6B11/6B11HV Isolated, Field Configurable Analog Input

Functional Description

The 6B11 and 6B11HV are single-channel isolated signal-conditioning modules which accept the outputs from thermocouple, millivolt, voltage and process current signals. Unlike conventional signal conditioners, the 6B11 and 6B11HV are complete microcomputer-based data acquisition systems. A major advantage of the onboard microcontroller is its ability to be remotely reconfigured for various sensor types and input ranges.

Synchronized Sampling

The synchronized sampling command allows data to be sampled simultaneously from all 6B11, 6B11HV, 6B12, 6B12HV modules and all 6B50 boards in a 6B Series system. Each module or board stores the data in a separate register within its microcontroller and can access the data with a separate command.

Software Configuration

The 6B11 and 6B11HV linearize and compensate J, K, T, E, R, S and B thermocouples. Additionally, these modules also digitize millivolt and voltage ranges from ±15 mV to ±5 V as well as 0 to ±20 mA process current inputs. Software is used to configure the 6B11 and 6B11HV 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 6B11 and 6B11HV

Each 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 6B11; 2500 V rms - Model 6B11HV) and clocked in by a custom controller chip. The on-board microprocessor then converts the data into engineering units 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. Cold junction compensation (CJC) is also performed at this stage. The 6B11 and 6B11HV use compensation factors to ensure the highest accuracy possible.

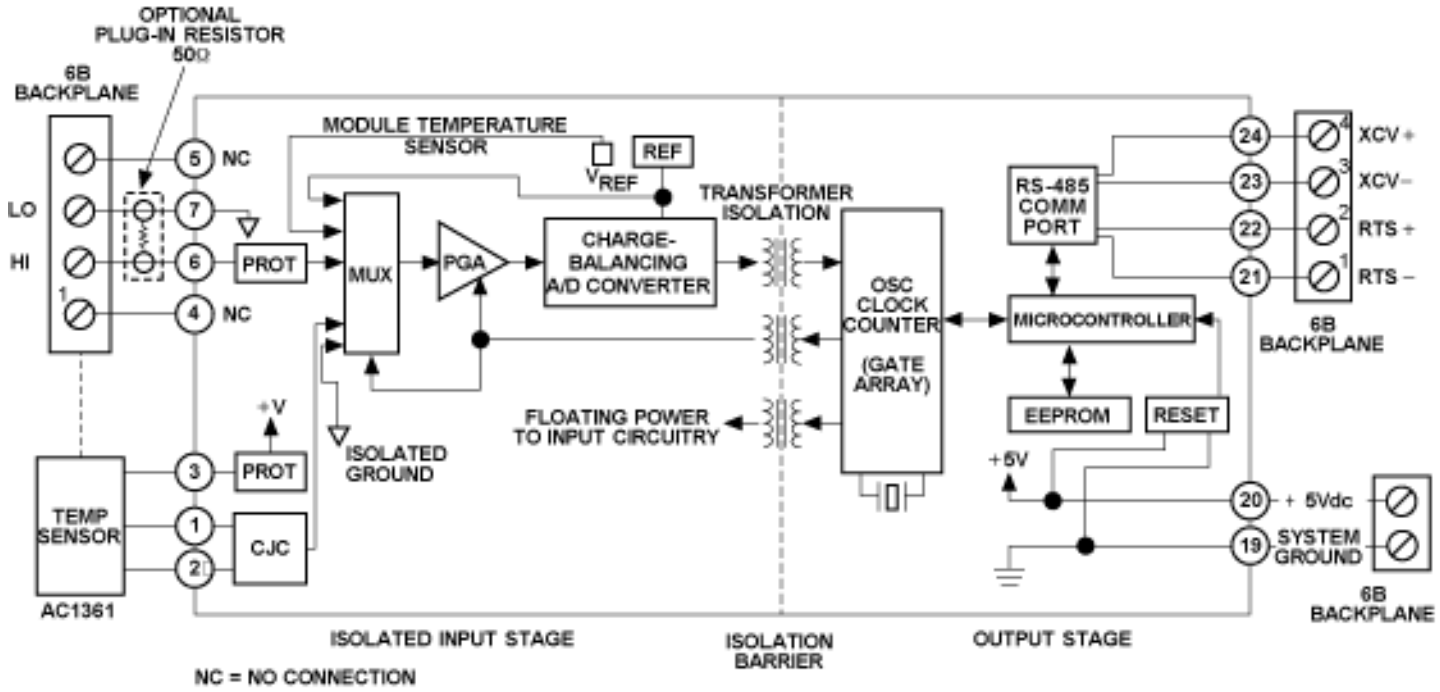

Figure 1. 6B11 and 6B11HV Functional Block Diagram

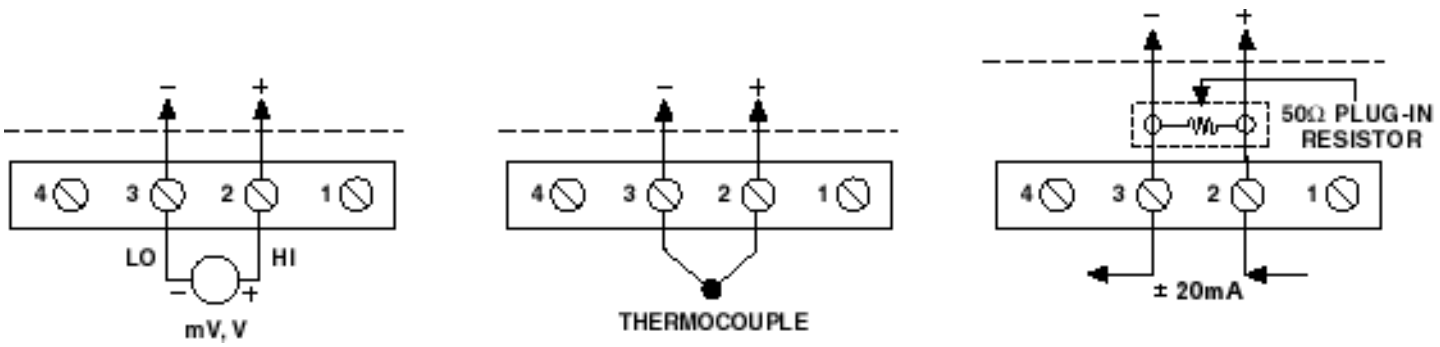

Figure 2. 6B11 and 6B11HV Field Connection Diagram

Inputs

- Thermocouples: J, K, T, E, R, S, B
- Millivolt: ±15 mV to ±500 mV
- Voltage: ±1 V; ±5 V
- Current: ±20 mA

Communications

- RS-485 Interface

Models 6B11 and 6B11HV

Range Description (Software Configurable)	Accuracy[1] (Typical)	Accuracy[1] (Maximum)	Noise (Peak-to-Peak)
±15 mV	±0.03 % FS	±0.06 % FS	±0.02 % FS
±50 mV	±0.015 % FS	±0.04 % FS	±0.01 % FS
±100 mV	±0.0055 % FS	±0.03 % FS	±0.005 % FS
±500 mV	±0.005 % FS	±0.03 % FS	±0.002 % FS
±1 V	±0.005 % FS	±0.03 % FS	±0.005 % FS
±5 V	±0.005 % FS	±0.03 % FS	±0.0015 % FS
±20 mA[2]	±0.008 % FS[3]	±0.03 % FS[3]	±0.005 % FS
J Thermocouple, 0°C to 760°C	±0.4°C	±0.75°C	±0.14°C
K Thermocouple, 0°C to 1000°C	±0.5°C	±0.75°C	±0.22°C
T Thermocouple, -100°C to +400°C	±0.5°C	±0.75°C	±0.2°C
E Thermocouple, 0°C to +1000°C	±0.5°C	±0.75°C	±0.2°C
R Thermocouple, +500°C to +1750°C	±0.63°C	±1.5°C	±0.3°C
S Thermocouple, +500°C to +1750°C	±0.62°C	±1.5°C	±0.4°C
B Thermocouple, +500°C to +1800°C	±1.2°C	±2.0°C	±0.7°C

[1]Accuracy is given for 6B11 and 6B11HV module only. When measuring thermocouple signals, the CJC temperature sensor error should be added to the module accuracy to compute the system accuracy. The AC1361 CJC temperature sensor is provided on each channel of the 6B Series backplanes.

[2]This range requires the use of a 50 Ω current-to-voltage conversion resistor, model AC1381.

[3]Does not include the error of the current to voltage input resistor, Model AC1381.

6B11 and 6B11HV Specifications

(typical @ +25°C and V_s = +5 V dc)

Description	Model 6B11 and 6B11HV
Inputs, Software Selectable	
Thermocouple Types	J, K, T, E, R, S, B
mV	±15 mV to ±500 mV (Refer to Model Table)

Volt	±1 V; ±5 V
Current Range	±20 mA
Communications	
Protocol	RS-485
Baud Rates, Software Selectable	300K, 600K, 1.2K, 2.4K. 9.6K, 19.2K
Accuracy[2]	
Initial @ +25°C	Refer to Model Table
Input Offset vs. Temperature	±0.3 µV/°C
Span vs. Temperature	±3 ppm/°C (±25 ppm/°C, maximum)
Cold Junction Compensation[1]	
Initial Accuracy @ +25°C	±0.25°C (±0.75°C, maximum)
Accuracy, +5°C to +45°C	±0.5°C (±0.0125°C/°C)
Input Resistance	100 MΩ
Bandwidth, -3 dB	4 Hz
Conversion Rate	9 samples /second
Synchronized Sampling Command	Yes
Conversion Time	70 ms maximum
Common-Mode Voltage (CMV)	
Input-to-Output and Power	
Model 6B11	1500 V rms, continuous
Model 6B11HV	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	58 dB
Input Protection	240 V rms, continuous
Input Transient Protection	ANSI/IEEE C37.90.1-1989
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	0 to 95% @ +60°C noncondensing

[1] When used with the CJC temperature sensor, model AC1361, provided on each channel of 6B Series backplanes.

Specifications subject to change without notice.