



Application

Analog Input Range Selection

The possible input voltage ranges are the same for both differential and single-ended modes. Since current measurements are converted to voltages using external precision resistors, the same voltage ranges apply. Choices of input voltage ranges include unipolar, bipolar, and offset ranges. All ranges are selected by setting jumpers located inside the module.

Table 1. Analog Input Ranges.

Voltage Ranges	Current Ranges (using external 250 Ohm resistor)
0 to 5 Vdc	0 to 20 mA
1 to 5 Vdc	4 to 20 mA
-5 to +5 Vdc	-20 to +20 mA
0 to 10 Vdc	0 to 40 mA
-10 to +10 Vdc	-40 to +40 mA

Input Out of Range Detection

If the analog signal is well beyond the normal operating range selected, the NOSIG contact associated with the analog point will be enabled. Note that there are some out-of-range signals that do not set the NOSIG bit. The out of range thresholds for each input range are shown on page 37.

Absolute Signal Ranges

The absolute working range for any analog input signals is from -10.3 volts to +10.3 volts with regard to AGND (analog ground). The acceptable common mode voltage range (either differential or single-ended with regard to its appropriate analog reference input) is from -10.3 volts to +10.3 volts.



Sampling Speed

The rate at which each of the analog input channels is sampled depends upon the mode of operation. Each channel is given a 225 μ sec time slot during the multiplexing process. During that time slot, the input voltage is connected to the measuring system, the measuring system is allowed to settle, the settled value is sampled (and held), and is then converted to a 12-bit value by an analog-to-digital converter. The channels are sampled in numerical order. In single-ended mode, the 16 channels are sampled in 3.60 msec on a continuous repeating basis. In differential mode, the eight channel pairs are sampled in 1.80 msec on a continuous repeating basis. Converted data are stored in the module's RAM and can be accessed by the controller. Data for a given channel is available at the previously stored value until an updated conversion replaces it.

Sampling speed is unrelated to internal access speed within the Regent system. Programming and other features determine how often the Regent system can access the converted data. There are no "lockout times" when the Regent system is prevented from reading the current stored values of the converted data.

Single-Ended References

When single-ended input mode is selected, the ground reference for all eight signals on the same input field wiring terminal block is AREF1 on the top terminal block and AREF2 on the bottom. This ground reference may be different from the external I/O analog ground AGND also available on the same connector. When used with the analog input terminal block assemblies (T3325-XX), both AREF1 and AREF2 are isolated from AGND by 1K Ohm resistors.

When the single-ended signals are measured, the appropriate ground reference for the signal is selected by another multiplexer on the board, and becomes the reference for the measurement. In differential mode, AREF1 and AREF2 are not used as references.



Input Over Voltage Protection

All analog inputs, regardless of mode and analog references (AREF1 and AREF2), are protected from over-voltages (these ranges are shown on page 37).

Current Measurement Considerations

Precision resistors external to the module are required to convert currents to voltages that can be measured directly by the module. The resistors can be mounted on field marshaling terminals or are provided using the appropriate analog input termination blocks. For differential current measurements, both sides of the external resistor are brought onto the module.

It is possible to mix current and voltage measurements on the same module as long as they can work with the same voltage range selected. In the case of single-ended measurements, this either requires that both current and voltage measurements are referenced to the same reference point (AREF1 or AREF2), or that voltage inputs be on one set of eight inputs and current inputs on the other set.

Input Range and Mode Selection Jumpers

The jumpers that determine the mode and input range for the module are set at manufacturing time for an input range of 1 to 5 volts and the 16-channel, single-ended input mode. If other input ranges or another mode is desired these jumpers must be repositioned to the appropriate settings.

There are 17 jumper locations that are used. They are summarized in Tables 2 and 3, below. The module's cover must be removed to access and reposition the jumpers.