Application Note No. 0302

Connecting 4-20mA Transducers to the ITA-1

Background

The ITA-1 has 3 standard input couplings namely ICP, DC and AC. The ICP interface provides a constant current supply to two wire devices such as accelerometers.

However, it is sometimes required to connect transducers with industry-standard 4-20mA output to input channels of the ITA-1. The node can accommodate these types of signal as described below.

Types of 4-20mA Transducer

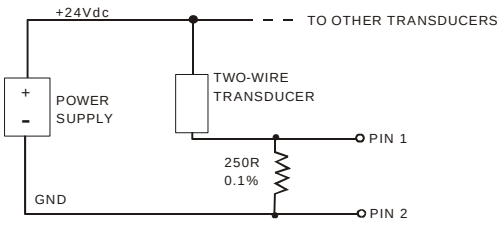
There are two basic types of 4-20mA transducer, namely loop-powered and non loop-powered. A loop-powered device has two wires and the internal electronics are supplied by the measurement currents flowing through it. A non loop-powered device typically has three wires ie. power, signal and ground with the output signal current being referenced to the ground.

The interconnection to the input channel of an ITA-1 is basically the same in both cases. A high tolerance resistor with tight temperature tolerance (typically a wire-wound device) is used as a load resistance to produce a voltage from the 4-20mA measurement current. The tolerance of the resistor should be +/- 0.1% to maintain system accuracy.

Connections

The connections for loop-powered and non loop-powered transducers are shown below. In the examples, the pins of the ITA-1 shown refer to channel 1, but the same applies to all 16 channels.

LOOP-POWERED CONNECTION

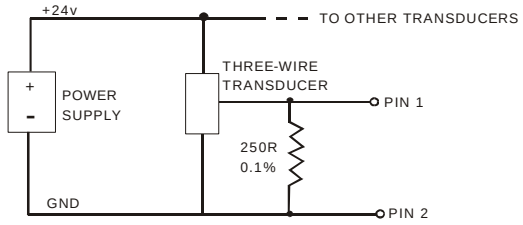


A load resistor is connected between pins 1 and 2 of the ITA-1. This resistor can be mounted on the connector itself or on a terminal strip mounted in the enclosure. A value of 250R is selected as this will give a 5V output at full scale range of 20mA. Alternatively, a 100R resistor can be used which will give a maximum output of 2V. Setting the gain of the ITA-1 channel to 5 will give a 10V range internally to the ITA-1. Note that the input range with a 250R

resistor is +1 to +5V, and with a 100R resistor is 0.2 to +1V (due to the minimum current always being 4mA). If the voltage drops substantially below the minimum voltage, then this indicates a broken cable or faulty transducer.

A single power supply can be used to power multiple transducers. Simply ensure that it has a current rating sufficient to supply the number of transducers connected at 20mA, plus some contingency. A voltage of 24V is typical for 4-20mA transducers, though some can operate at a lower voltage. Note that the negative (common) terminal of the power supply must be connected to one of the ground pins of the ITA-1 (ie. pin 2,4,6 etc).

NON LOOP-POWERED CONNECTION



The diagram above shows a typical 3-wire transducer arrangement. Again, the power supply can power multiple transducers but a higher rated supply current may be required due to the quiescent current of the transducers.