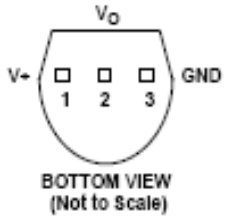
Hardware Example: AD22100 Integrated Temperature Sensor AI

On the same breadboard as the thermocouple amplifier discussed in class is the AD22100 temperature sensor. It is a small, black, application-specific integrated circuit (ASIC) designed for use in high-volume circuits, such as computer boards and thermostats. Its connection and use is very simple. The three pins on the bottom are connected as shown in the figure: pin #1 for power, pin #2 for output signal, and pin #3 as ground. Since only one pin is needed for the output, the sensor is most easily connected in a single-ended scheme to a DAQ device.



Pin No.	Mnemonic	Description
1	V+	Power Supply Input
2	V_O	Device Output
3	GND	Ground

$$V_{OUT} = (V+/5\ \text{V}) \times (1.375\ \text{V} + 22.5\ \text{mV/°C} \times T_A)$$

GENERAL DESCRIPTION

The AD22100[1] is a monolithic temperature sensor with on-chip signal conditioning. It can be operated over the temperature range −50°C to +150°C, making it ideal for use in numerous HVAC, instrumentation, and automotive applications.

The signal conditioning eliminates the need for any trimming, buffering, or linearization circuitry, greatly simplifying the system design and reducing the overall system cost.

The output voltage is proportional to the temperature x the supply voltage (ratiometric). The output swings from 0.25 V at −50°C to +4.75 V at +150°C using a single +5.0 V supply.

Make the appropriate connections required to interface the AD22100 to the USB-6008 device. Note that the sensor is already positioned on the breadboard in such a way that the ground and power pins share the same ground and power rails as the thermocouple amplifier. So, all that remains is to connect the output pin to an appropriate analog input channel. After the connections have been made, and correct sensor operation verified, create a LabVIEW VI to measure the sensor output voltage and convert it to actual temperature. Use a software-paced mode, and display the results on a chart. Include a switch whereby the user may select to show either the raw sensor voltage on the chart, **or** the converted temperature.