

In this exercise, you will create a program using the Analog Express VI that measures temperature data. The program will allow you to display the data in Celsius or Fahrenheit units. The code that performs the selection of the units will be a separate VI, called by your program as a subVI.

In this exercise, you will

- ## MATERIALS

LabVIEW
USB cable

PROCEDURE

Part I Connect Equipment

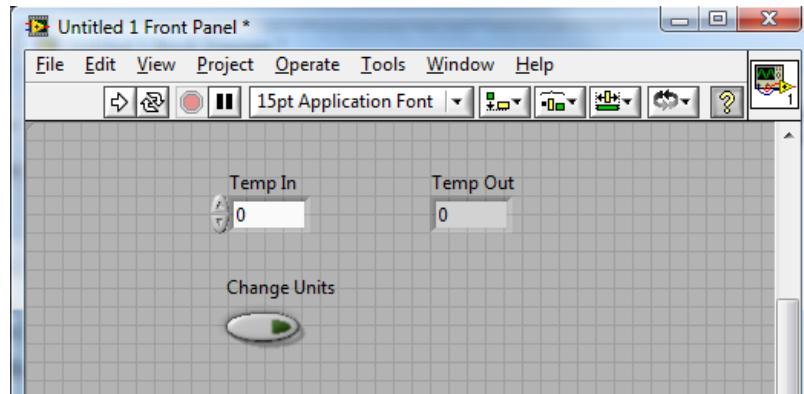
1. Connect the USB cable to the SensorDAQ or LabQuest interface.
2. Connect the other end of the USB cable to any available USB port on your computer. If you are using a LabQuest interface with a power button, turn it on.

Exercise 7

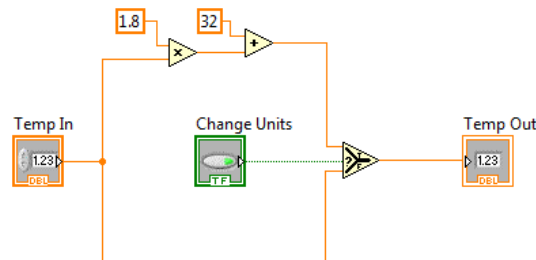
3. Connect the Temperature Probe to Ch. 1.

Part II Start LabVIEW and Create a VI to Convert Temperature Units

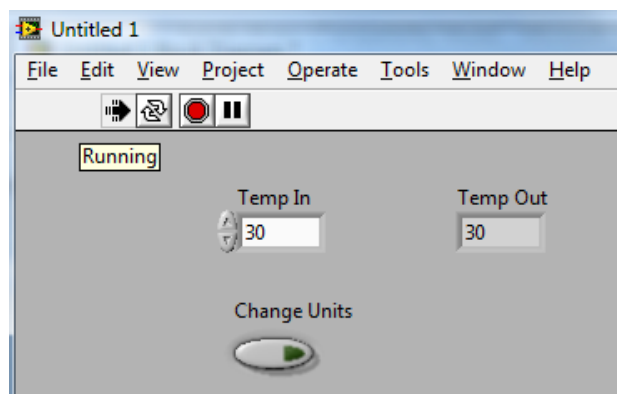
4. Start LabVIEW.
5. From the Getting Started window, click the “Blank VI” link under the New category.
6. On the front panel, add a Numeric Control and label it “Temp In”, a Boolean Push Button labeled “Change Units”, and a Numeric Indicator labeled “Temp Out”. Organize your front panel with the controls on the left and indicators on the right.



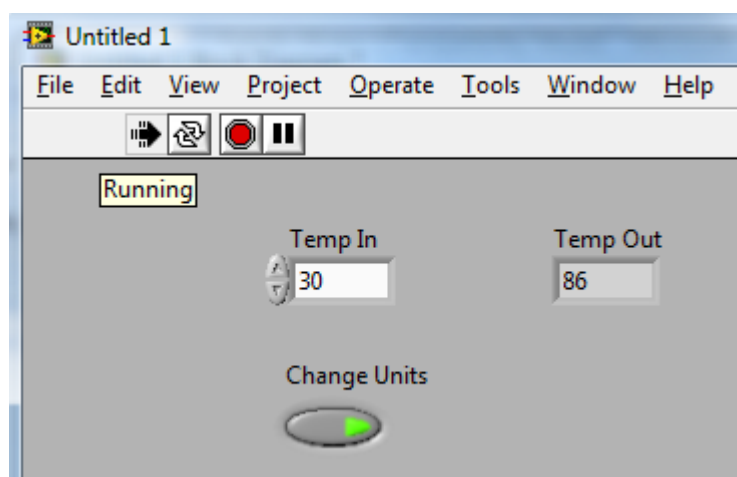
7. Go to the block diagram using <Ctrl-E>.
8. Build the block diagram as shown in the figure below. You will need to add the Select Function from the Comparison palette and the Add and Multiply Functions from the Numeric palette.



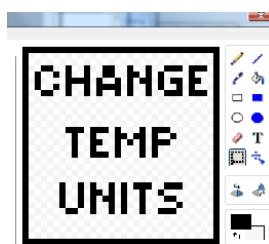
9. View the front panel using <Ctrl-E>.
10. Type a value of 30 in the Temp In control and run the program.



11. Click the Change Units control, and run the program again to verify that the VI is performing properly.

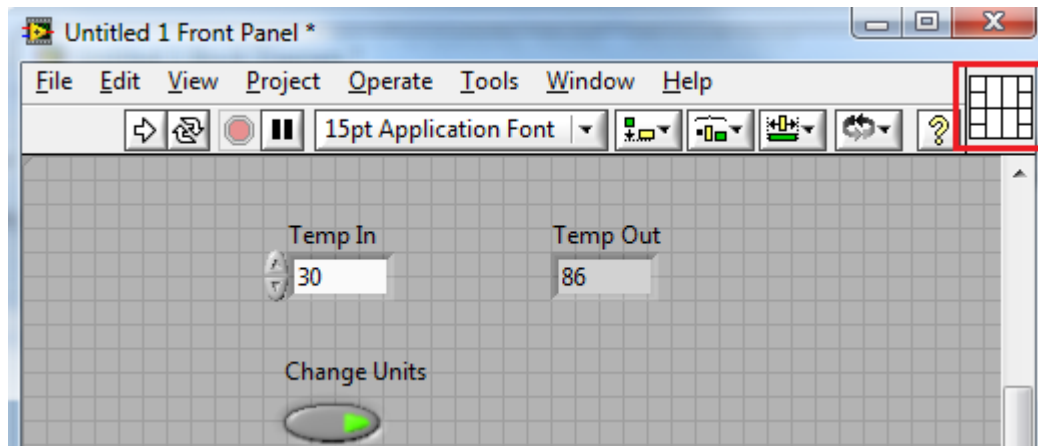


12. Open the icon editor by right-clicking the icon in the upper-right corner of the front panel and selecting Edit Icon. Create an appropriate icon and press the OK button to close the icon editor.

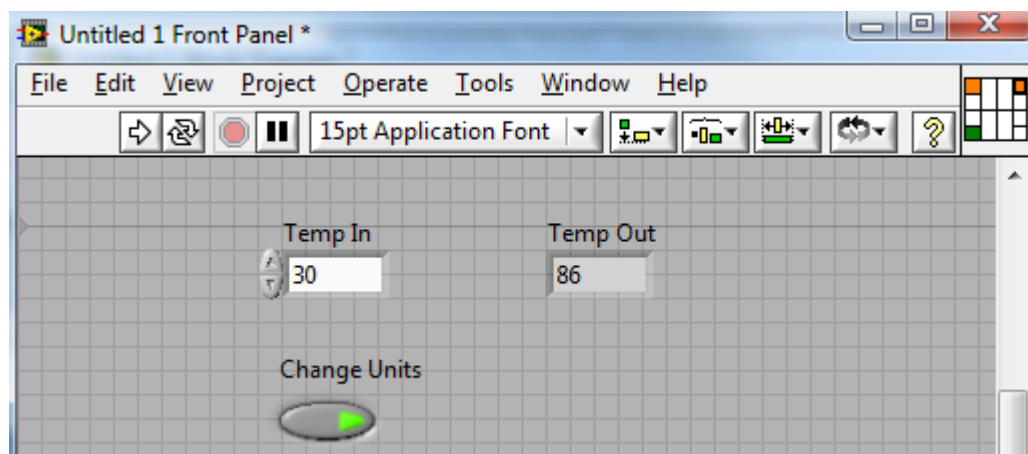


13. Show the connector pane by right-clicking the icon in the upper-right corner of the front panel and selecting Show Connector.

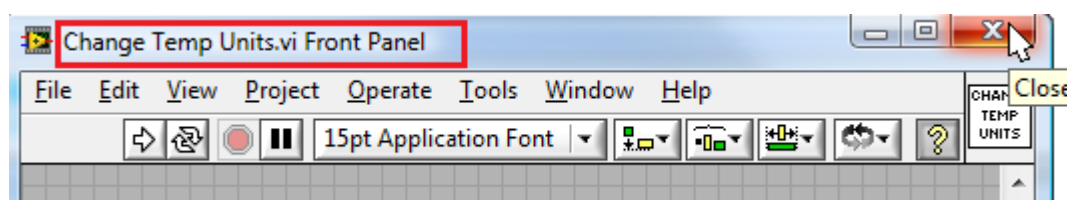
Exercise 7



14. Create terminals for the two front panel controls and the indicator.
 - a. Click the upper-left terminal box and click the Temp In control.
 - b. Click the bottom-left terminal box and click the Change Units control.
 - c. Click the upper-right terminal box and click the Temp Out indicator.

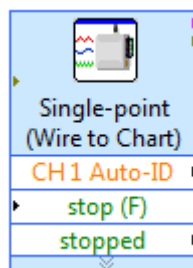


15. Save the VI with the name Change Temp Units and close this VI.



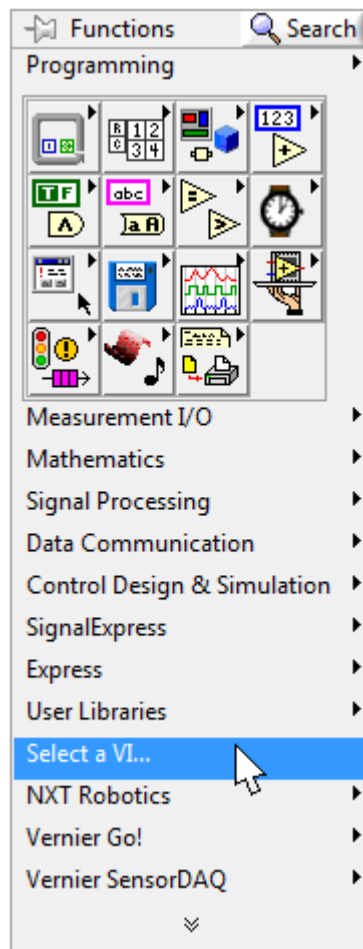
Part III Create a VI to Measure Temperature in Degrees Celsius or Fahrenheit

16. Open a New Blank VI.
17. View the block diagram workspace using <Ctrl-E>.
18. Place the Analog Express VI in the block diagram with a timing length of 20 seconds and sample rate of 2 samples/second.

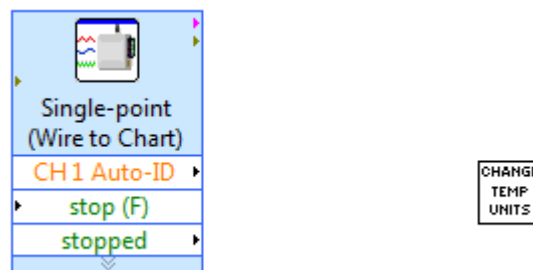


Exercise 7

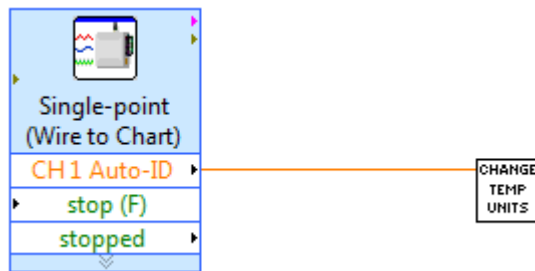
19. Place the Change Temp Units VI into your block diagram workspace. This VI can be found by going to the Functions palette and choosing Select a VI.



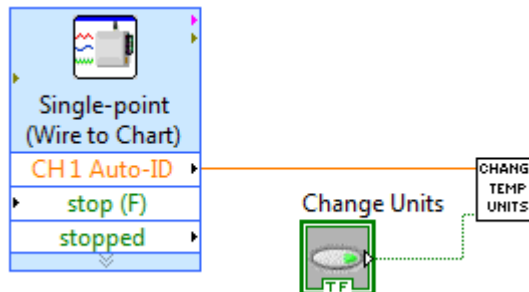
20. Navigate to the Change Temp Units VI and double-click to place it on the block diagram.



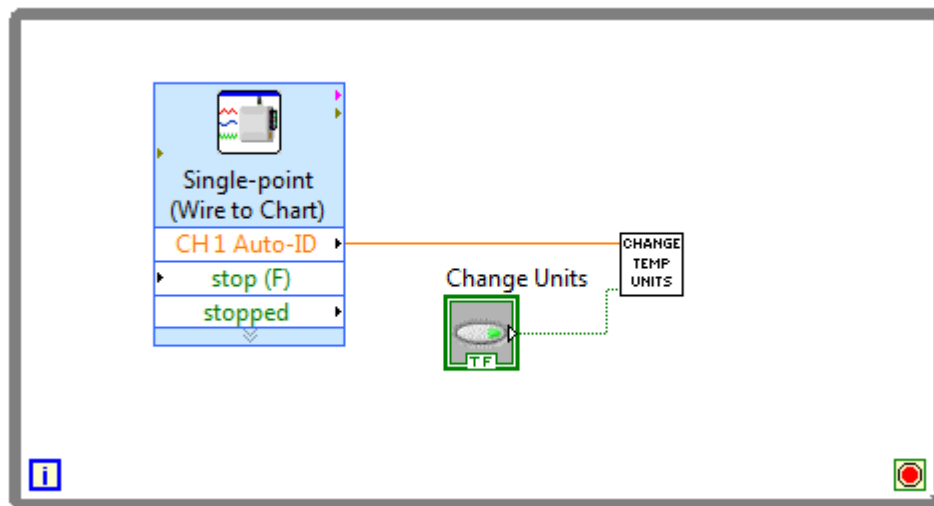
21. Wire the Express VI's CH 1 Auto-ID terminal to the subVI's Temp In terminal.



22. Right-click the subVI's Change Units input terminal and select Create ► Control from the menu.

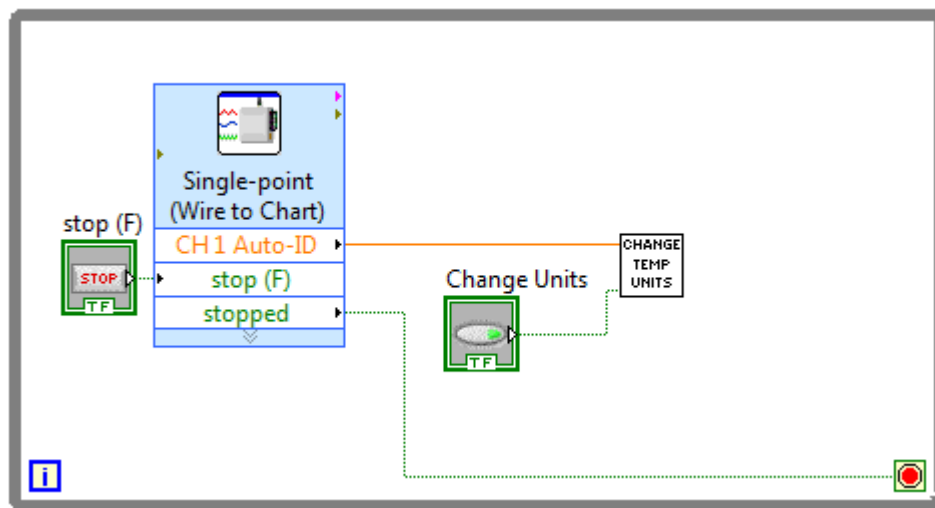


23. Place the code within a While Loop.

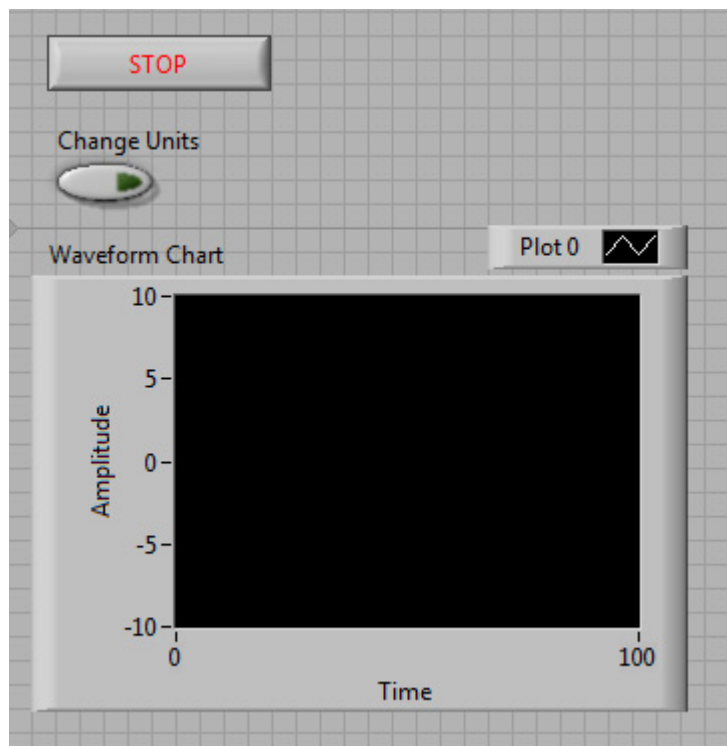


Exercise 7

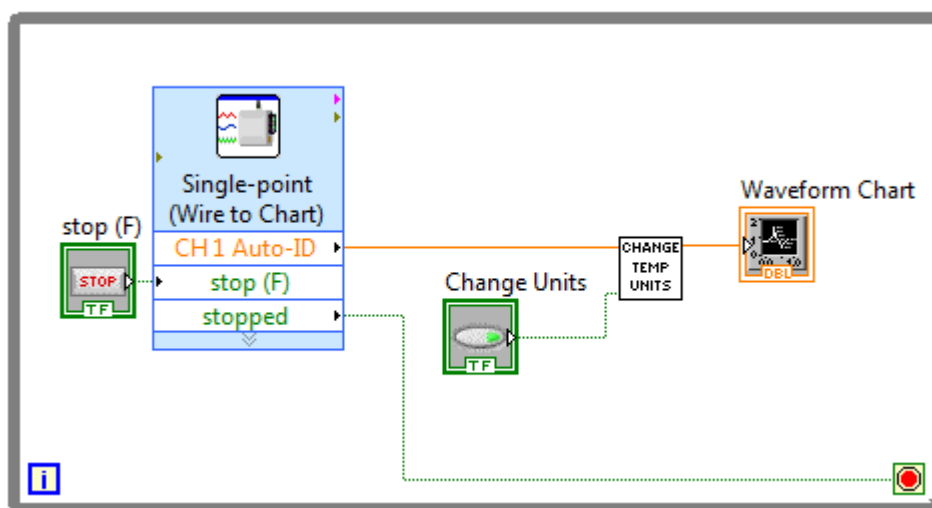
24. Wire the Analog Express VI's stopped output terminal to the While Loop's conditional terminal. In addition, create a STOP button control by right-clicking on the Express VI's "stop (F)" input terminal and selecting Create ► Control.



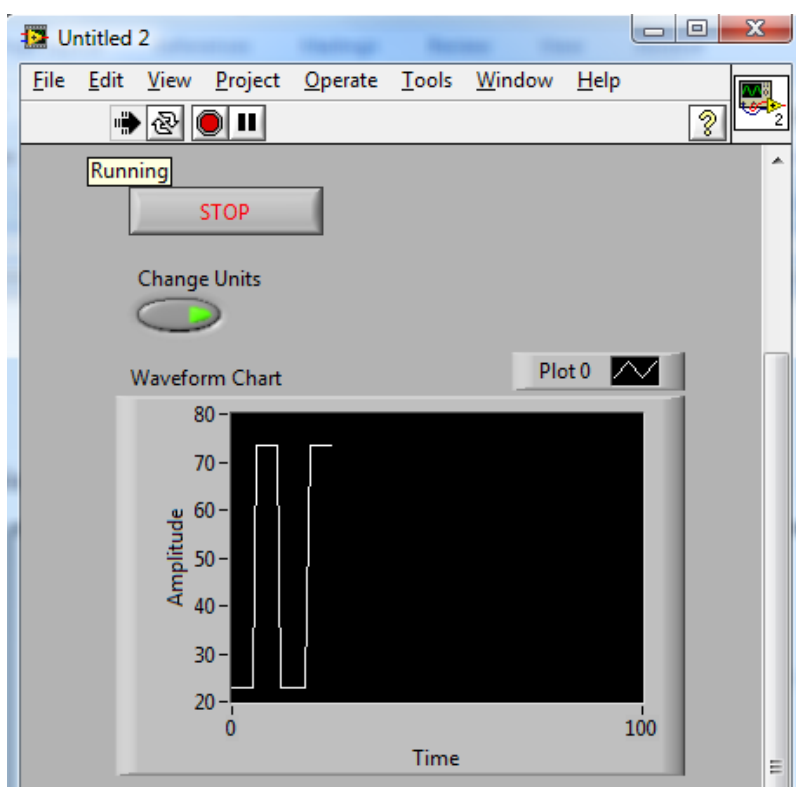
25. Go to the front panel and add a Chart.



26. Go to the block diagram and wire the subVI's Temp Out terminal to the Chart terminal.



27. Go to the front panel and run the VI. Click the Change Units control to change the units from Celsius to Fahrenheit.



Tip: If you are sharing this LabVIEW program to be opened, viewed, and run on a different computer, you must send both the program file and the subVI file.

EXTENSIONS

1. A chart's plot keeps a history of previous data points; therefore, when the units are changed, the previous data points do not change. Replace the chart with a thermometer. A thermometer does not keep a history, so the user interface will only display the most recent data point.
2. Modify the temperature conversion subVI to provide an option of selecting Kelvin units. Use an Enum control wired to a Case Structure. The Enum control should have three items with names that correspond to the three units. The Case Structure should have a case for every value.
3. Use the second method to create a subVI inside your temperature conversion subVI. Highlight the Add and Multiply functions and their corresponding constants that are found inside the Fahrenheit case of the Case Structure (refer to Step 8 above), and then choose Create SubVI from the Edit menu. Name this new subVI "C to F" and create an appropriate icon.