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# TMP36 Temperature Sensor in LabVIEW

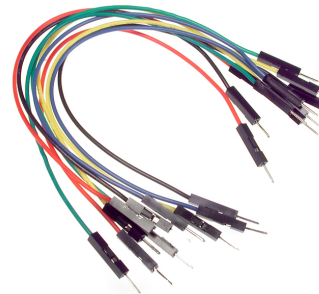
Hans-Petter Halvorsen

# Contents

- We will use LabVIEW to read Temperature data from TMP36 Temperature Sensor
- We will use the USB-6008 DAQ Device or I/O Module

# Hardware

- DAQ Device (e.g., USB-6008)
- Breadboard
- TMP36 Temperature Sensor
- Wires (Jumper Wires)



# Software

- LabVIEW
  - Graphical Programming Environment
- DAQmx Driver
  - Driver used for Communication with external Hardware such as USB-6008

# USB-6008

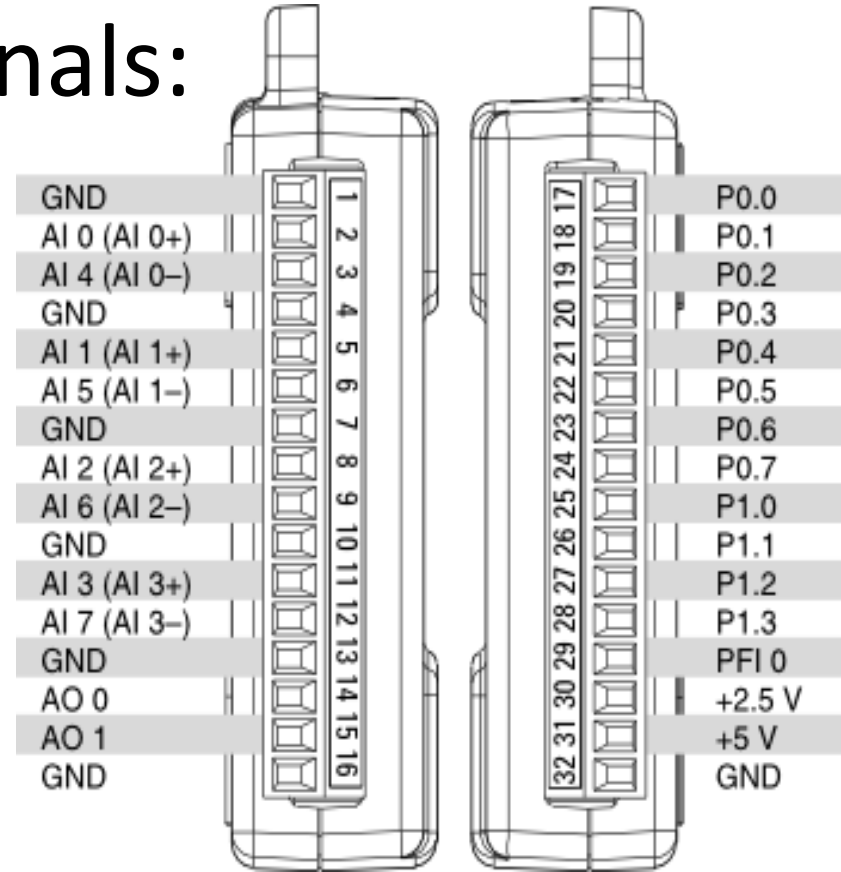
- USB-6008 is a DAQ Device from NI
- Can be used within LabVIEW
- NI-DAQmx Driver
- It has Analog and Digital Inputs and Outputs



# USB-6008

4 different types of Signals:

- AO – Analog Output
- AI – Analog Input
- DO – Digital Output
- DI – Digital Input



# TMP36



FRONT

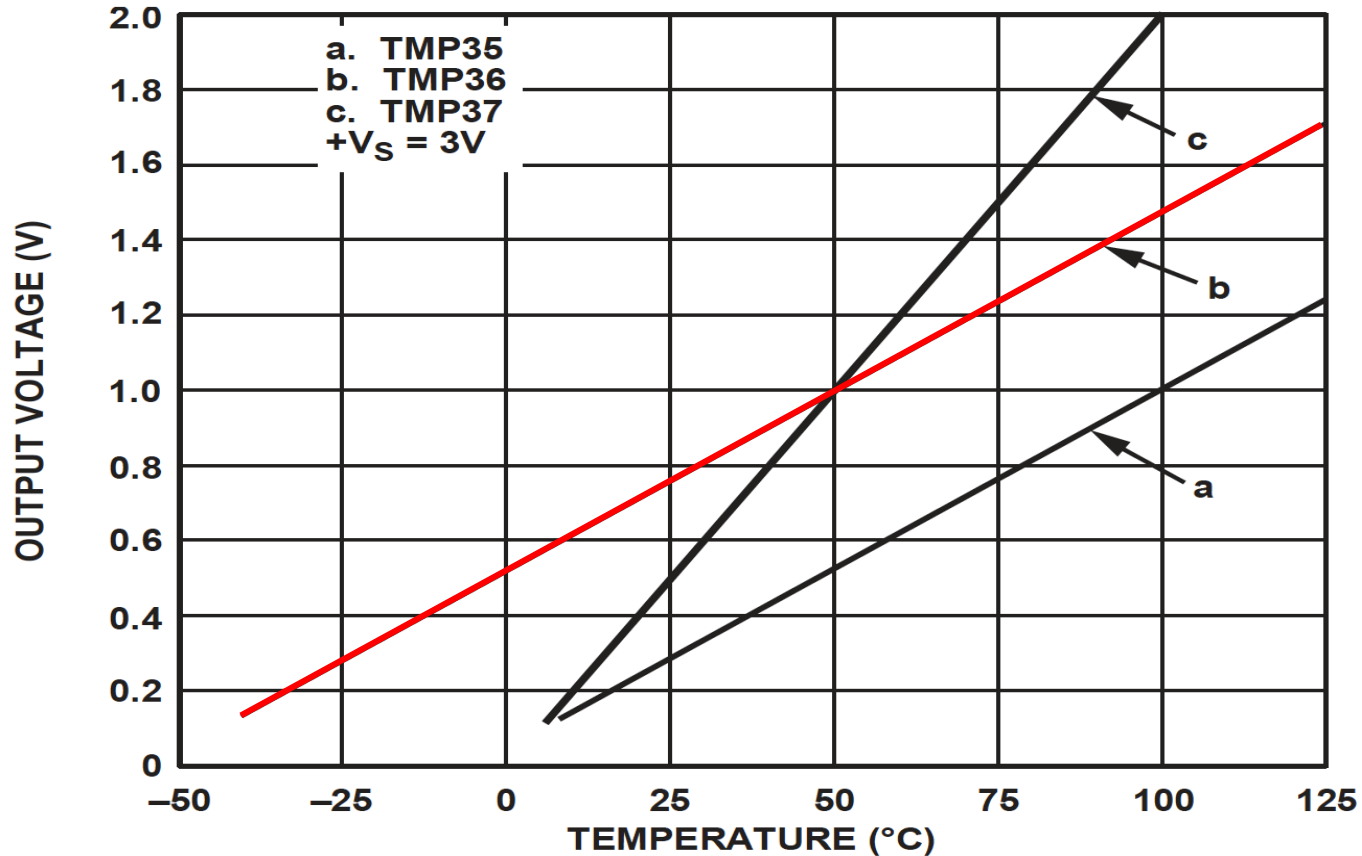


BACK

TMP is a small, low-cost temperature sensor and cost about \$1 (you can buy it “everywhere”)

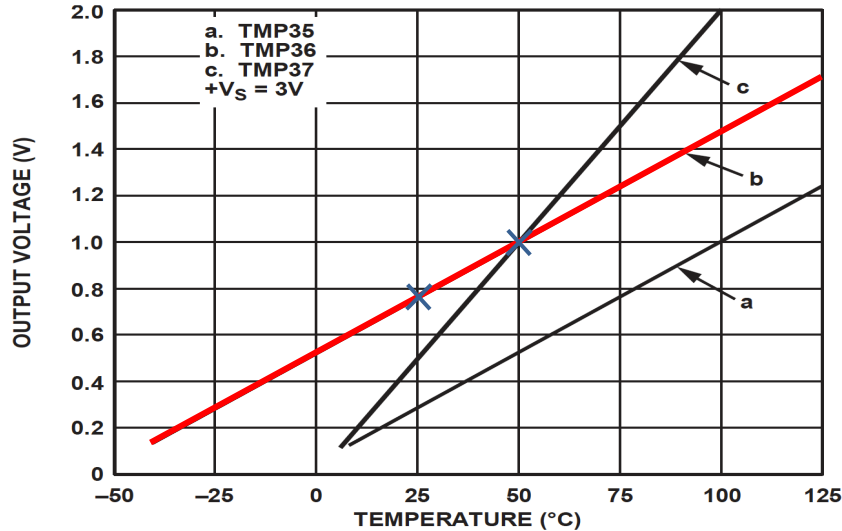
# Datasheet

## *Output Voltage vs. Temperature*





# Linear Scaling



This gives:

$$y - 25 = \frac{50 - 25}{1 - 0.75} (x - 0.75)$$

Then we get the following formula:

$$y = 100x - 50$$

Convert from Voltage (V) to degrees Celsius  
From the Datasheet we have:

$$(x_1, y_1) = (0.75V, 25^{\circ}C)$$
$$(x_2, y_2) = (1V, 50^{\circ}C)$$

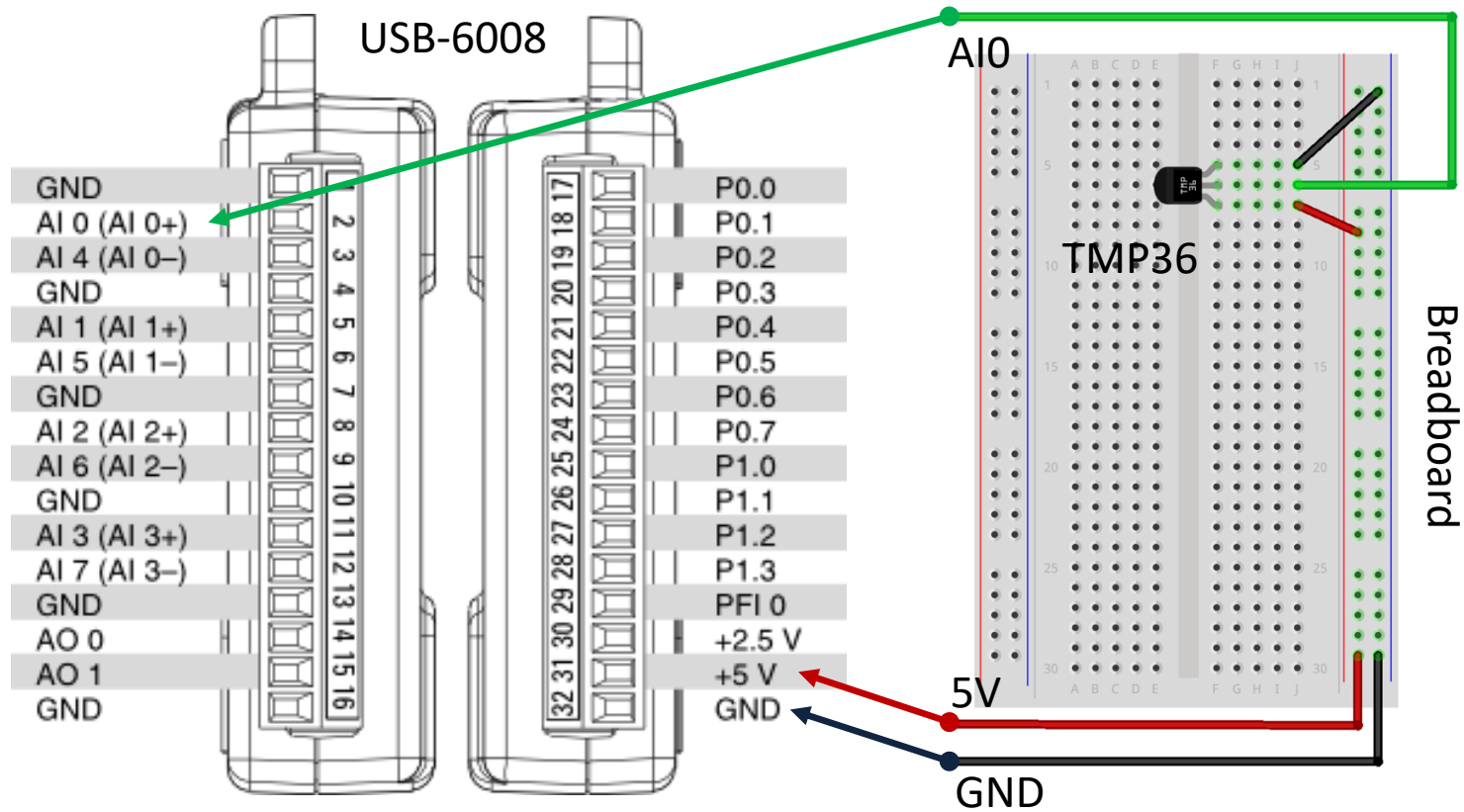
There is a linear relationship between  
Voltage and degrees Celsius:

$$y = ax + b$$

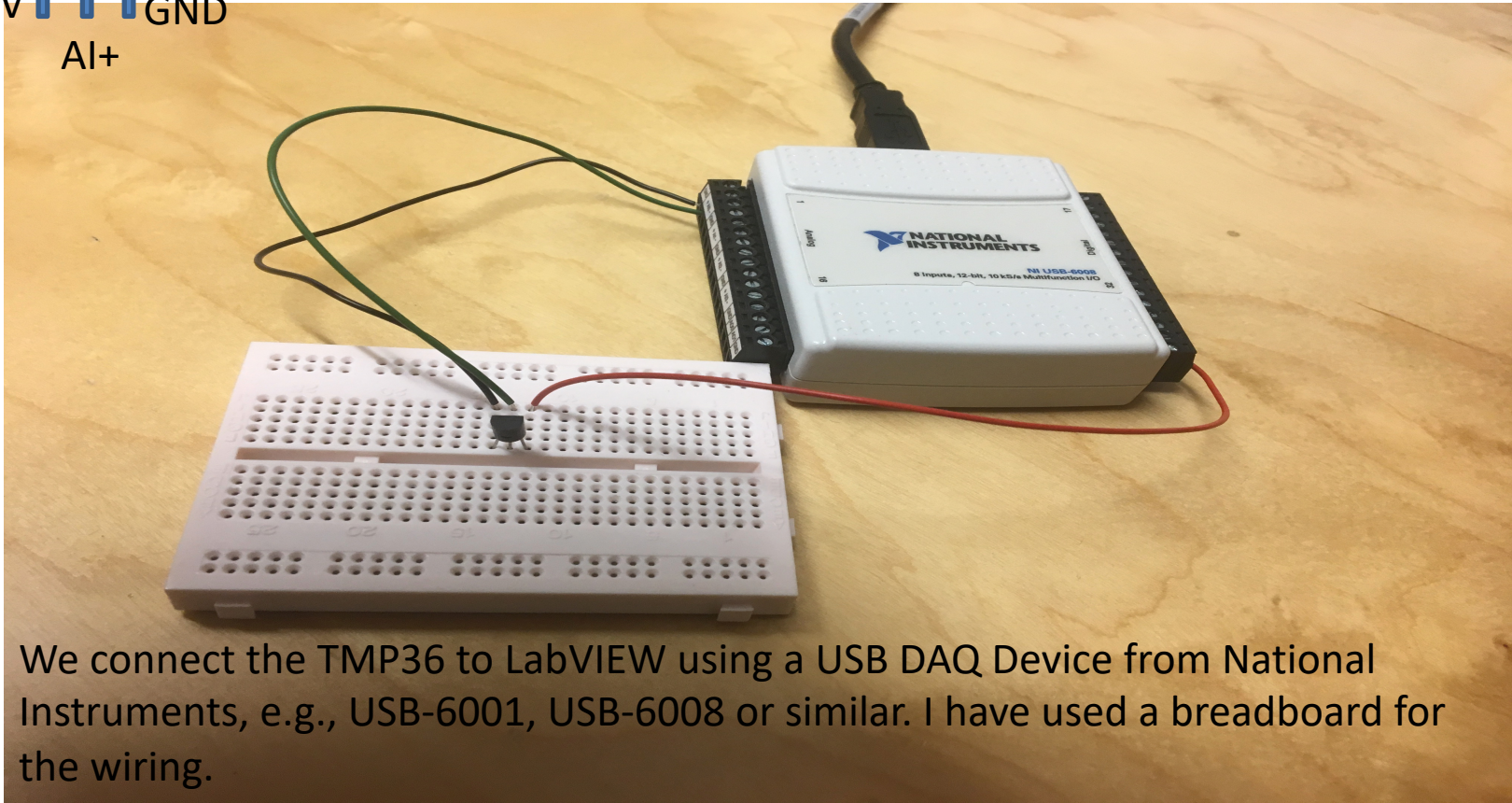
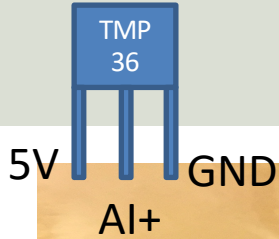
We can find a and b using the following  
known formula:

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1} (x - x_1)$$

# Wiring



# Wiring



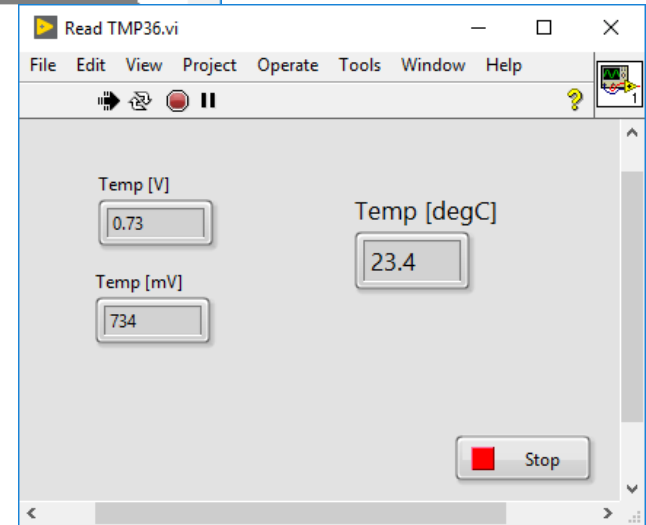
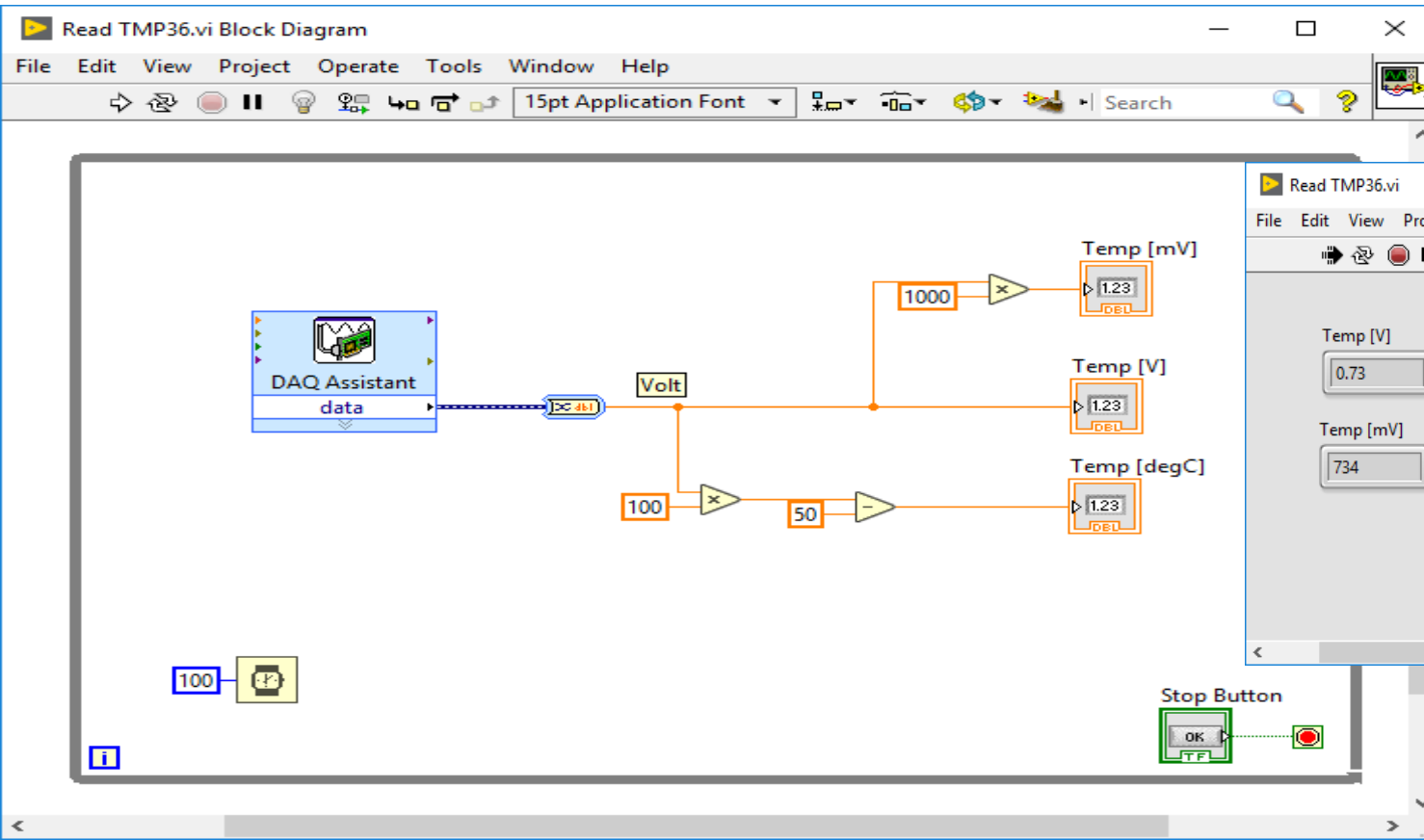
We connect the TMP36 to LabVIEW using a USB DAQ Device from National Instruments, e.g., USB-6001, USB-6008 or similar. I have used a breadboard for the wiring.

# Pseudo Code

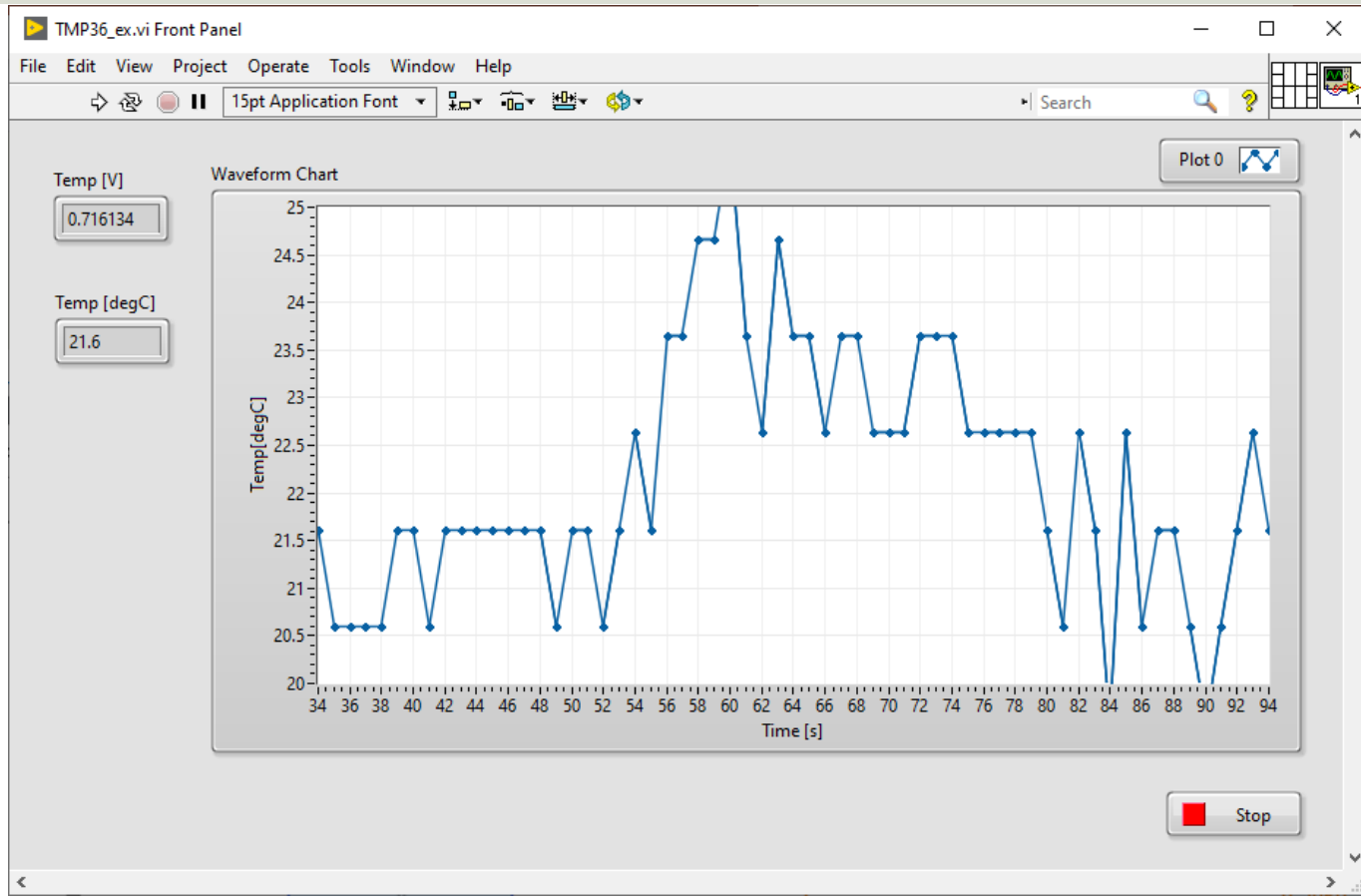
We want to present the value from the sensor in degrees Celsius:

1. Read Signal from DAQ Device (0-5V)
2. Convert to degrees Celsius using information from the Datasheet
3. Show/Plot Values in your Application GUI

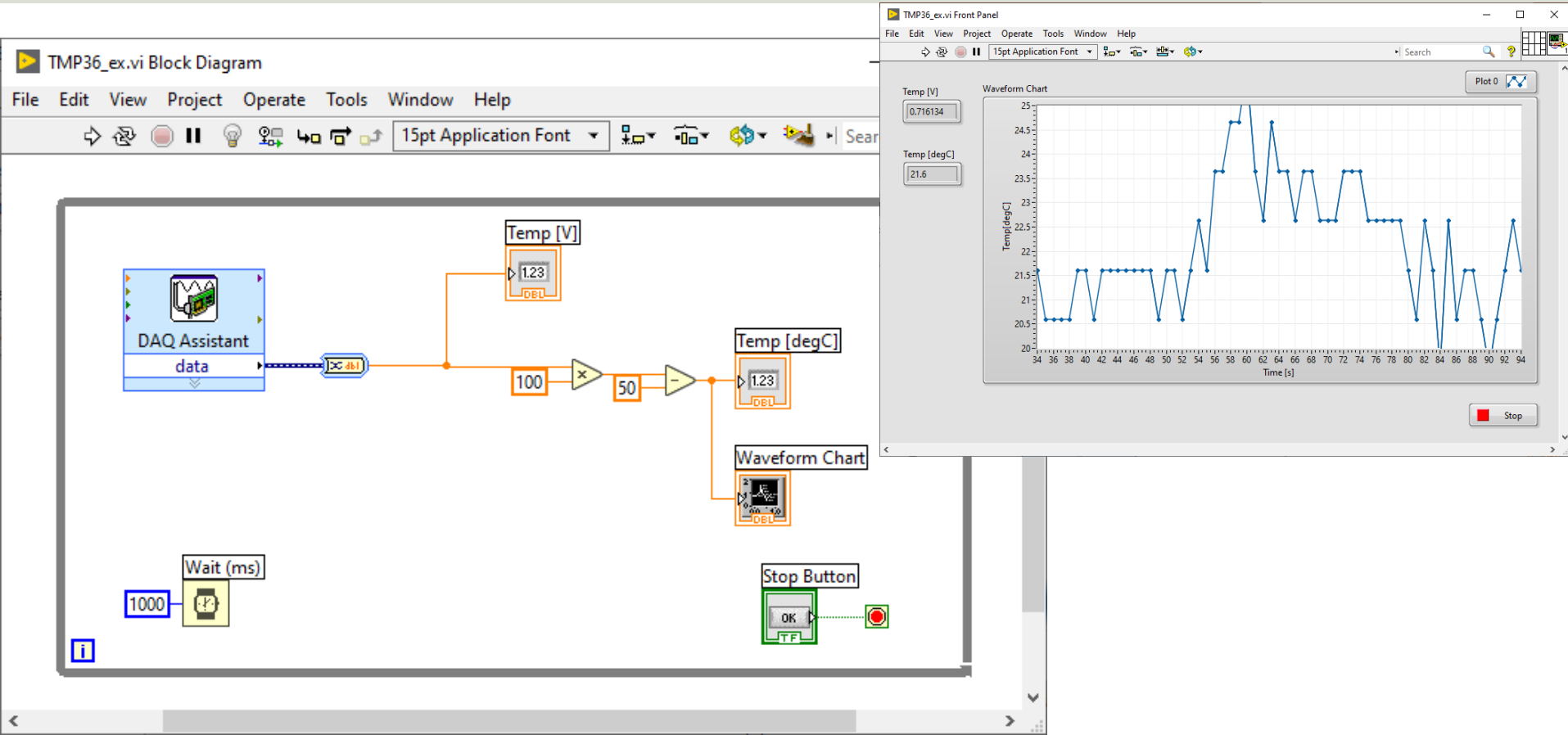
# LabVIEW Example



# Plotting Example

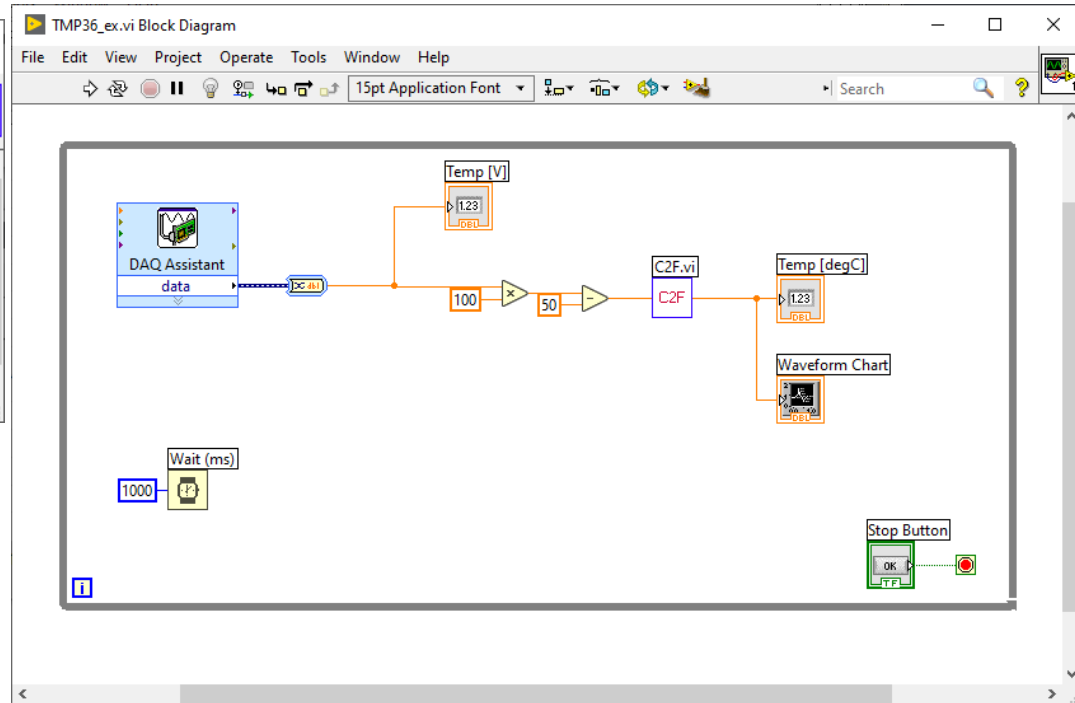
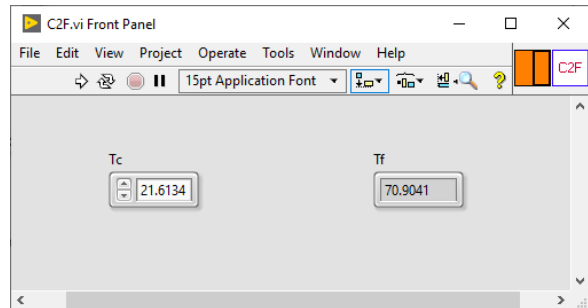
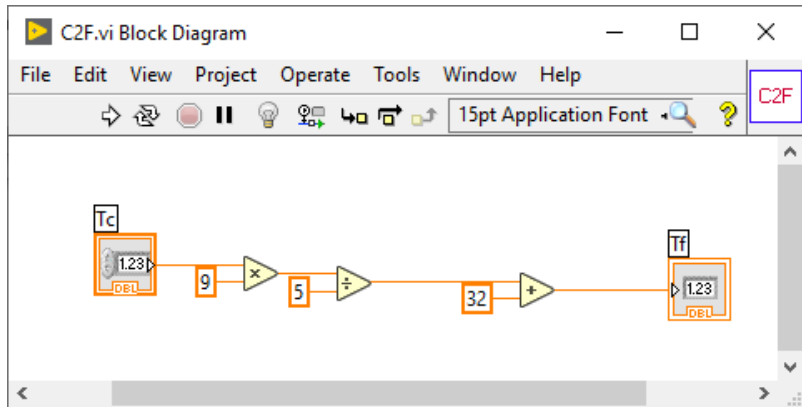


# Plotting Example



# Celsius to Fahrenheit

$$T_F = \frac{9}{5}T_C + 32$$





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