LabJack

EI-1034 Datasheet

EI1034 Temperature Probe

Description

The EI-1034 is a universal temperature probe that consists of a silicon type temperature sensor mounted in a waterproof 316 stainless steel tube. It uses the LM34CAZ precision silicon temperature sensor with a typical room temperature accuracy of ±0.4 °F (±1.0 °F max). Because of the high-level linear voltage output and high accuracy, this probe is easier to use and superior to thermocouples, thermistors, or RTDs, for many applications in the range of 0 to 230 °F (temperature range varies with positive supply voltage, negative supply voltage, and LabJack model). The probe is suitable for air and liquid applications, and can be conveniently secured into pipes, vessels and chambers by using available ¼ inch compression fittings.

The EI-1034 is intended to be connected to a LabJack for 5-volt power but can be used as a stand-alone temperature sensor when connected to a DVM and a power supply in the range of 5 to 30 volts.

Electrical Connections

Three wires require connections; they are +5 volts (red), ground (black) and signal output (white). These wires can be connected to the appropriate terminal on the LabJack or other power supply in the case of using the sensor as a stand-alone unit. The output wire (white) connects to an analog input and will normally output a voltage of approximately 0.77 volts at room temperature.

Cable Length

The probe has a 10k internal resistor from signal to ground that helps keep the signal stable when sinking current or driving capacitive loads. The cable length of the probe can be extended to 25 ft without serious degradation in performance. If the user desires to extend the length of the cable beyond 25 ft (up to 500 ft) then a resistor of 10K ohms should be inserted in series with the white wire. The resistor should be placed at the 6 ft length of the probe. When using a series resistor of 10K ohm the user should consider the voltage drop across the resistor when calculating the final temperature measurement.

Low Temperature Operation

The low temperature range of the EI-1034 can be extended to -40 °F by adding a 100K resistor to a negative supply voltage. The Vm- supply on the U6 and T7 is handy for this. Note that if you don't have a negative voltage available but do have an isolated voltage available such as a battery or wall-wart, you can connect it backwards to make a negative voltage. A standard wall plug-in supply can be used in the range of 5 to 15 volts. A 9-volt battery is also a good source for a negative voltage. Care must be taken to connect the positive terminal of the isolated supply to the GND wire (black) of the EI-1034 and the negative terminal of the supply in series with a 100K resistor to the white wire of the EI-1034.

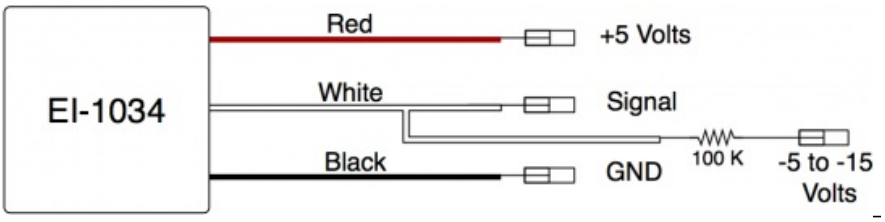

Figure 1

Formulas to Calculate Temperature From Measured Probe Voltage

°F = 100*volts

°K = (55.56*volts) + 255.37

°C = (55.56*volts) + 255.37 - 273.15

LabJack U12 Quickstart

Connect the red wire to +5V, black wire to GND, and white wire to AI0.

Run LJlogger. By default, the first row will be set to Channel = 0 SE, and the Voltage column should show something around 0.77 volts if the EI-1034 is at room temperature.

To improve resolution, you need to use gain which requires a differential channel. Add a jumper wire from AI1 to GND, then in the desired row of LJlogger set Channel = 0-1 Diff. Now you can adjust Gain so you are using the smallest range possible. For example, the +/-2V range would allow temperatures up to 200 degrees F.

To make LJlogger display degrees C, enter 55.56 for multiplier and –17.78 for offset in the appropriate row. To make LJlogger display degrees F, enter 100.0 for multiplier and 0.0 for offset. The scaled temperature will appear in the “Scaled Data” column.

U3/U6/UE9 Quickstart

Connect the red wire to VS, black wire to GND, and white wire to AIN0.

Run LJLogUD. By default, the first row will be set to +Ch=0 and -Ch=199 (single-ended), and the Voltage column should show something around 0.77 volts if the EI-1034 is at room temperature.

U3 Comment: You will get better resolution using a low-voltage channel (FIO or EIO) on the U3-HV, and that is the only option on the U3-LV. Connect the white signal wire to FIO4 rather than AIN0, and in LJLogUD set +Ch=4.

To make LJLogUD display degrees C, enter a scaling equation such as "y=55.56*c - 17.78" in the desired row. Note that "c" in this example means it will use the voltage from the 3rd row, so use the appropriate variable from "a" to "p". To make LJLogUD display degrees F, enter a scaling equation such as "y=100.0*c" in the desired row.

T7 Quickstart

Connect the red wire to VS, black wire to GND, and white wire to AIN0. If the probe is at 70 degrees F, the voltage from AIN0 to GND should be 0.70 volts.

Traditional Technique: Acquire the voltage and in software multiply it by 100 to convert to degrees F.

Run LJLogM. By default, the first row will be set to AIN0, and the Voltage column should show something around 0.77 volts if the EI-1034 is at room temperature.

To make LJLogM display degrees C, enter a scaling equation such as "y=55.56*c - 17.78" in the desired row. Note that "c" in this example means it will use the voltage from the 3rd row, so use the appropriate variable from "a" to "p". To make LJLogM display degrees F, enter a scaling equation such as "y=100.0*c" in the desired row.

AIN-EF Technique: Configure an extended feature on the applicable channel to apply a slope of 100, and then read AIN0_EF_READ_A to get the scaled value.

In Kipling, go to the Analog Inputs tab, click the "+" at the far right of the AIN0 row, set Extended Feature to "Slope/Offset", and set Slope=100. Now you can read AIN0_EF_READ_A in any software, such as LJLogM, and get the scaled value.

Specifications

Range with 0/5 volt supply:

+10 to +230 °F (-12 to +110 °C) with the LabJack U12

0 to +230 °F (-17 to +110 °C) for the LabJack U3 or UE9

Accuracy:

+/- 0.4°F Typical Room Temperature

+/- 1°F Max Room Temperature

+/- 2°F Max 0°F to 230°F

+/- 3°F Max -40°F to 0°F

Sensor device in probe: LM34CAZ

Cable length: 6 ft supplied max 25 ft user extended

Power: +4 to 35 VDC at 100-400 µA

Output Current: 10 mA

Note: When operating at voltages less than 5 Volts the maximum operating temperature is reduced, typically at 4 Volts supply the maximum temperature limit is 200 °F

Probe dimensions: 6 in x 0.25in diameter. Metal tube is 316 stainless steel, product numberSS-14-6CLOSED from Omega.

Possible fittings:
http://www.omega.com/pptst/RA_RB.html
http://www.omega.com/pptst/OPN_RA_RB.html
http://www.omega.com/pptst/BRLK_SSLK.html

More information:
LM34 Datasheet
Temperature Sensors Application Note

Special Notice Regarding The EI-1034 Cable

Although the temperature sensor and associated electronics are rated for 110 degrees C, the normal cable is only rated for 80 degrees C. We have tested the cable and probe at 150 degrees C, and have noticed the cable gets soft at the high temperatures but continues to function. When the cable and probe were returned to normal temperatures, no degrading was observed in the cable or probe. Also at the low temperatures, the cable is only rated to -20 degrees C where the sensor and associated electronics are rated lower. Testing the probe with the wire at the lower temperatures showed normal operation and no degrading of the cable when returned to normal temperatures. The user should be aware that even though the probe itself can operate at the rated temperatures the use of the cable in environments of over 80 degrees C and lower than 20 degrees C is at your own risk.

Manufactured by:

ELECTRONIC INNOVATIONS CORP

3333 S. WADSWORTH BLVD. UNIT A104

LAKEWOOD CO 80227

303-987-2441 FAX 303-980-6581

Email: jk@designcircuit.com

Web: www.designcircuit.com