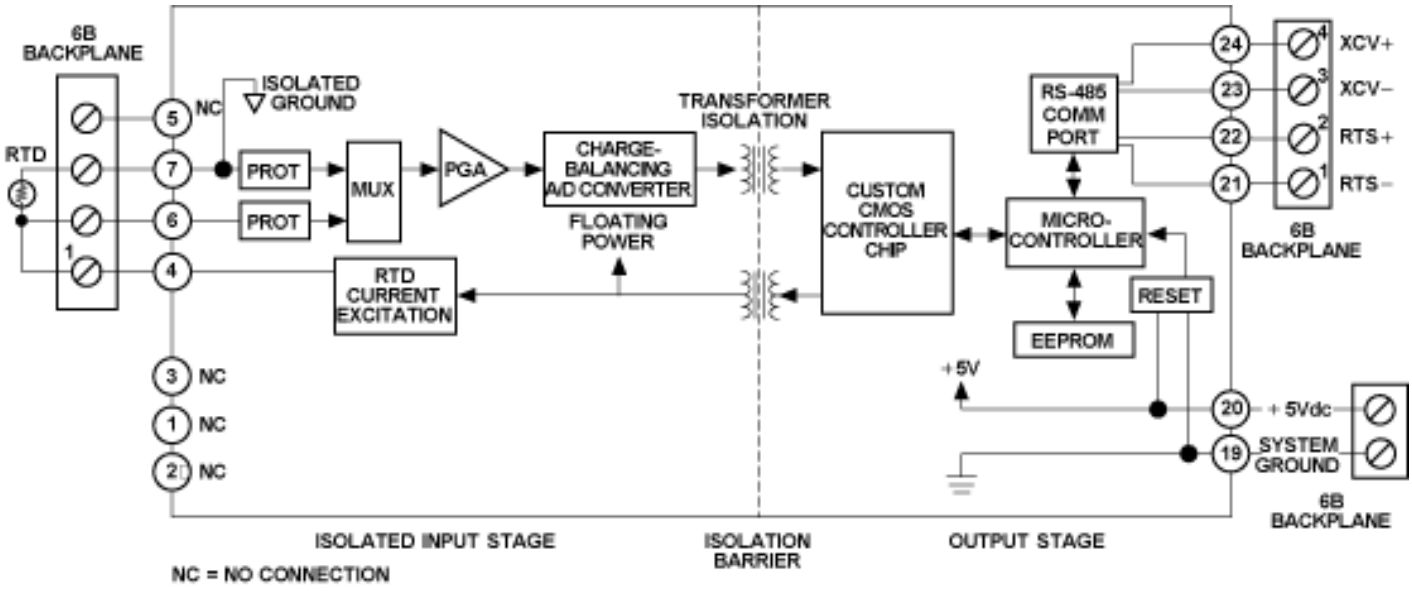

Figure 1. 6B13 and 6B13HV Functional Block Diagram

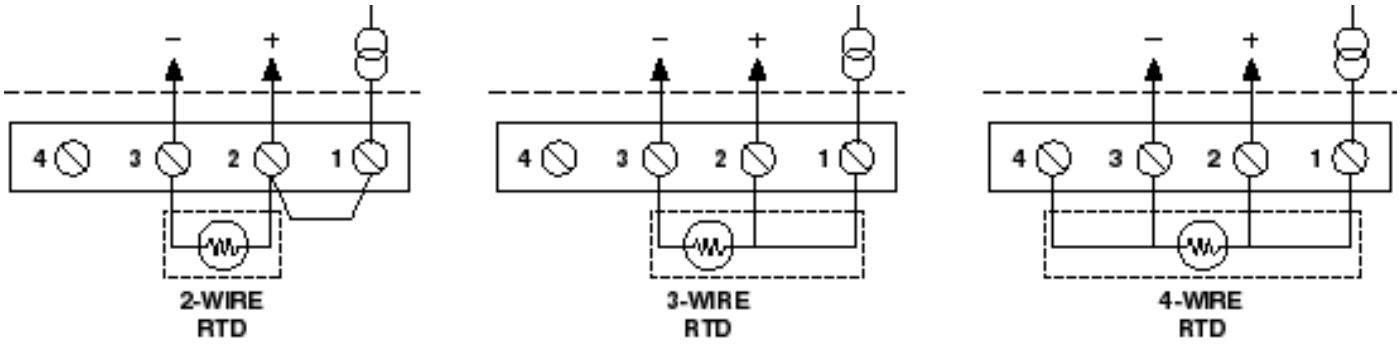

Figure 2. 6B13 and 6B13HV Field Connection Diagram

Inputs

- 100 Ω Platinum RTDs
- 120 Ω Nickel RTDs
- 10 Ω Copper RTDs

Communications

- RS-485 Interface

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 ½ @ +25°C), 0°C to +120°C	±0.13°C	±1.4°C	0.04°C
Cu, (10 ½ @ +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 noncondensing

[1] Combined effect of zero drift and spna drift.

Specifications subject to change without notice.