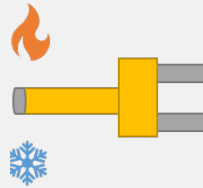# Measuring Temperature with DTS Data Acquisition Systems

October 2020

John Moors
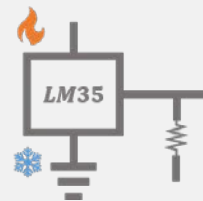
Topics

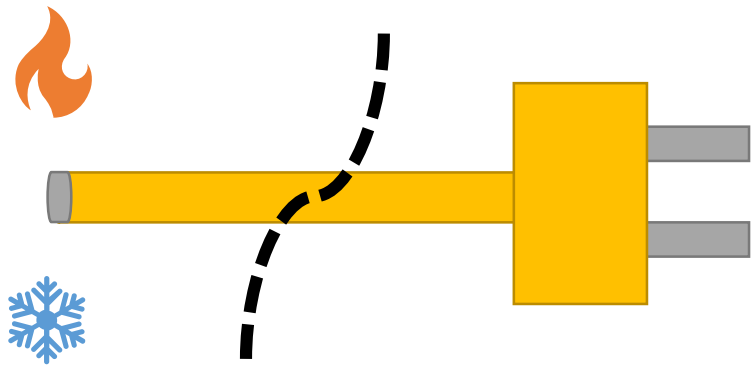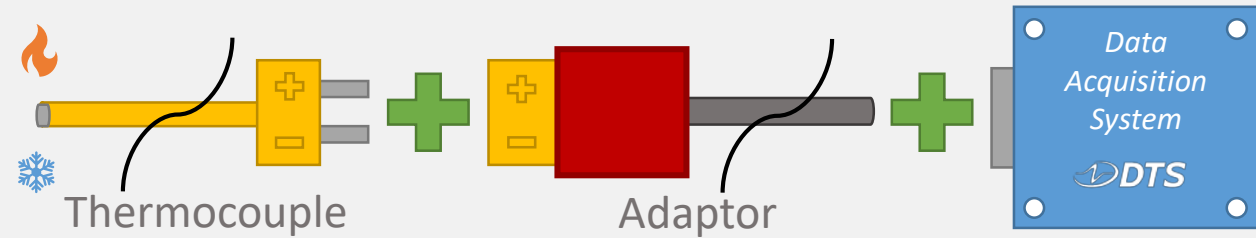Thermocouples

Resistance Temperature Detectors

Integrated Circuit Temperature Detectors

Thermocouples

Thermocouples: Thermocouple Adaptor

› **Adaptors connect the thermocouple to the DAS itself**

Thermocouple   Adaptor   Data Acquisition System

› **Adaptors have built-in Cold Junction Compensation and can deliver accurate results to the DAS.**
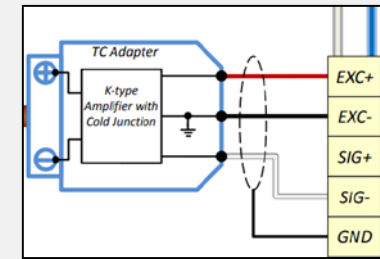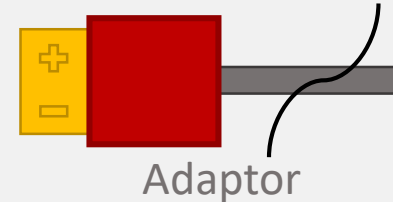
Adaptor

› **DTS sells a Texense adaptor that supports Type K Thermocouples**
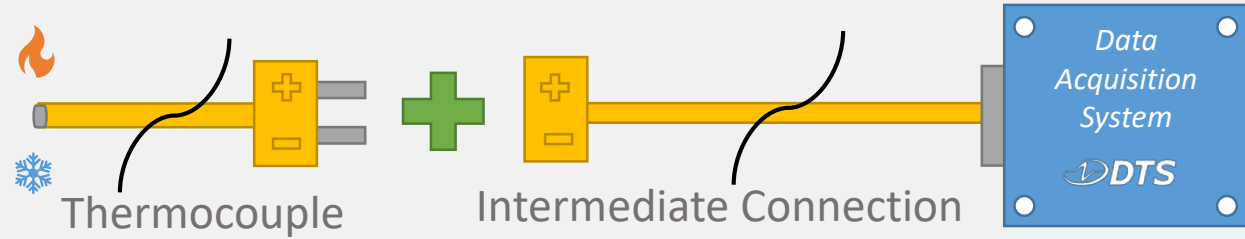
Click Here for Product Page

› **For using an Adaptor with your DTS DAS, refer to this article on the Help Center**

Click Here for Help Center Article

Thermocouples: Intermediate Connection

› **An intermediate connection can be directly soldered to the DAS, to then connect with the thermocouple**

Thermocouple   Intermediate Connection   *Data Acquisition System* DTS

✕ › **This therefore does NOT have Cold Junction Compensation, which would need to be considered with respect to accuracy and best use.**

› **For connecting without Cold Junction Compensation and how to account for it, refer to this article.**
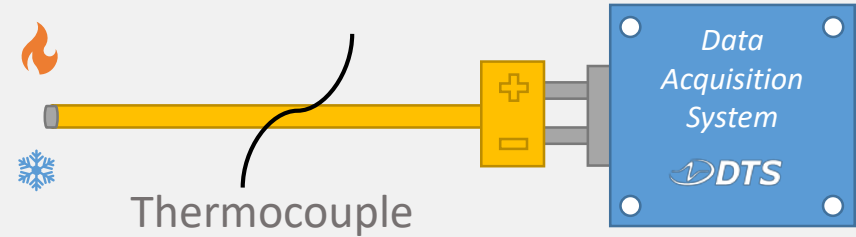
Click Here for Help Center Article

› **To see the results of a SLICE6 Air test DTS conducted to investigate accuracy when using this method, see our online test report**

Click Here for Our Test Report

Thermocouples: Direct Connection

› **A thermocouple can be soldered directly to the DAS pins, without using an adaptor or intermediate connection**

Thermocouple

Data Acquisition System

› **This therefore does NOT have Cold Junction Compensation, which would need to be considered with respect to accuracy and best use.**

› **For connecting without Cold Junction Compensation and how to account for it, refer to this article.**
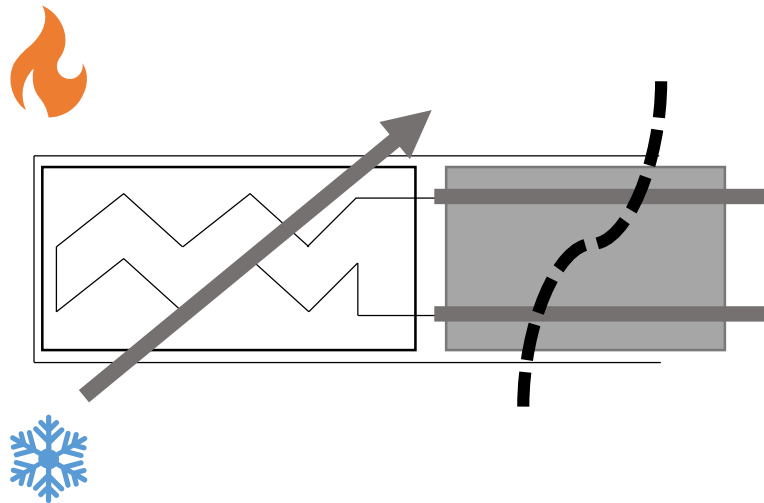
Click Here for Help Center Article

› **To see the results of a SLICE6 Air test DTS conducted to investigate accuracy when using this method, see our online test report**
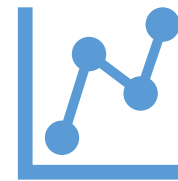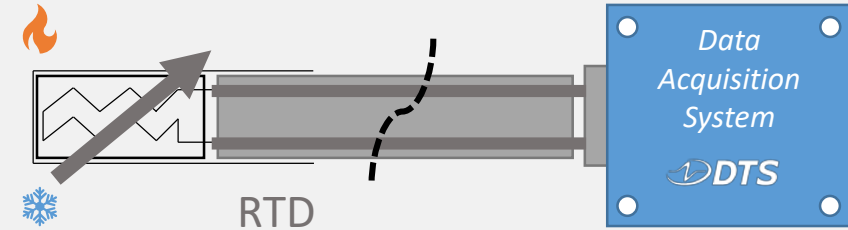
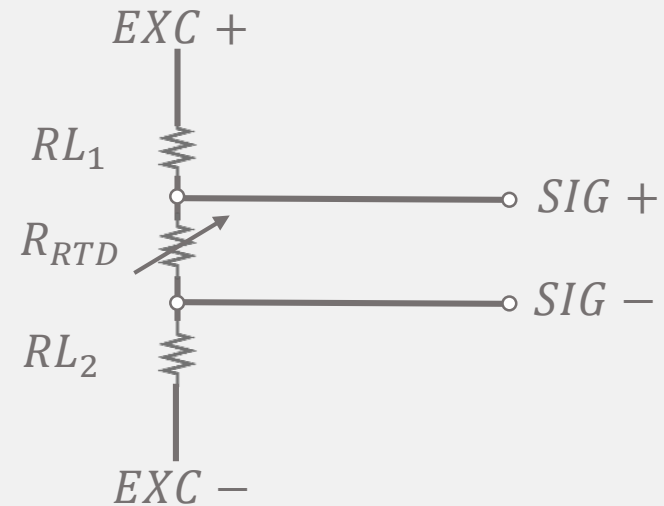**Click Here for Our Test Report**

Resistance Temperature Detectors (RTDs)

RTDs: Overview

› **An RTD can be connected directly to the DAS, with additional components as discussed below.**
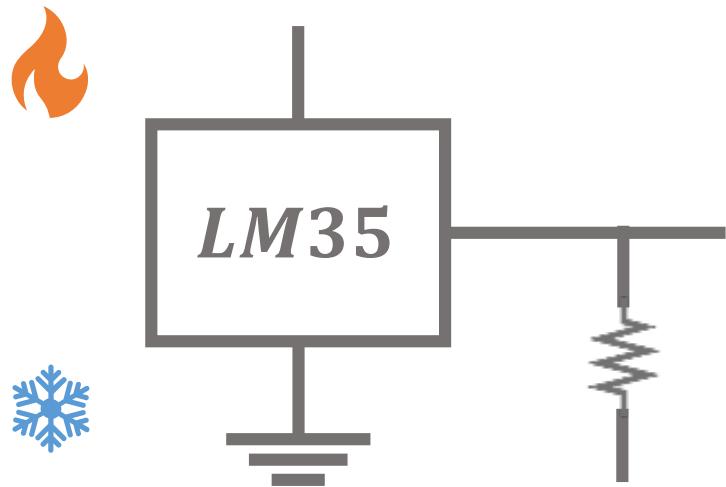

RTD

Data Acquisition System

DTS

› **The recommended connection uses current limiting resistors in series with the RTD for accuracy improvement.**

$EXC+$

RL_1

R_{RTD}

RL_2

$EXC-$

$SIG+$

$SIG-$

› **For a full breakdown on RTD's and recommended use with DTS DAS, see this H.C. Article**
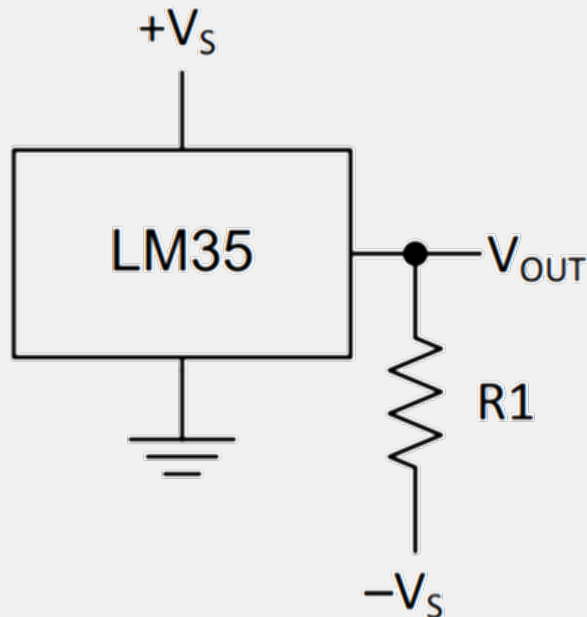
Click Here for Help Center Article

DTS

Integrated Circuit Temperature Sensors

Silicon Temperature Sensor

- Based on LM35
- -55 to 150°C, ±0.5°C
- 5 or 10V Excitation, <200 uA

- Add a few components to achieve differential output with low noise

Full-Range Centigrade Temperature Sensor
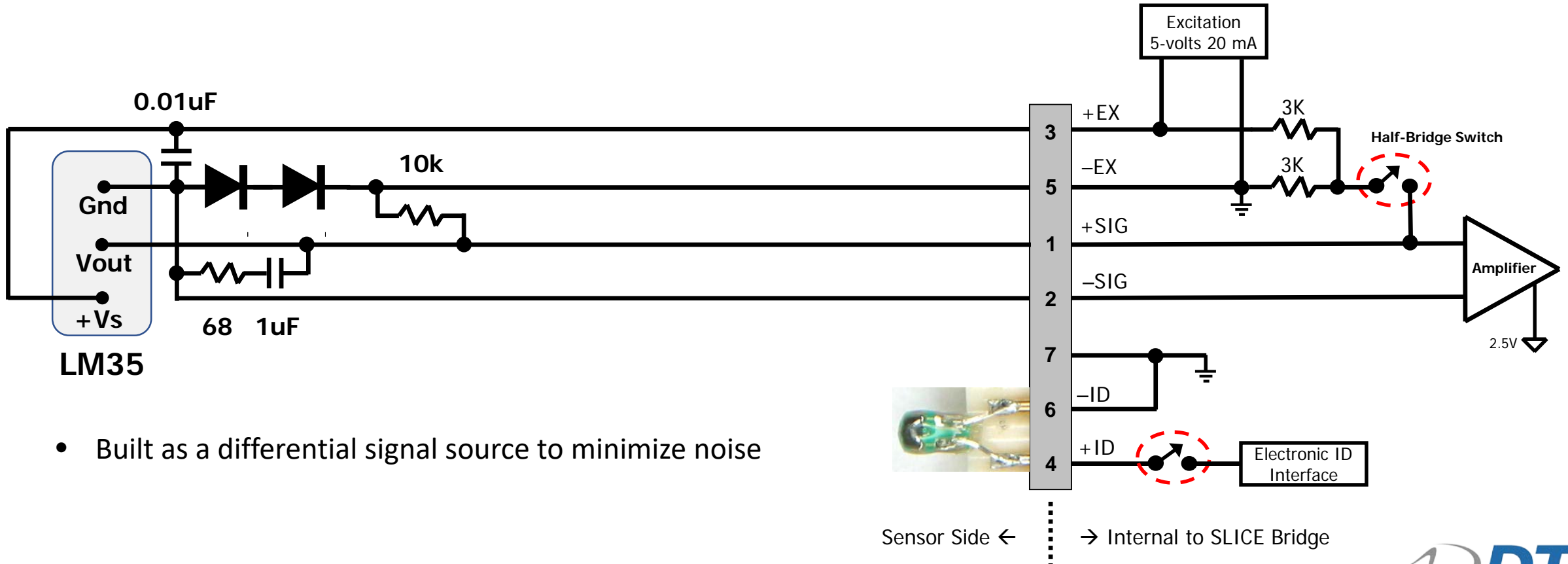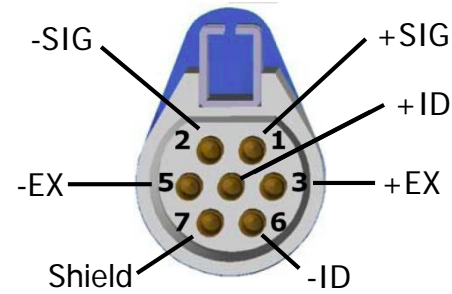
Choose $R_1 = -V_S / 50\ \mu A$

$V_{OUT} = 1500$ mV at 150°C

$V_{OUT} = 250$ mV at 25°C

$V_{OUT} = -550$ mV at -55°C

Sample Connection to SLICE System

- Built as a differential signal source to minimize noise

Sensor Side ← ⋮ → Internal to SLICE Bridge
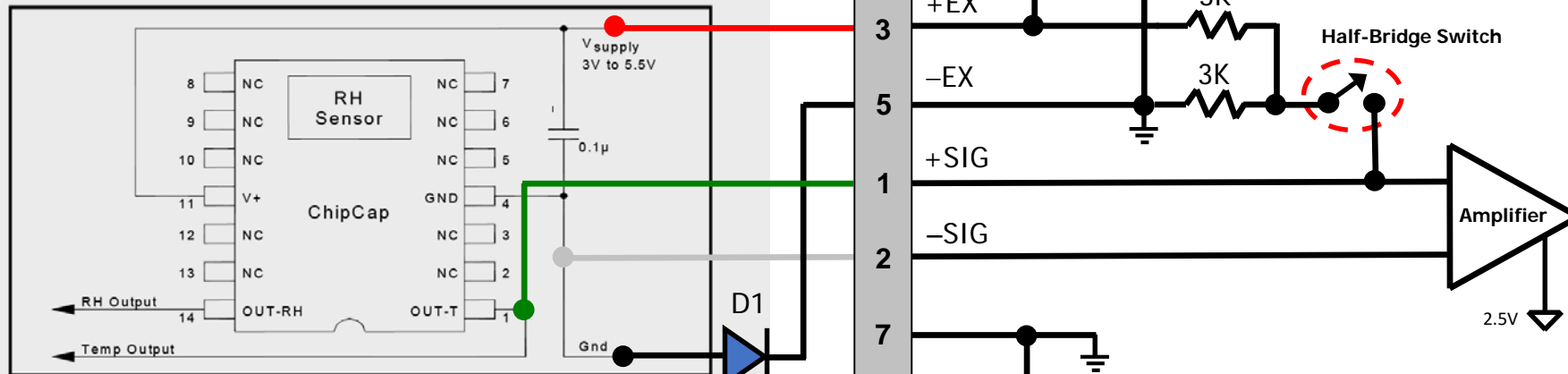
Sample System Hookup

Figure 5: Analog Interface - Linear and Ratiometric Modes

D1 should be a small signal diode such as 1N914

Sensor Side ← ⋮ → Internal to SLICE Bridge

THANK YOU