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Logging Temperature Data to Text File in LabVIEW

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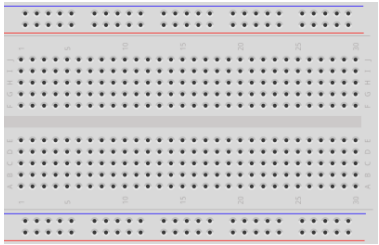
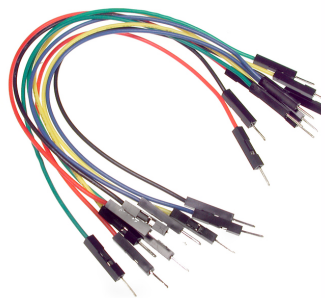
Contents

- We will use LabVIEW to read Temperature data from TMP36 Temperature Sensor
- We will use the USB-6008 DAQ Device or I/O Module
- The Temperature Data will be logged to a Text File
- We can then open the Text File in, e.g., Excel, where we can make a Plot, do some Analysis, etc.

Hardware

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





Software

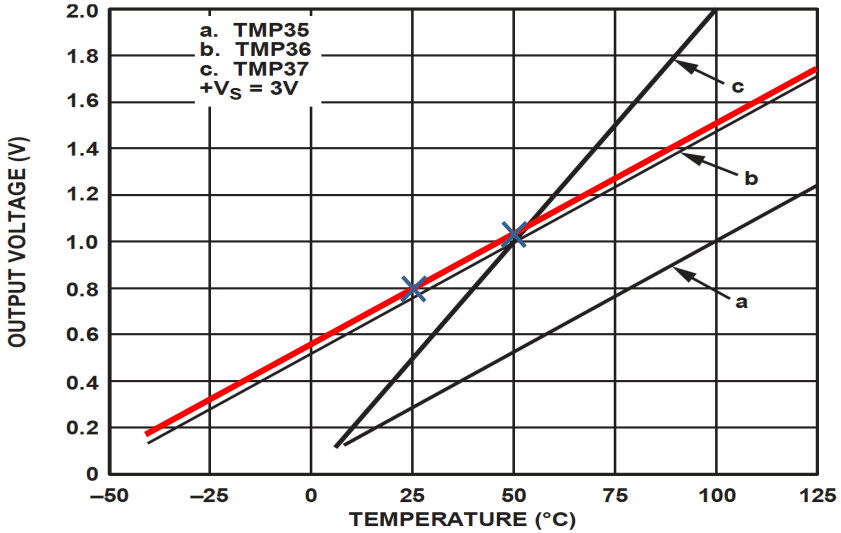
- LabVIEW
  - Graphical Programing Environment
- DAQmx Driver
  - Driver used for Communication with external Hardware such as USB-6008

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

TMP36 - Linear Scaling

TMP3x Datasheet:



This gives:

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

Then we get the following formula:

$$y = 100x - 50$$

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

$$(x_1, y_1) = (0.75V, 25°C)$$
$$(x_2, y_2) = (1V, 50°C)$$

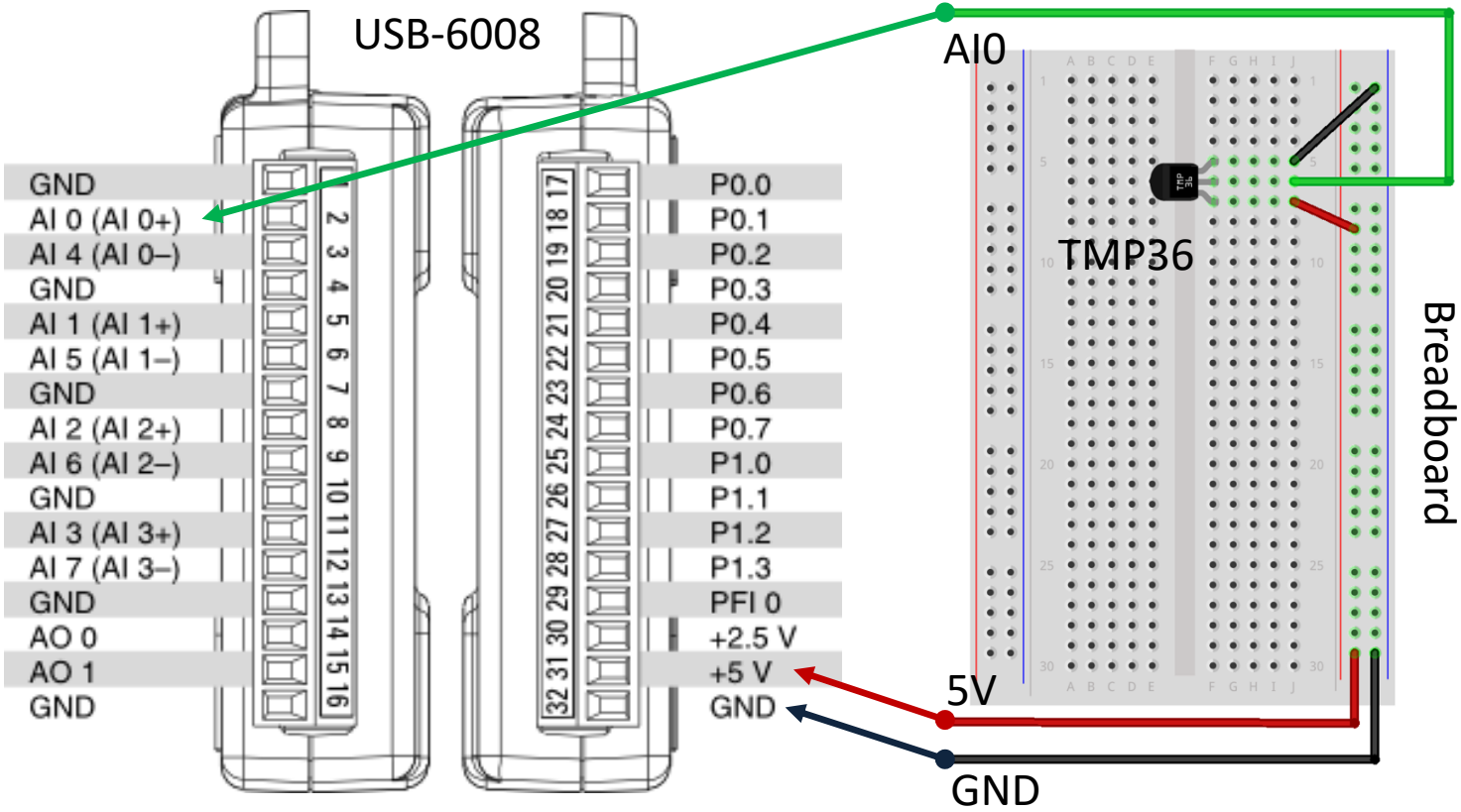
There is a linear relationship between Voltage and degrees Celsius:

$$y = ax + b$$

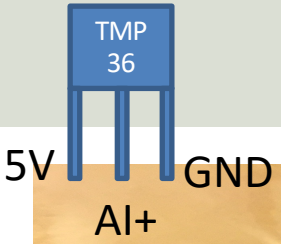
We can find a and b using the following known formula:

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

Wiring

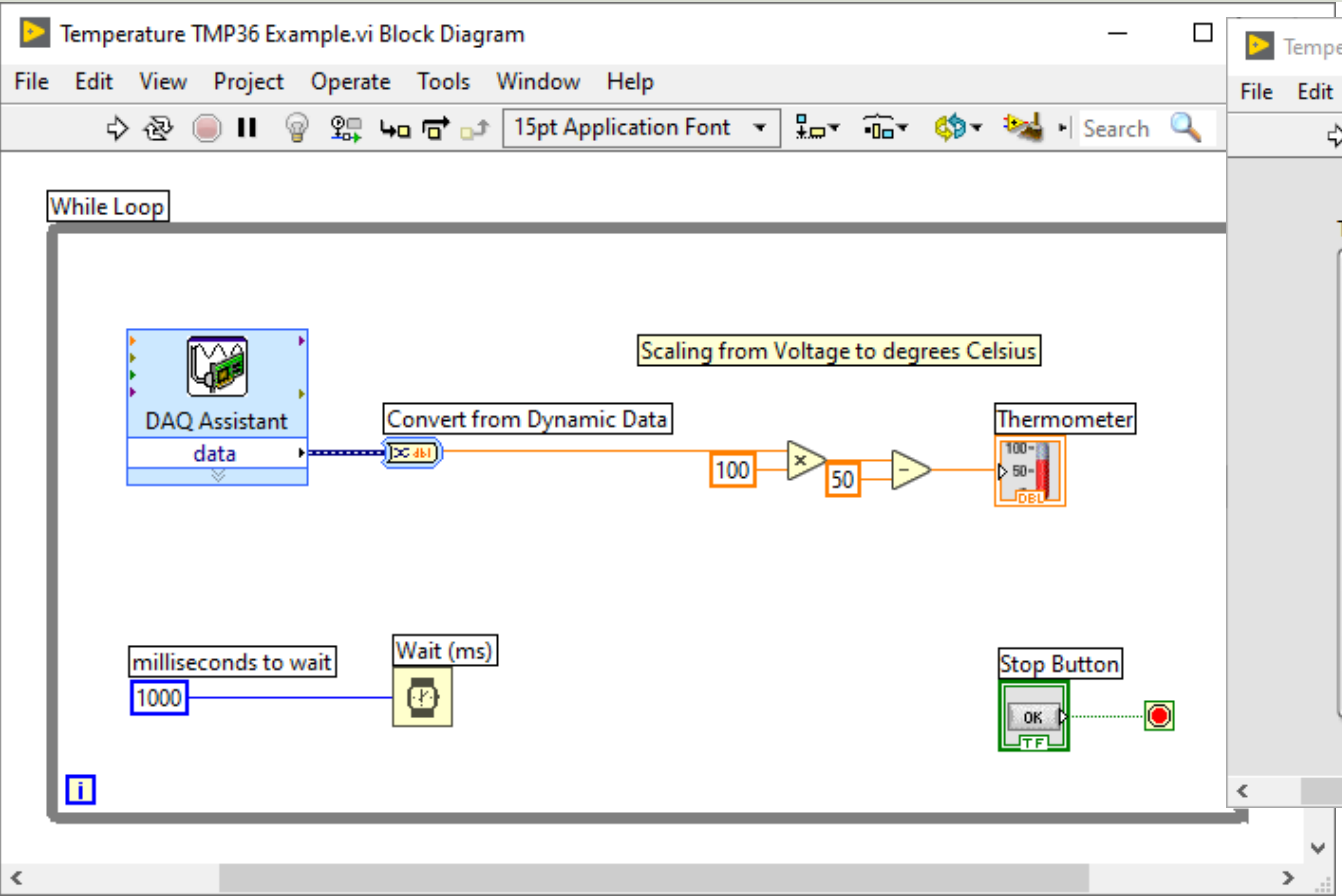

USB-6008
GND
AI 0 (AI 0+)
AI 4 (AI 0–)
GND
AI 1 (AI 1+)
AI 5 (AI 1–)
GND
AI 2 (AI 2+)
AI 6 (AI 2–)
GND
AI 3 (AI 3+)
AI 7 (AI 3–)
GND
AO 0
AO 1
GND
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
P0.0
P0.1
P0.2
P0.3
P0.4
P0.5
P0.6
P0.7
P1.0
P1.1
P1.2
P1.3
PFI 0
+2.5 V
+5 V
GND
AI0
TMP36
5V
GND
Breadboard

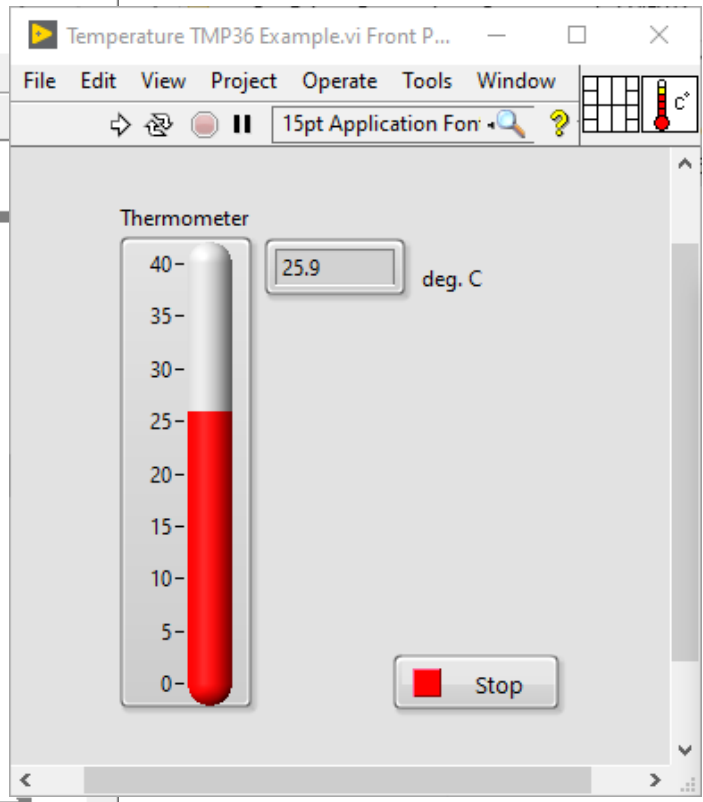
Wiring



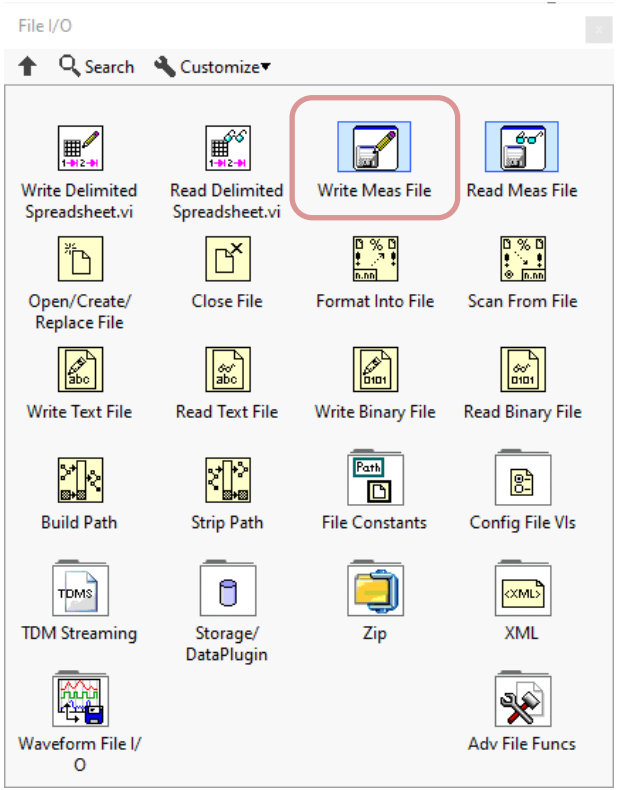
We connect the TMP36 to LabVIEW using a USB DAQ Device from National Instruments, e.g., USB-6001, USB-6008 or similar. I have used a breadboard for the wiring.

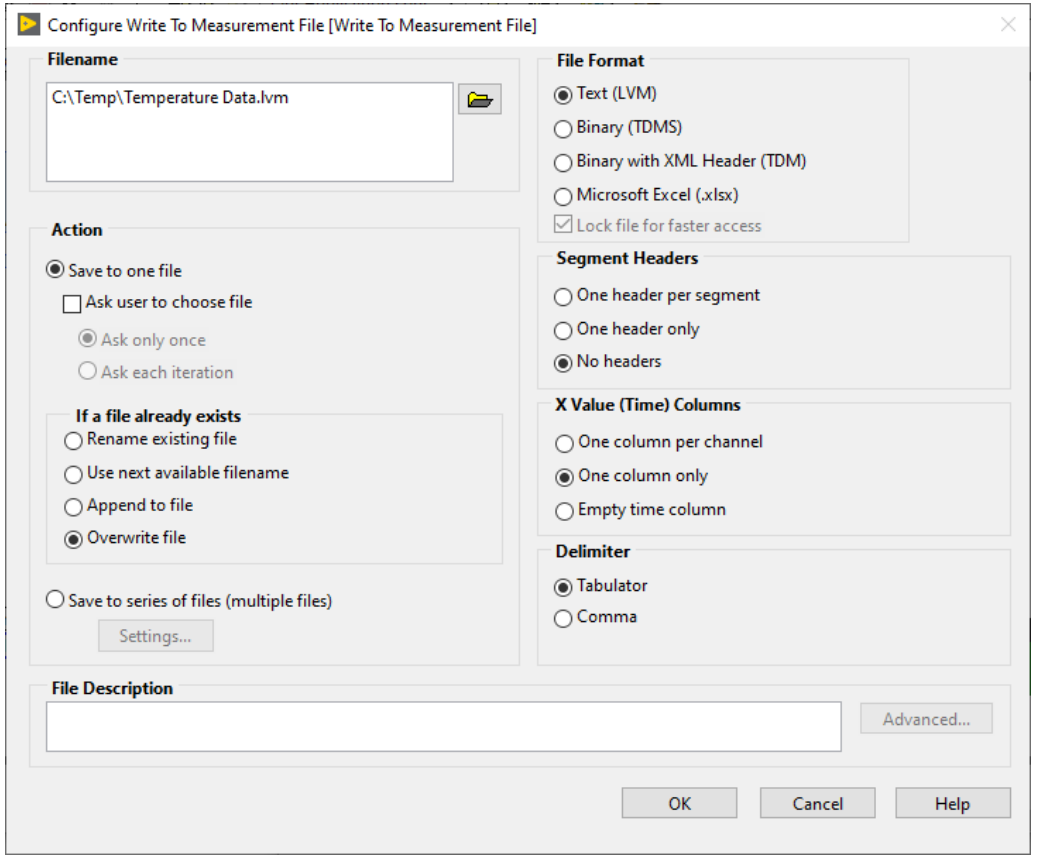
Read Temperature Data



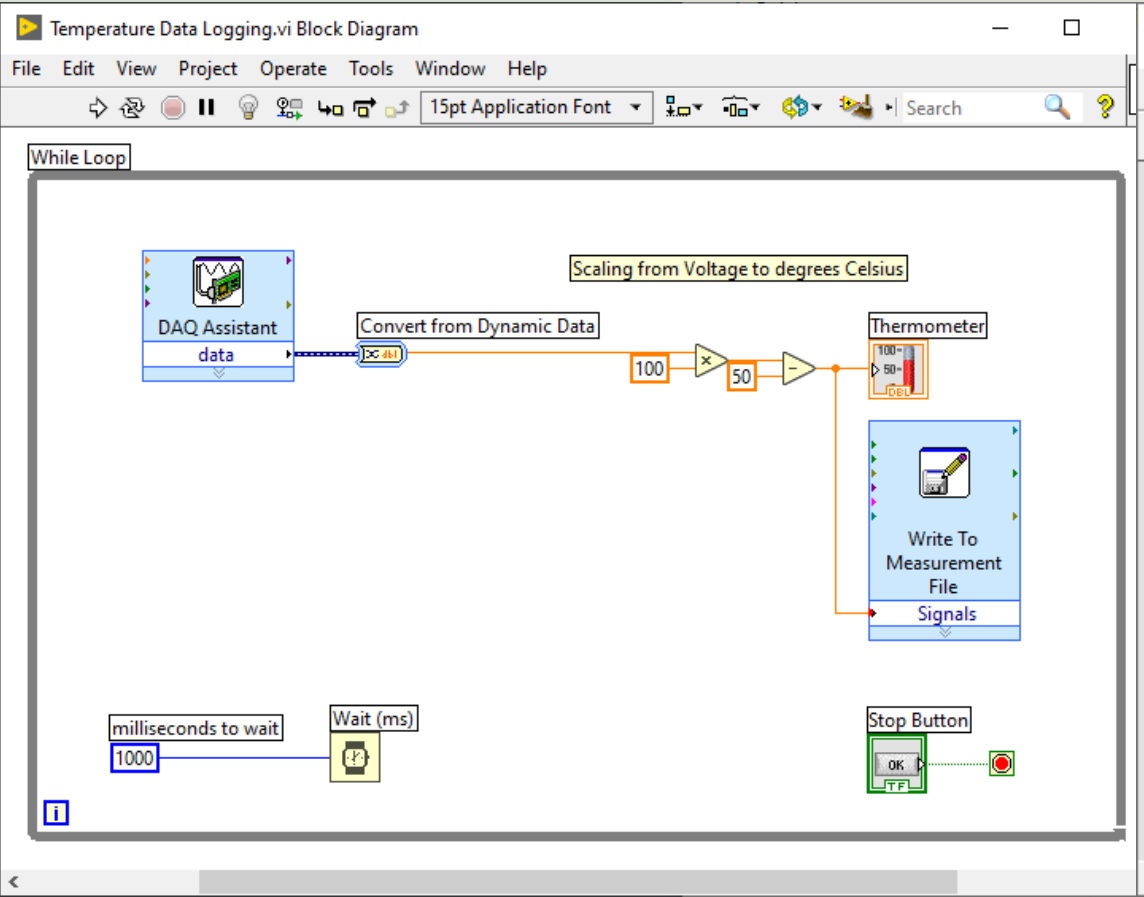


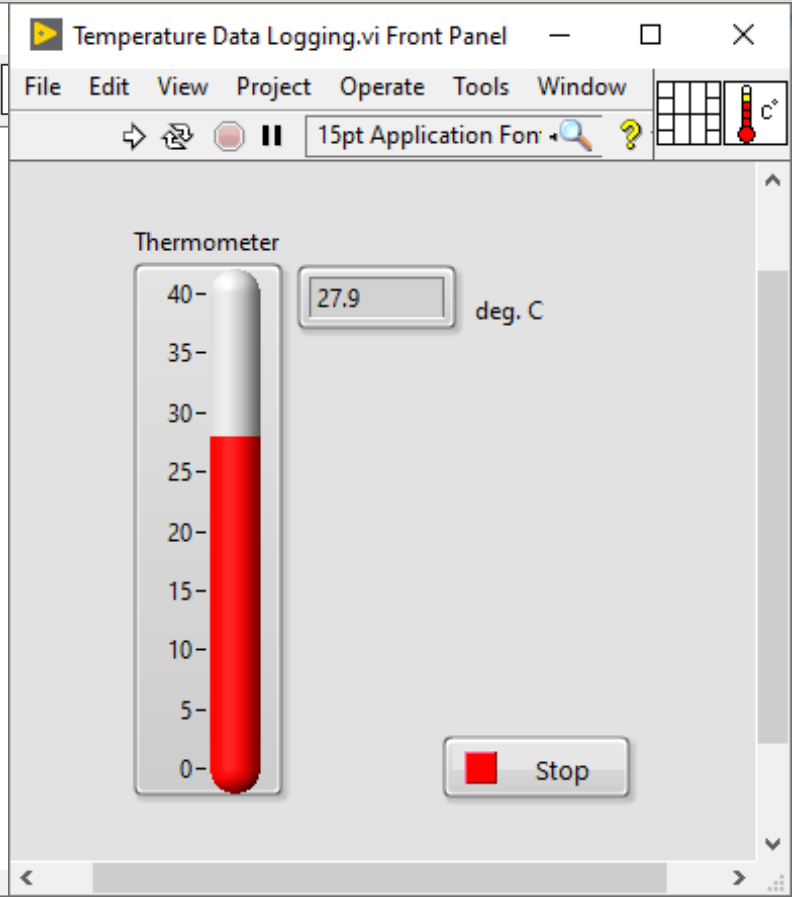
Write to Measurement File



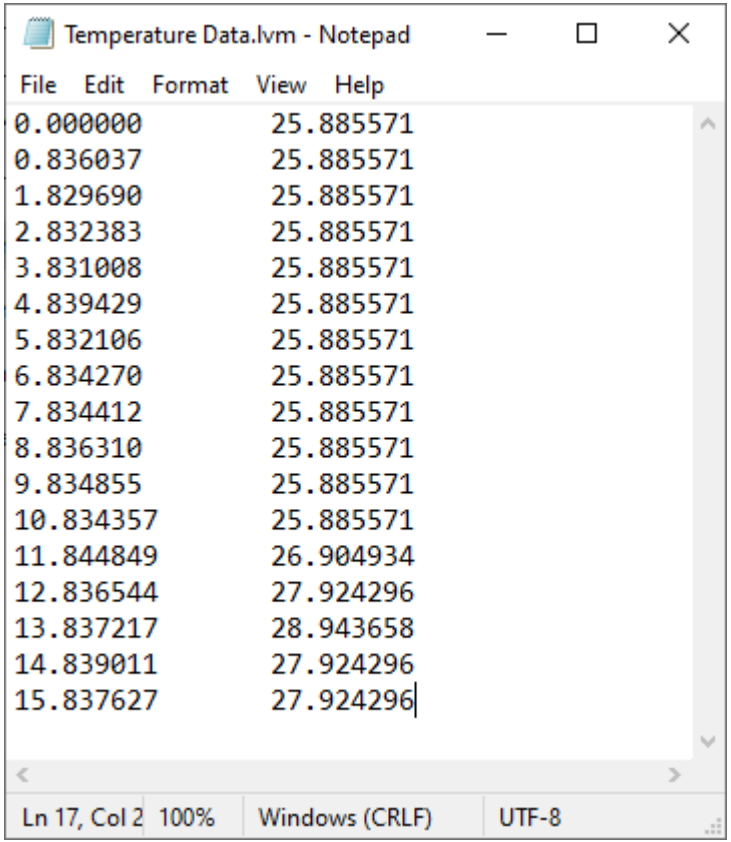


LabVIEW

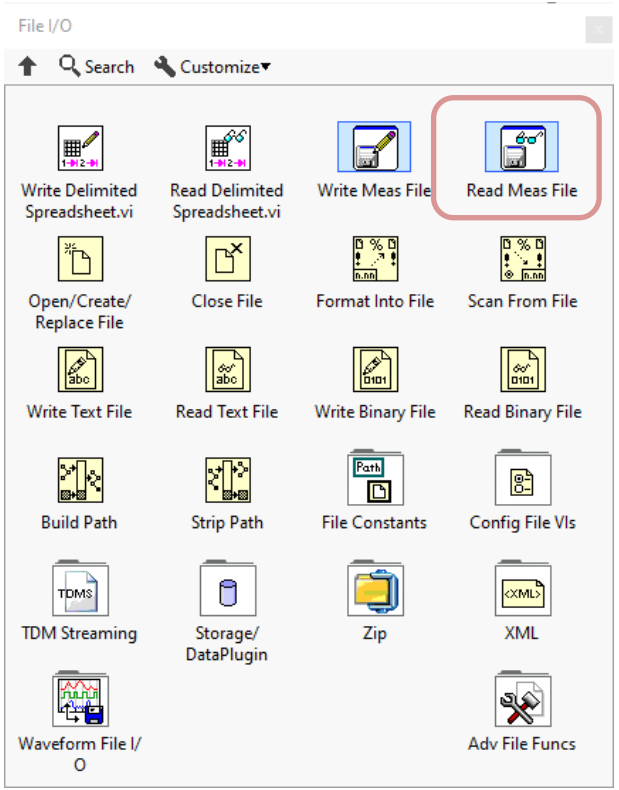

Temperature Data Logging.vi Block Diagram
File Edit View Project Operate Tools Window Help
15pt Application Font
Search
While Loop
DAQ Assistant
data
Convert from Dynamic Data
Scaling from Voltage to degrees Celsius
100
50
Thermometer
Write To Measurement File
Signals
milliseconds to wait
1000
Wait (ms)
Stop Button
OK
TF

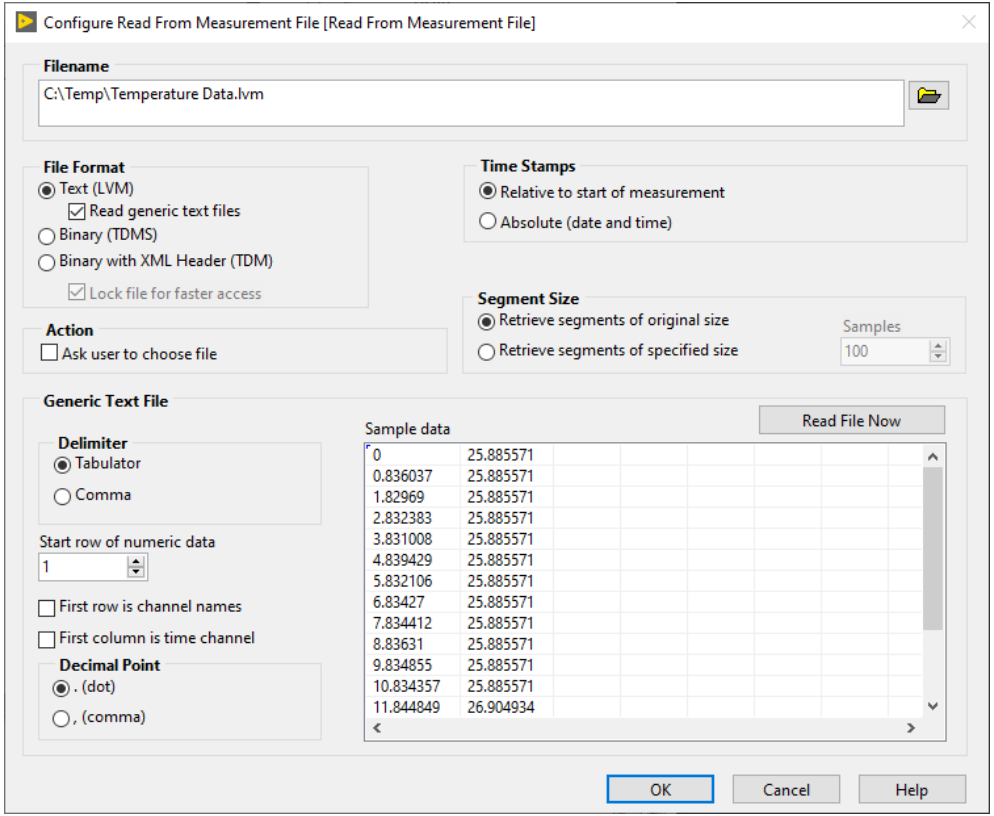

Temperature Data Logging.vi Front Panel
File Edit View Project Operate Tools Window
15pt Application Font
Thermometer
40
35
30
25
20
15
10
5
0
27.9
deg. C
Stop

Measurement Data

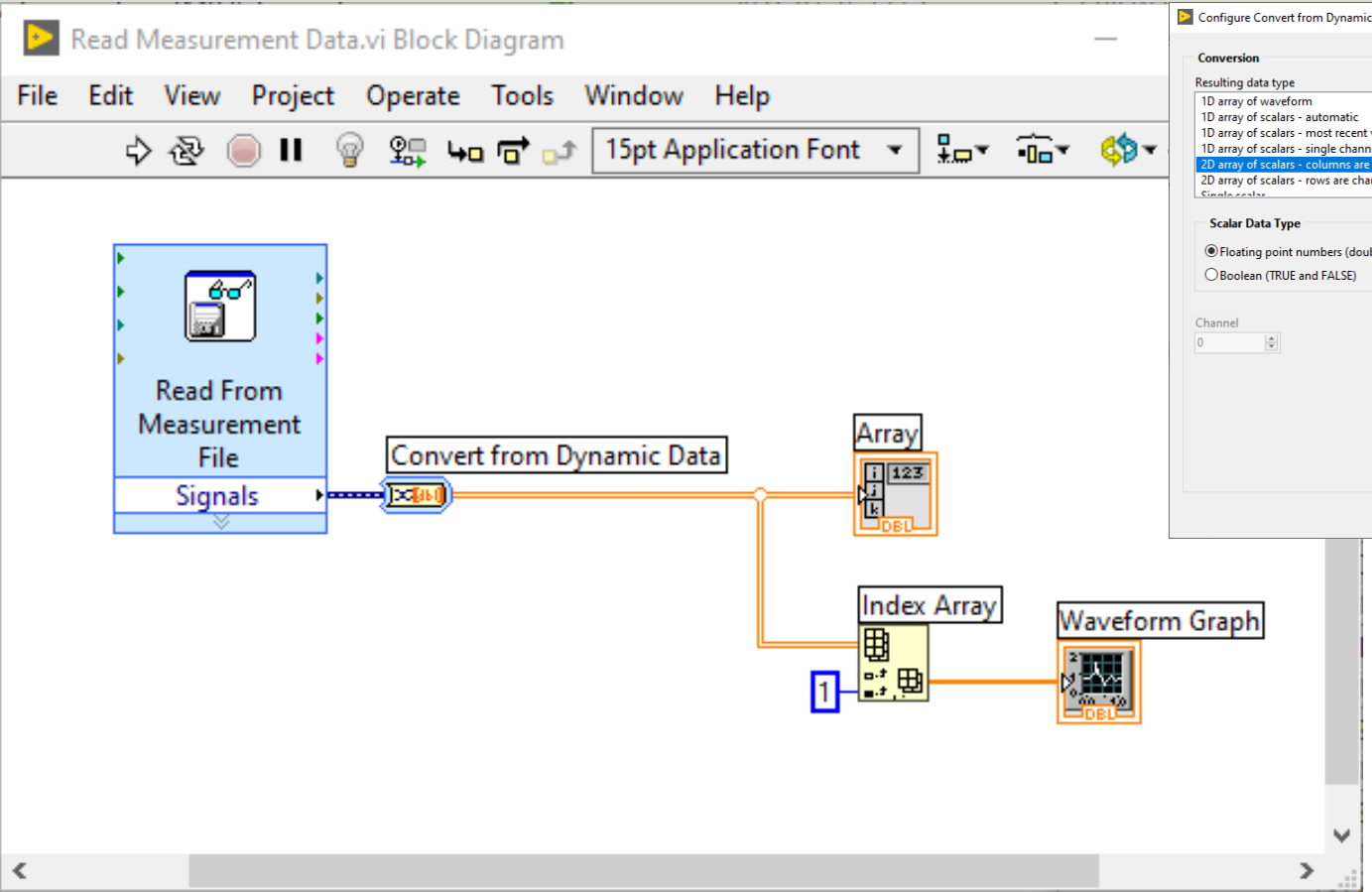


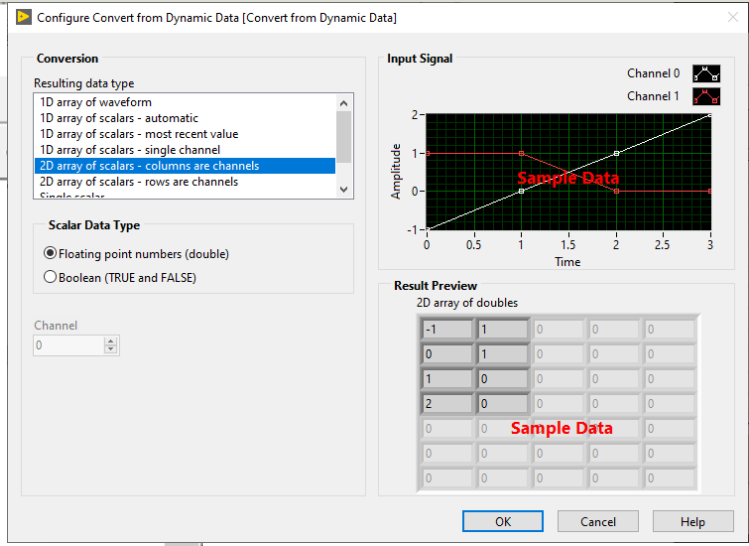
Read from Measurement File



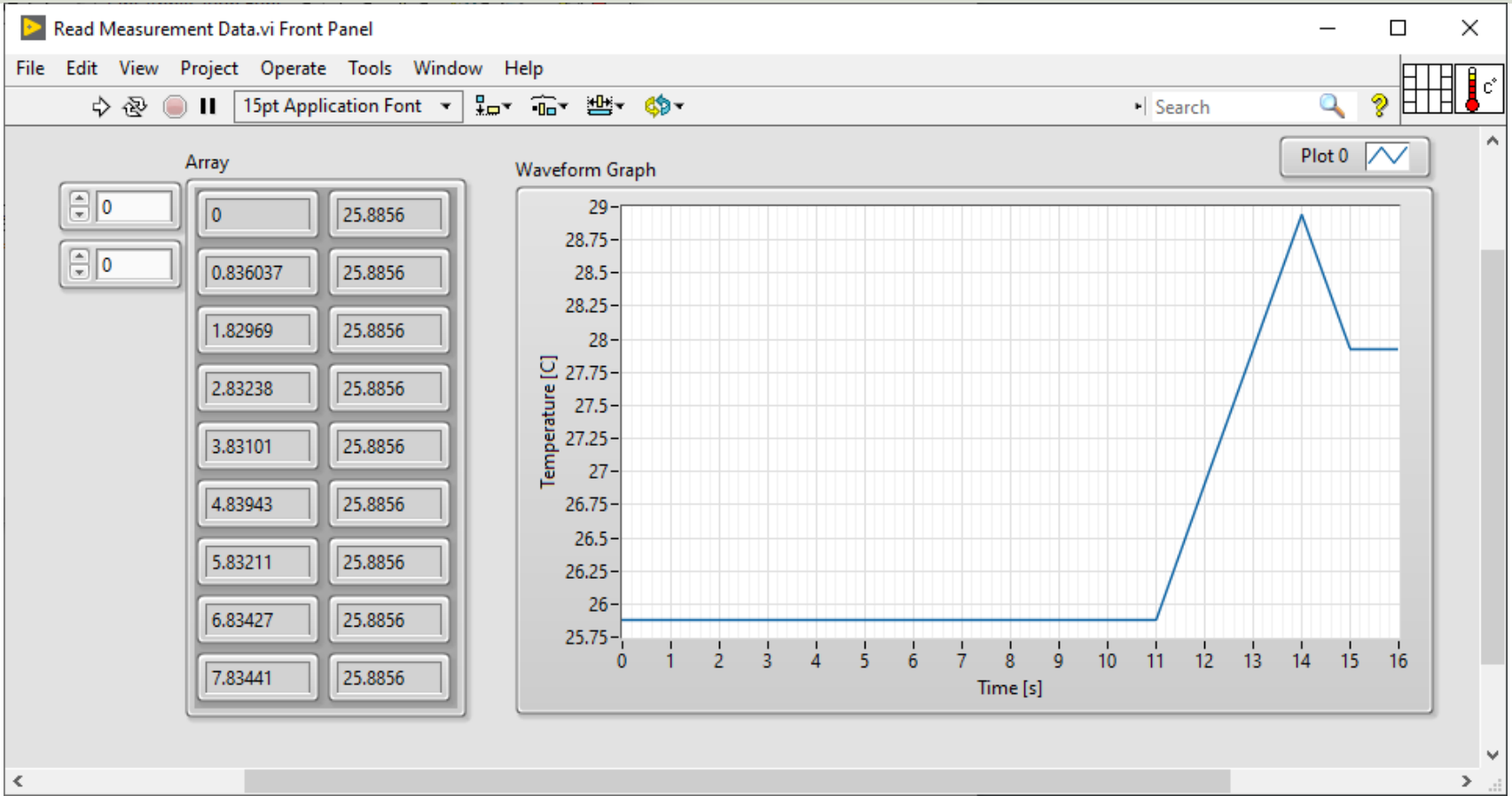


LabVIEW

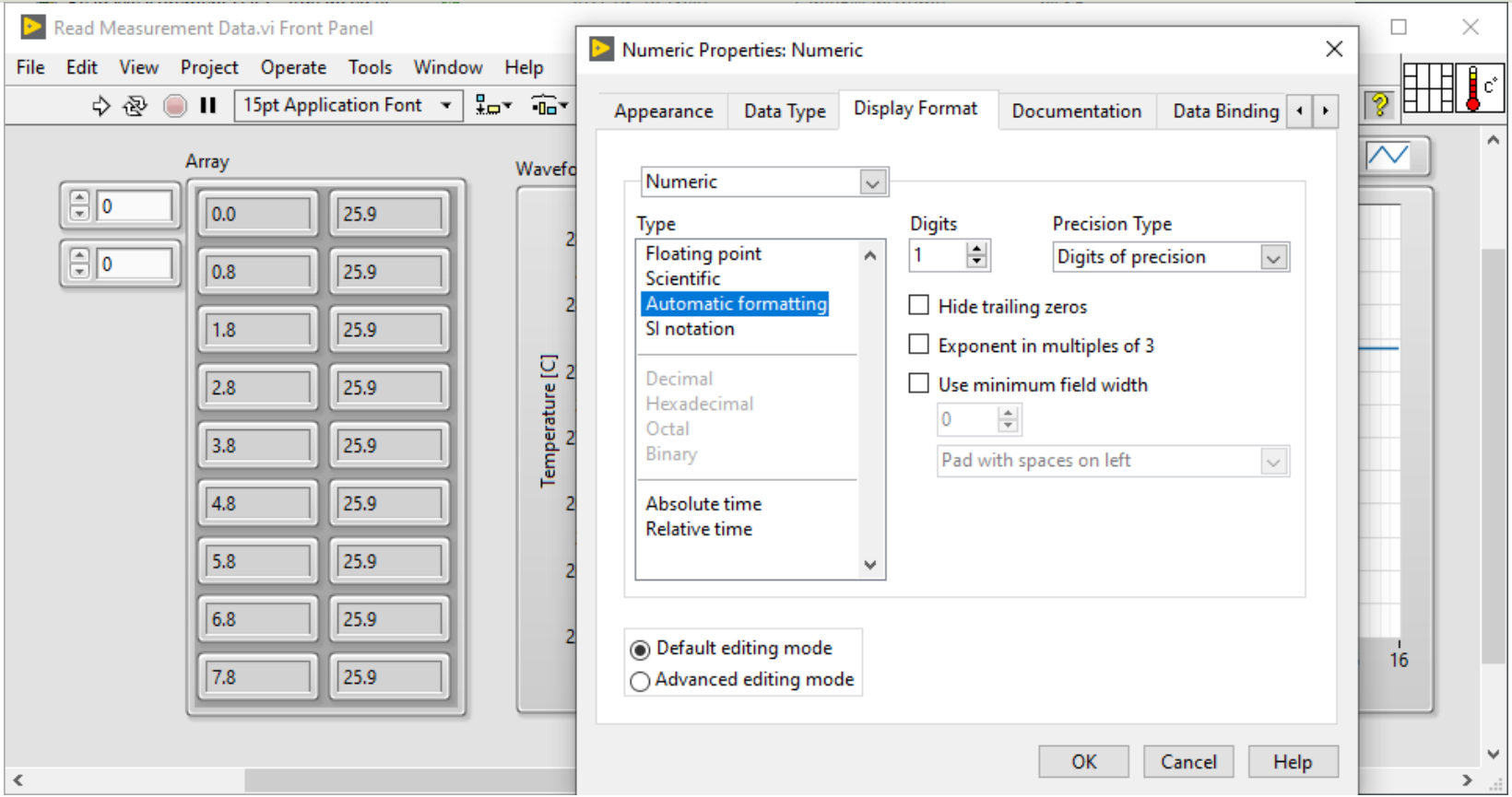

Read Measurement Data.vi Block Diagram
File Edit View Project Operate Tools Window Help
15pt Application Font
Read From Measurement File
Signals
Convert from Dynamic Data
Array
Index Array
Waveform Graph
1
DBL


Configure Convert from Dynamic Data [Convert from Dynamic Data]
Conversion
Resulting data type
1D array of waveform
1D array of scalars - automatic
1D array of scalars - most recent value
1D array of scalars - single channel
2D array of scalars - columns are channels
2D array of scalars - rows are channels
Scalar Data Type
Floating point numbers (double)
Boolean (TRUE and FALSE)
Channel
Input Signal
Channel 0
Channel 1
Amplitude
Time
Sample Data
Result Preview
2D array of doubles
Sample Data
OK
Cancel
Help

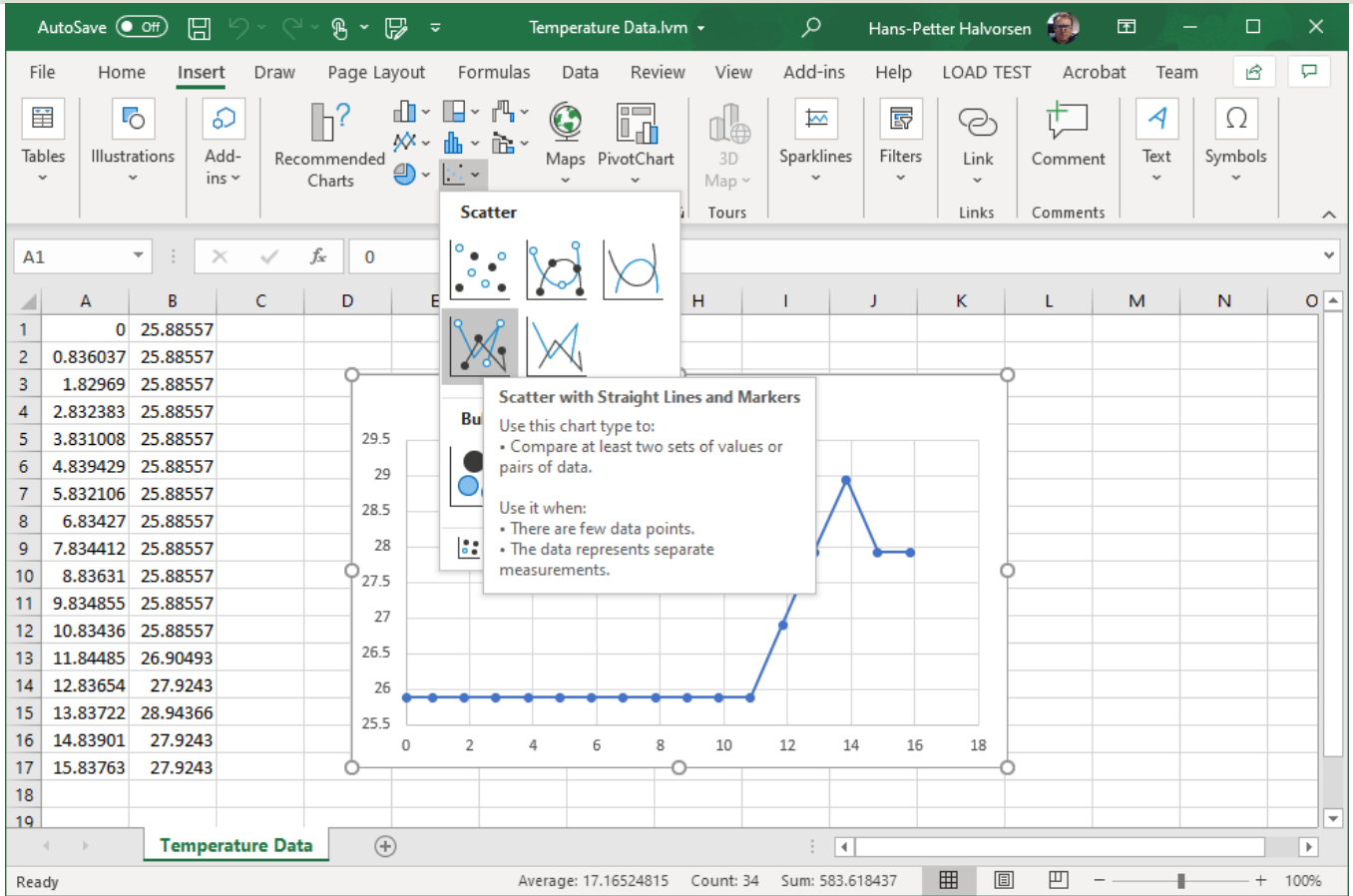
LabVIEW


Read Measurement Data.vi Front Panel
File Edit View Project Operate Tools Window Help
15pt Application Font
Search
Array
0
0
0 25.8856
0.836037 25.8856
1.82969 25.8856
2.83238 25.8856
3.83101 25.8856
4.83943 25.8856
5.83211 25.8856
6.83427 25.8856
7.83441 25.8856
Waveform Graph
Plot 0
Temperature [C]
29
28.75
28.5
28.25
28
27.75
27.5
27.25
27
26.75
26.5
26.25
26
25.75
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Time [s]

Setting Number of Decimals



Excel



	A	B
1	0	25.88557
2	0.836037	25.88557
3	1.82969	25.88557
4	2.832383	25.88557
5	3.831008	25.88557
6	4.839429	25.88557
7	5.832106	25.88557
8	6.83427	25.88557
9	7.834412	25.88557
10	8.83631	25.88557
11	9.834855	25.88557
12	10.83436	25.88557
13	11.84485	26.90493
14	12.83654	27.9243
15	13.83722	28.94366
16	14.83901	27.9243
17	15.83763	27.9243
18		
19		

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