

Overview

DAQ-2543 and DAQ-128 are data acquisition peripheral boards that can be used with MINI-MAX and PRO-MAX series microcontroller boards. DAQ-2543 has 11 and DAQ-128 has 8 analog input channels with 12-bit resolution. DAQ-2543 has 0 to 4V input range and DAQ-128 has -4 to 4V input range. This application note describes how to easily interface 4-20mA or 0-20mA type current-loop sensors to either DAQ-2543 or DAQ-128.

Theory of Operation

The simplest method to measure current-loop sensors with a data acquisition system is to convert the current to a voltage. This can easily be done with the addition of a resistor to the input of DAQ-2543 or DAQ-128 on the channel that is performing the current-loop measurement.

Using Ohm's Law:

$$\text{Voltage} = \text{Resistance} \times \text{Current} \quad (V = IR)$$

Hence,

$$\text{Voltage at the input of DAQ board} = \text{Resistance of external resistor} \times \text{Current of the current loop}$$

A typical value for external resistor is determined by the range of currents being measured. For a 4-20mA current loop, the highest current in the loop should result in a voltage not higher than the input range (0 to 4 Volts) of DAQ-2543 or DAQ-128.

$$4 \text{ Volts} = \text{Resistance} \times 20\text{mA}$$

$$\text{Resistance} = 4 \text{ Volts} / 20\text{mA} = 200 \text{ Ohms}$$

A value of 150 ohms or 180 ohms can be used to allow for some overrange.

Installation

One end of the external resistor is connected to an unused analog input on the DAQ-2543 or DAQ-128. and the other end is connected to negative terminal of the external sensor supply as shown in Figure 1.

Caution: If the sensor becomes defective for some reason and it is internally shorted, the supply voltage will fully appear between the input of DAQ-2543 or DAQ-128 and Ground. This may damage the components on the DAQ board or the power supply. If the power supply itself is not current limited, it is recommended to limit the current flowing through the current loop using a current limiting resistor.

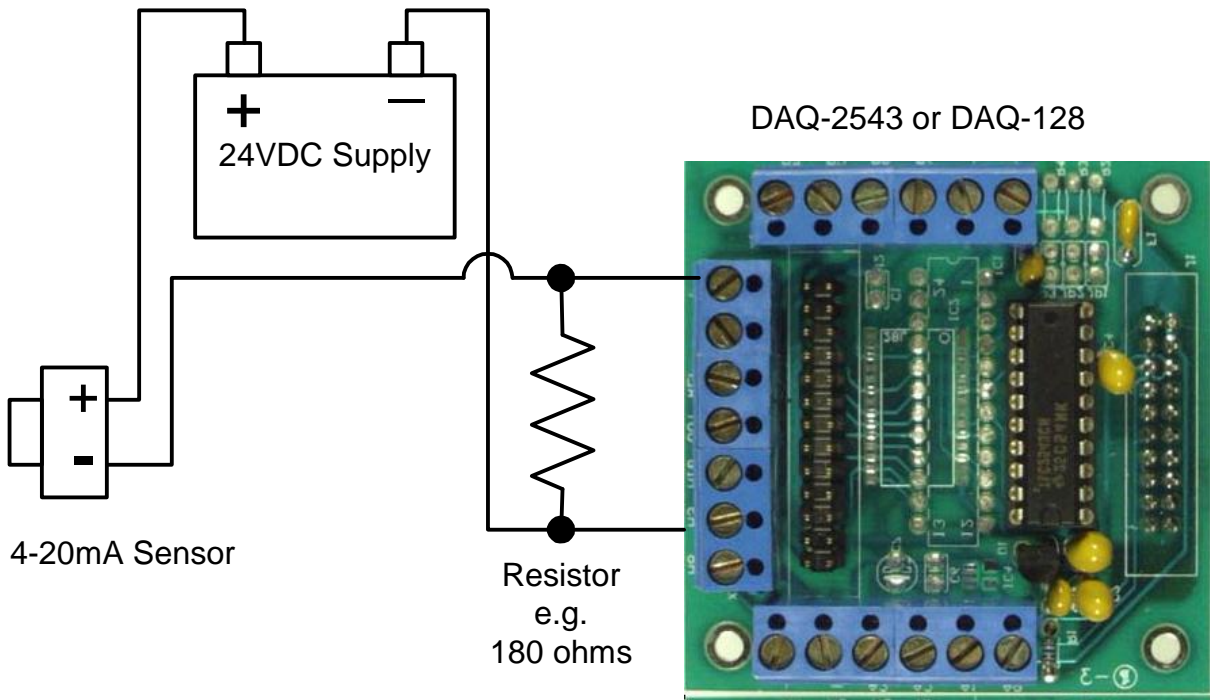


Figure 1

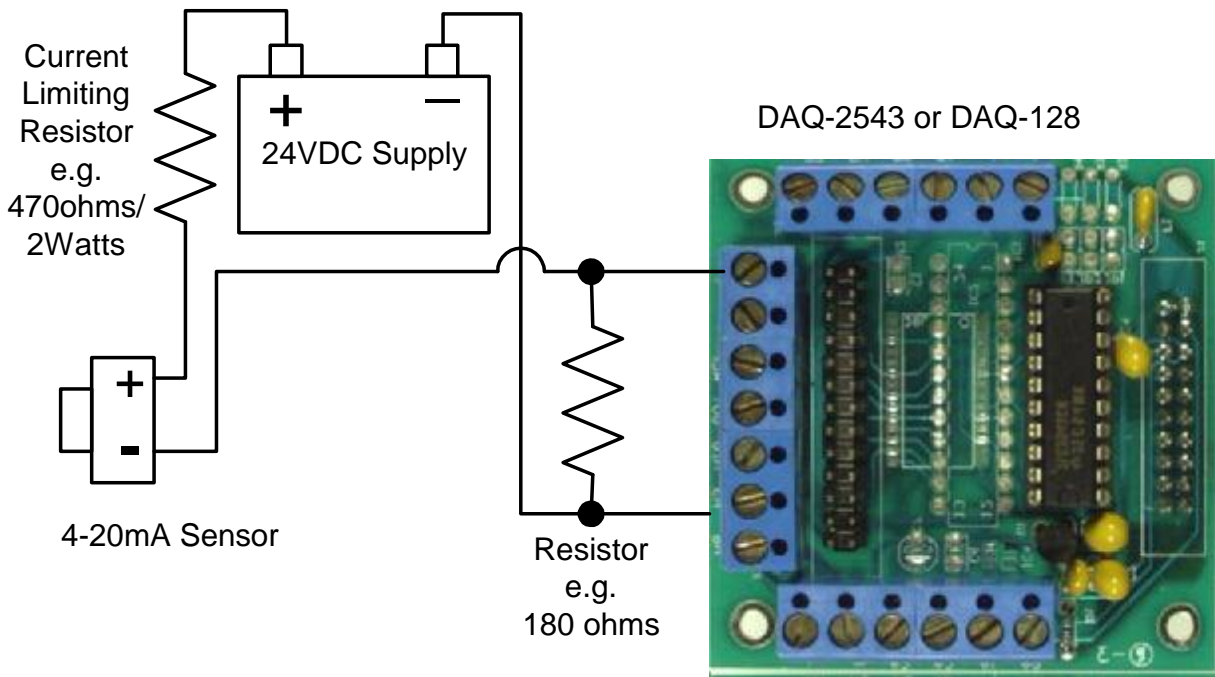


Figure 2