

<https://www.halvorsen.blog>

# LabVIEW DAQmx

Communicate with NI DAQ Devices in LabVIEW

Hans-Petter Halvorsen



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    - Use DAQ Assistant in LabVIEW
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    - Use “Low-level” DAQmx VIs in LabVIEW

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# Introduction

Hans-Petter Halvorsen



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# DAQ in LabVIEW

- To use DAQ Hardware in **LabVIEW** we need to use the **DAQmx** driver
- We will use the following DAQ hardware to exemplify:
  - **TC-01** Thermocouple Temperature Device
  - **USB-600x** or similar DAQ Devices with Analog and Digital Channels
  - Note! Other DAQ devices from NI will work in the same manner since they all use the same DAQmx driver
- This Tutorial will show different ways to read data from these DAQ devices
- The features and principles shown here will be the same for other DAQ hardware from other vendors as well

# TC-01 Thermocouple



<https://www.ni.com/docs/en-US/bundle/usb-tc01-specs/page/specs.html>

# USB-600x

## Entry-Level, Plug-and-Play USB Data Acquisition

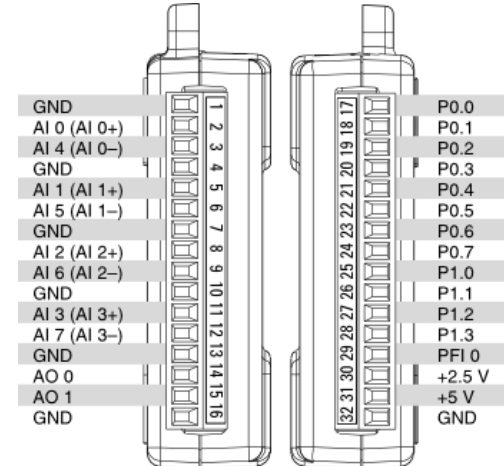
You depend on accurate measurements to make key decisions and discoveries, and NI's plug-and-play, USB multifunction I/O devices deliver quality measurements at an entry-level price.



USB-6008

## Compare NI's Entry-Level, Stand-Alone Data Acquisition Devices

	USB-6003			USB-6002			USB-6001			USB-6000		
	<a href="#">View Specifications</a>			<a href="#">View Specifications</a>			<a href="#">View Specifications</a>			<a href="#">View Specifications</a>		
I/O Type	AI	AO	DIO	AI	AO	DIO	AI	AO	DIO	AI	AO	DIO
No. of Channels <sup>1</sup>	4/8	2	13	4/8	2	13	4/8	2	13	0/8	0	4
Sample Rate (kS/s and Timed)	100	5	SW	50	5	SW	20	5	SW	10	-	SW
Resolution	16 bits		-	16 bits		-	14 bits		-	12 bits		-
Programming Language Support	ANSI C, Python, Visual C# .NET, Visual Basic .NET, and LabVIEW											



<https://www.ni.com/en/shop/data-acquisition/entry-level-usb-daq.html>

# DAQ and I/O Devices

TC-01 Thermocouple



1 Analog Input (AI) Channel

The Video will focus on USB-600x and Analog Input (AI).  
The programming principles are the same for both devices (and other similar devices from NI) and the different Channel options.  
The Tutorial (PDF) will show examples using both devices

USB-600x



I/O Devices have typically 4 different types of channels:

- Analog In (AI)
- Analog Out (AO)
- Digital In (DI)
- Digital Out (DO)

# DAQmx



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## NI-DAQ™mx

NI-DAQ™mx provides support for customers using NI data acquisition and signal conditioning devices.

[+ Read More](#)

**i** Note: Install programming environments such as NI LabVIEW or Microsoft Visual Studio® before installing this product.

### DOWNLOADS

Supported OS

Windows

[View Readme](#)

Version

2023 Q4

Included Editions

Full

Application Bitness

32-bit and 64-bit

Language

English, French, German, Japanese, Korean,  
Simplified Chinese

### NI-DAQmx 2023 Q4

Release Date

Oct/11/2023

Included Versions

2023 Q4

> Supported OS

> Language

> Checksum

[DOWNLOAD](#)

[INSTALL OFFLINE](#)

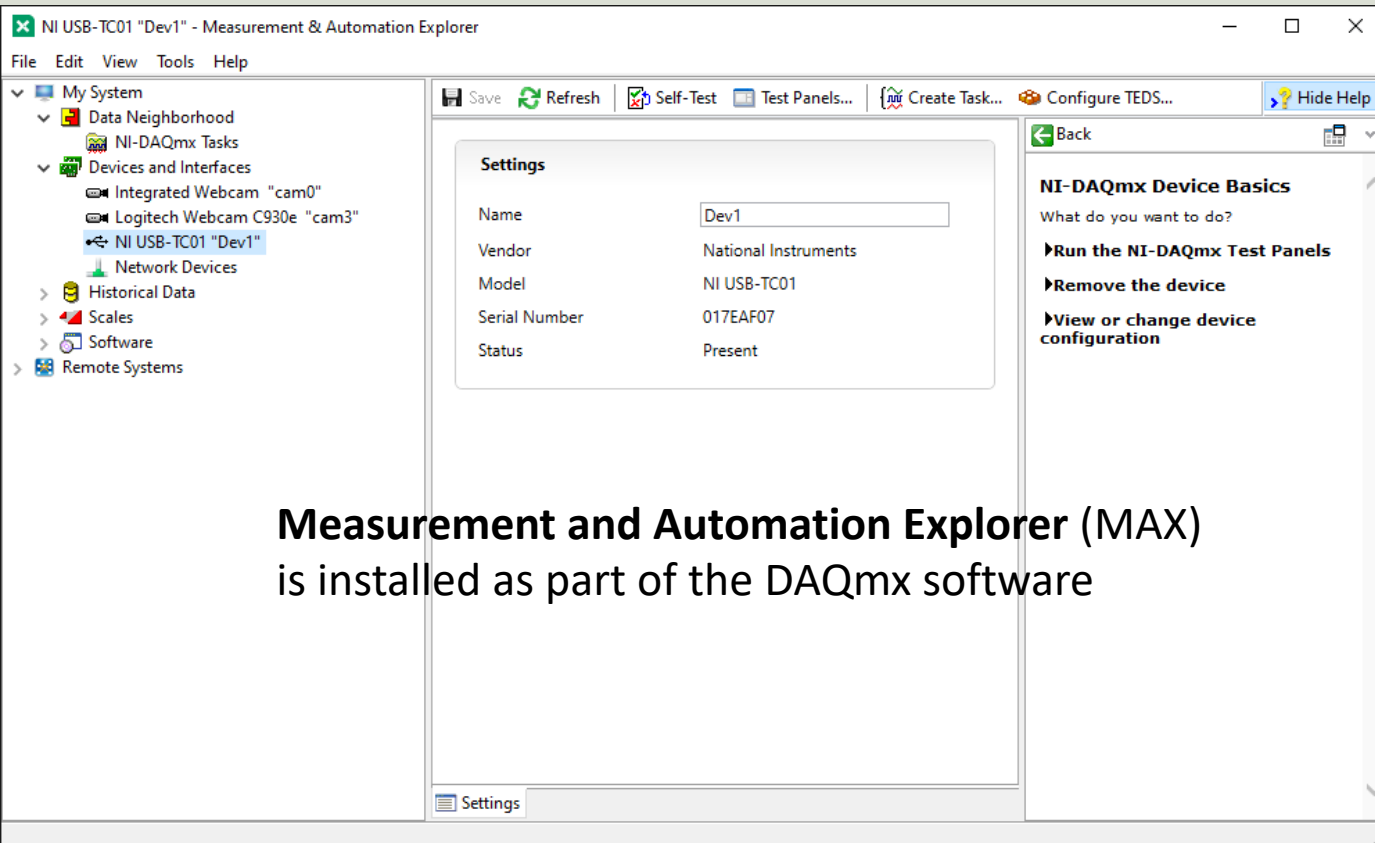
File Size  
5.68 MB

To use DAQ hardware in **LabVIEW** we need to use the **DAQmx** driver. It can be downloaded for free.

<https://www.ni.com/en/support/downloads/drivers/download.ni-daq-mx.html>



# MAX



You can use MAX to test and configure your DAQ device

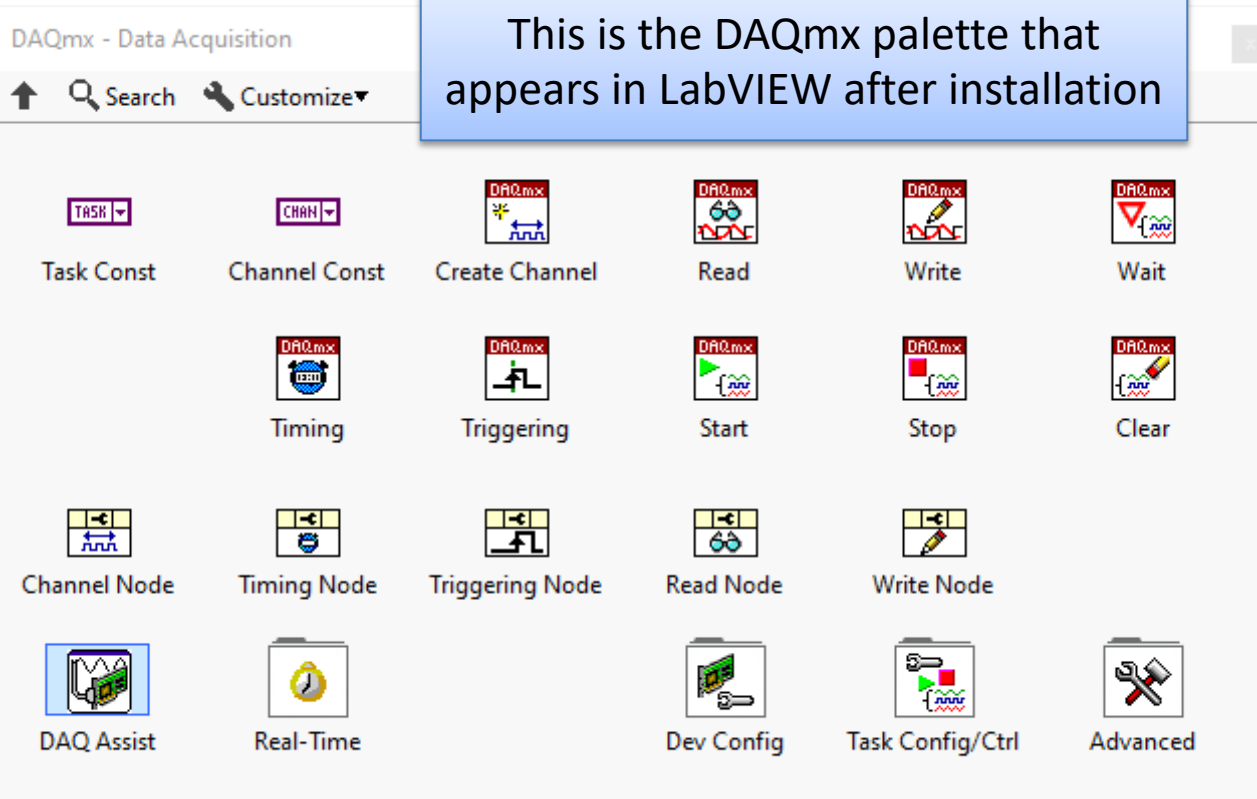
**Measurement and Automation Explorer (MAX)**  
is installed as part of the DAQmx software

MAX – Measurement and Automation Explorer

# DAQmx in LabVIEW

This is the DAQmx palette that appears in LabVIEW after installation

To use DAQ hardware in **LabVIEW** we need to use the **DAQmx** driver. It can be downloaded for free.



<https://www.ni.com/en-no/support/downloads/drivers/download.ni-daq-mx.html>

# Different options using DAQmx

You have different options when setting up and connecting the DAQ device using DAQmx and LabVIEW:

1. Use the “DAQ Assistant” in LabVIEW  
(Configuration through a Wizard)
2. Configure DAQ Settings using MAX
3. Use the “Low-level” DAQmx VIs in LabVIEW  
(Full control of all details in your code)

# Practical LabVIEW Examples

Hans-Petter Halvorsen



# LabVIEW Examples

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# USB-600x

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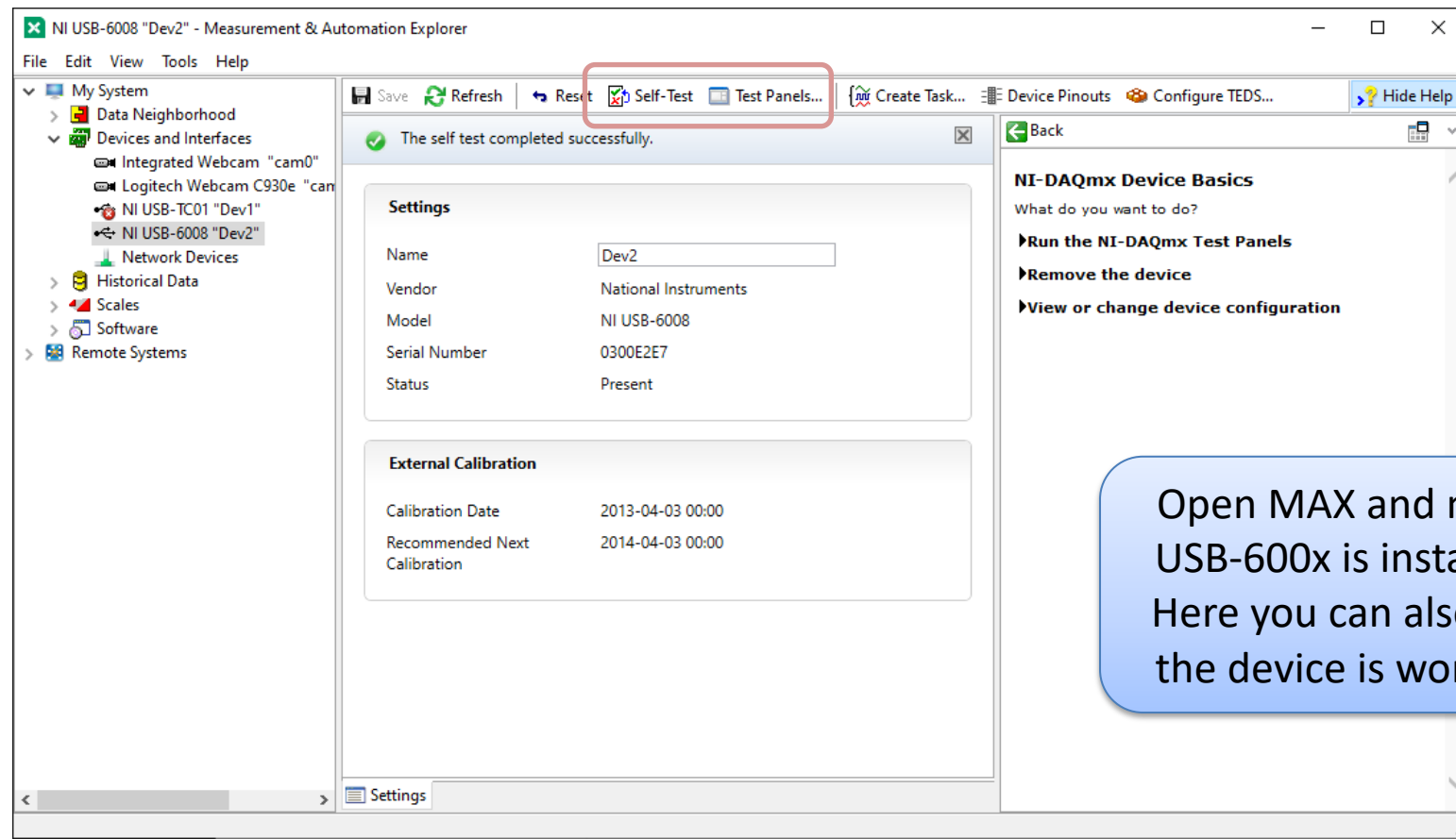
# I/O Channels

I/O Devices have typically 4 types of channels:

- Analog In (AI)
- Analog Out (AO)
- Digital In (DI)
- Digital Out (DO)

This Tutorial will focus on Analog In. The programming principles are the same for the other types

# USB-600x and MAX



Open MAX and make sure the USB-600x is installed properly. Here you can also test to see if the device is working properly



# DAQ Assistant

USB-600x

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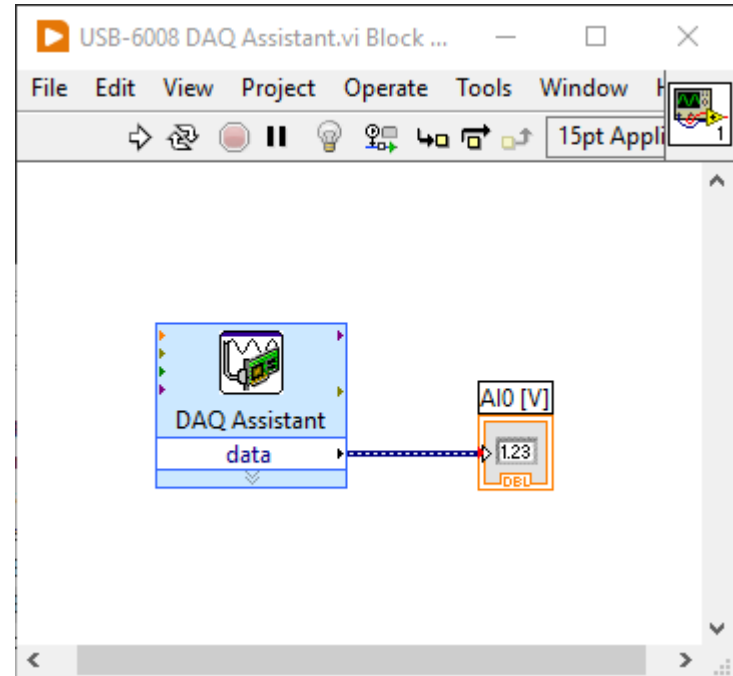
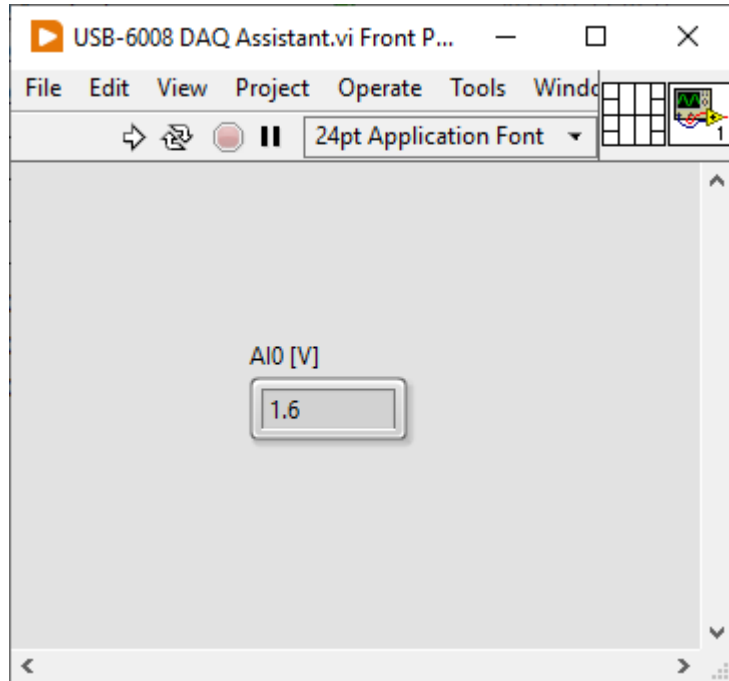


# Different options using DAQmx

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# DAQ Assistant



Here, a 1.5V Battery is connected to Analog Input Channel 0 (AI0)

**Select the measurement type for the task.**

A **task** is a collection of one or more virtual channels with timing, triggering, and other properties.

To have **multiple measurement types** within a single task, you must first create the task with one measurement type. After you create the task, click the **Add Channels** button to add a new measurement type to the task.

## Acquire Signals

## Analog Input

- ☒ Voltage
- ☐ Temperature
- ☐ Strain
- ☐ Current
- ☐ Resistance
- ☐ Frequency

## Create New ...

**Select the physical channel(s) to add to the task.**

If you have previously configured **global virtual channels** of the same measurement type as the task, click the **Virtual** tab to add or copy global virtual channels to the task. When you copy the global virtual channel to the task, it becomes a local virtual channel. When you add a global virtual channel to the task, the task uses the actual global virtual channel, and any changes to that global virtual channel are reflected in the task.

If you have TEDS configured, click the **TEDS** tab to add TEDS channels to the task.

For hardware that supports **multiple channels** in a task, you can select multiple channels to

## Physical

## Supported Physical Channels

## Dev2 (USB-6008)

- ai0
- ai1
- ai2
- ai3
- ai4
- ai5
- ai6
- ai7

<Ctrl> or <Shift> click to select multiple channels.

&lt; Back

Next &gt;

Finish

Cancel

# DAQ Assistant

## DAQ Assistant



Undo

Redo

Run

Add Channels

Remove Channels

## Express Task

## Connection Diagram

Channel	Value
Voltage	0

Table

Display Type

## Configuration

## Triggering

## Advanced Timing

## Logging

## Channel Settings



Details

## Voltage

Click the Add Channels button (+) to add more channels to the task.

## Timing Settings

## Acquisition Mode

1 Sample (On Demand)

## Voltage Input Setup



Settings

## Signal Input Range

Max 5

Min 0

## Scaled Units

Volts

## Terminal Configuration

Differential

## Custom Scaling

&lt;No Scale&gt;

Samples to Read

1k

Rate (Hz)

1k

## Measuring Voltage

Most measurement devices are designed for measuring, or reading, voltage. Two common **voltage measurements** are DC and AC.

DC voltages are useful for measuring phenomena that change slowly with time, such as temperature, pressure, or strain.

AC voltages, on the other hand, are waveforms that constantly increase, decrease, and reverse polarity. Most powerlines deliver AC voltage.

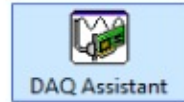
**Terminal Configuration** specifies the grounding mode used for the virtual channel:

- Differential**— Depending on your specific hardware, the positive and negative inputs for the physical channel are either unreferenced or are connected to measurement system ground through a shield.

OK

Cancel

# Note!!! – DAQ Assistant Error



DAQ Assistant

Do you get an Error like this when trying to use the DAQ Assistant?



## Workaround:

- Install LabVIEW 2021 SP1
- LabVIEW 2021 SP1 does not need to be activated, it is sufficient to install LabVIEW 2021 on your system and not activate it
- Installing just the LabVIEW 2021 SP1 run-time engine will not be sufficient, the LabVIEW ADE needs to be installed

In “LabVIEW 2022 Q3” to “LabVIEW 2023 Q3” there is a bug with the DAQ Assistant. **To fix that you need to install the LabVIEW 2021 SP1 core component.** See information on this web page from NI:

<https://knowledge.ni.com/KnowledgeArticleDetails?id=kA03q0000019gTMCA&l=en-NO>

Another solution is to use, e.g., the lower level DAQ functions in LabVIEW, see upcoming examples in this Tutorial.

I have been in contact with NI, and it is expected that this error will be fixed in upcoming versions of LabVIEW

This Bug/Issue has been fixed in LabVIEW 2024 Q1 and NI-DAQmx 2024 Q1 (and newer)

# Convert from Dynamic Data

Search Palettes

Return Customize

Convert from

Functions Controls

Convert from Dynamic Data

Configure Convert from Dynamic Data [Convert from Dynamic Data]

**Conversion**

Resulting data type

- 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
- Single scalar**
- Single waveform

**Scalar Data Type**

☒ Floating point numbers (double)

☐ Boolean (TRUE and FALSE)

Channel

0

**Input Signal**

Channel 0

Channel 1

Amplitude

Time

Sample Data

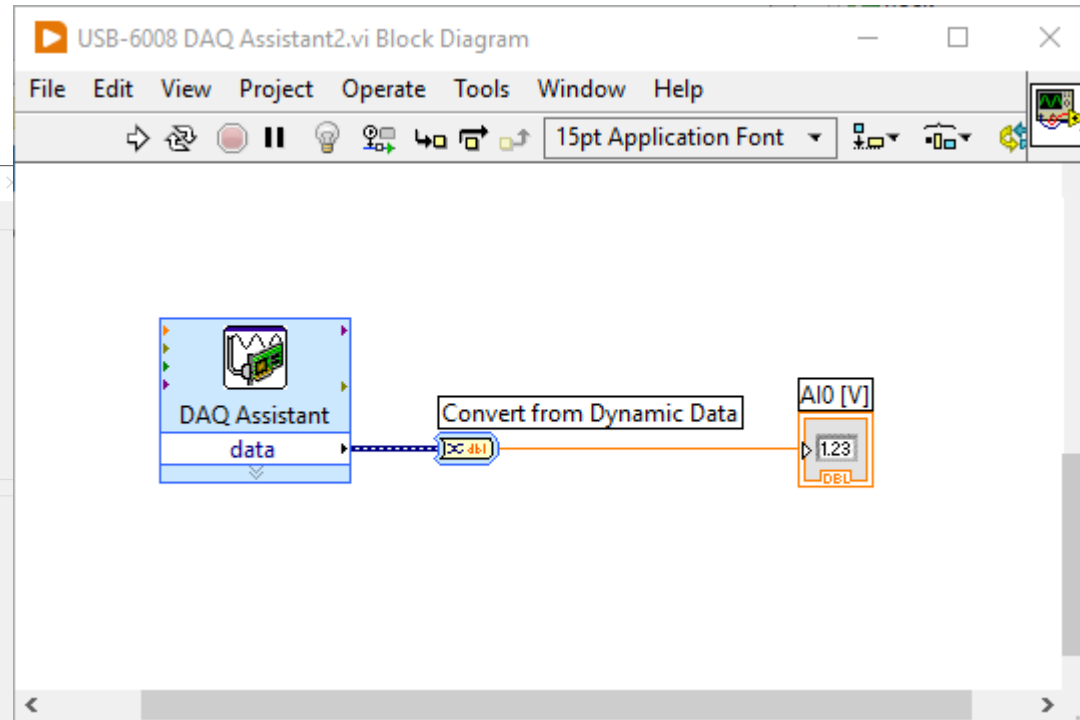
**Result Preview**

Single value (double)

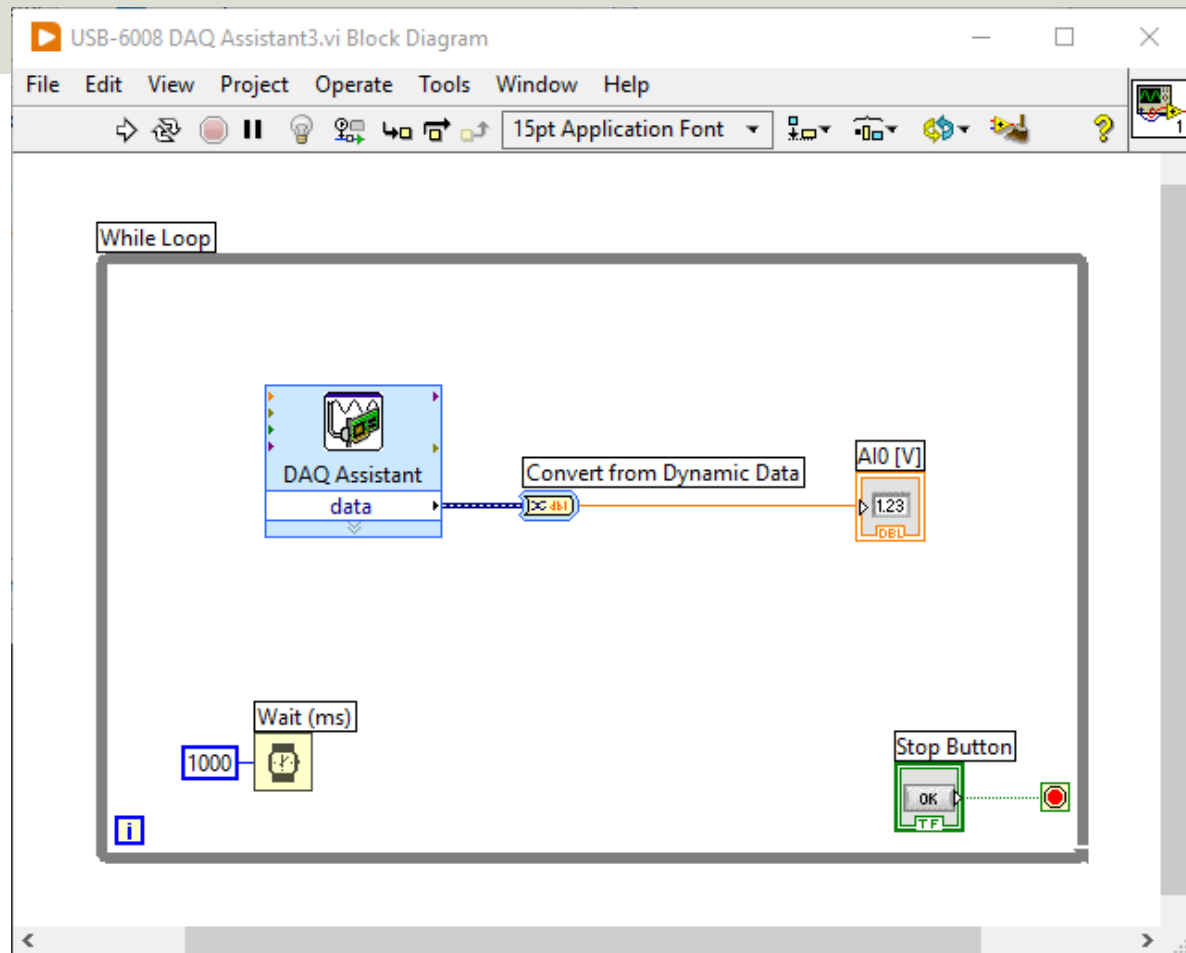
2

Sample Data

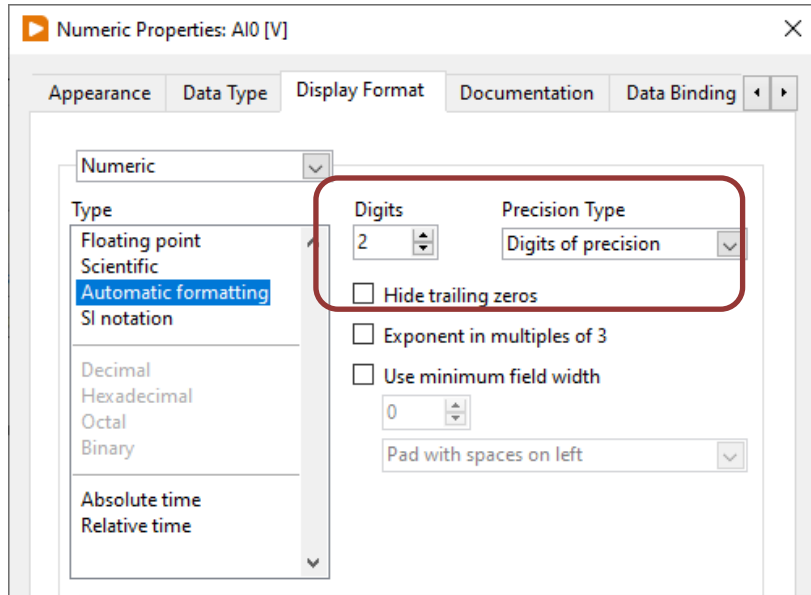
OK Cancel Help



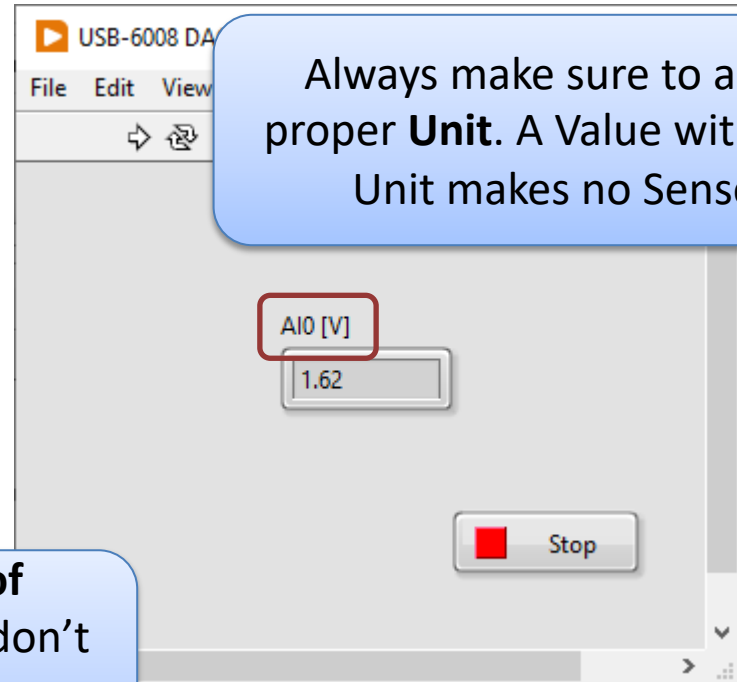
# While Loop



# Number of Decimals and Units

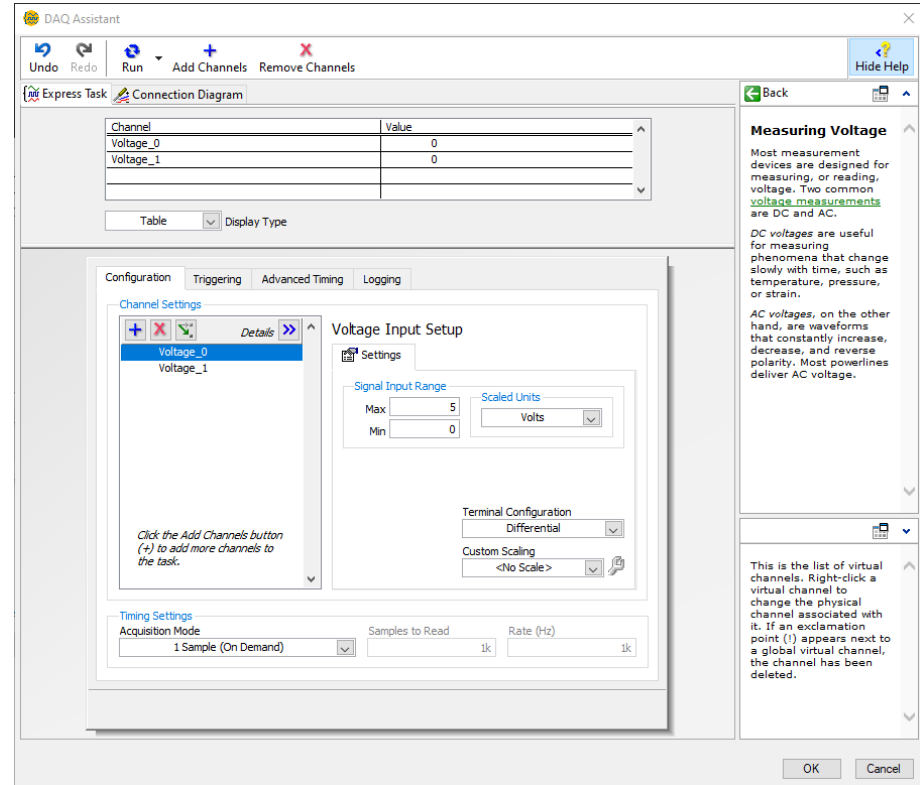
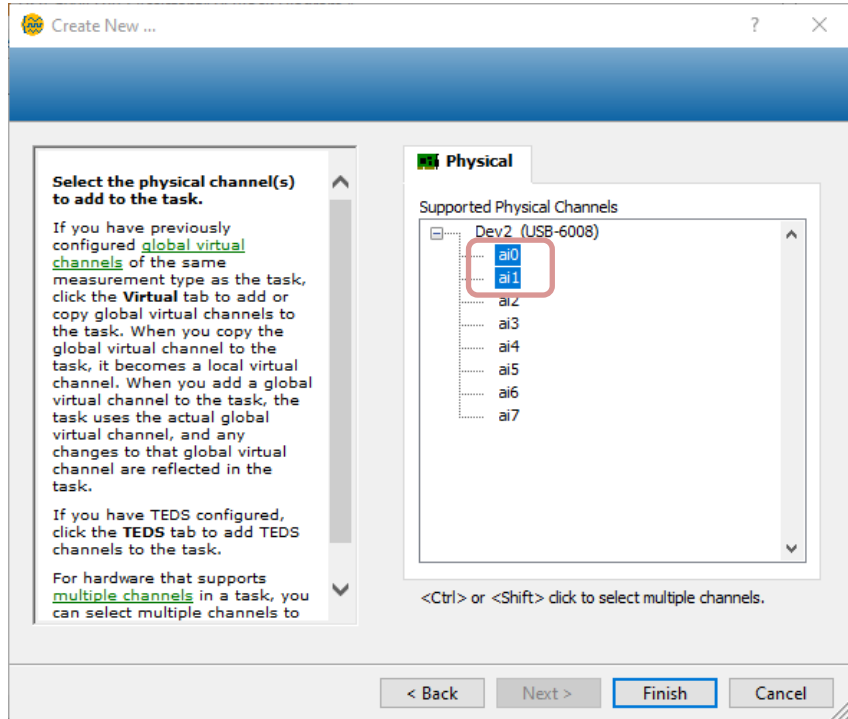


Make sure to select a proper **Number of Decimals**. Typically, a DAQ Device/Sensor don't have an Accuracy with 10 Decimals. Make sure to read the Datasheet for the selected Hardware

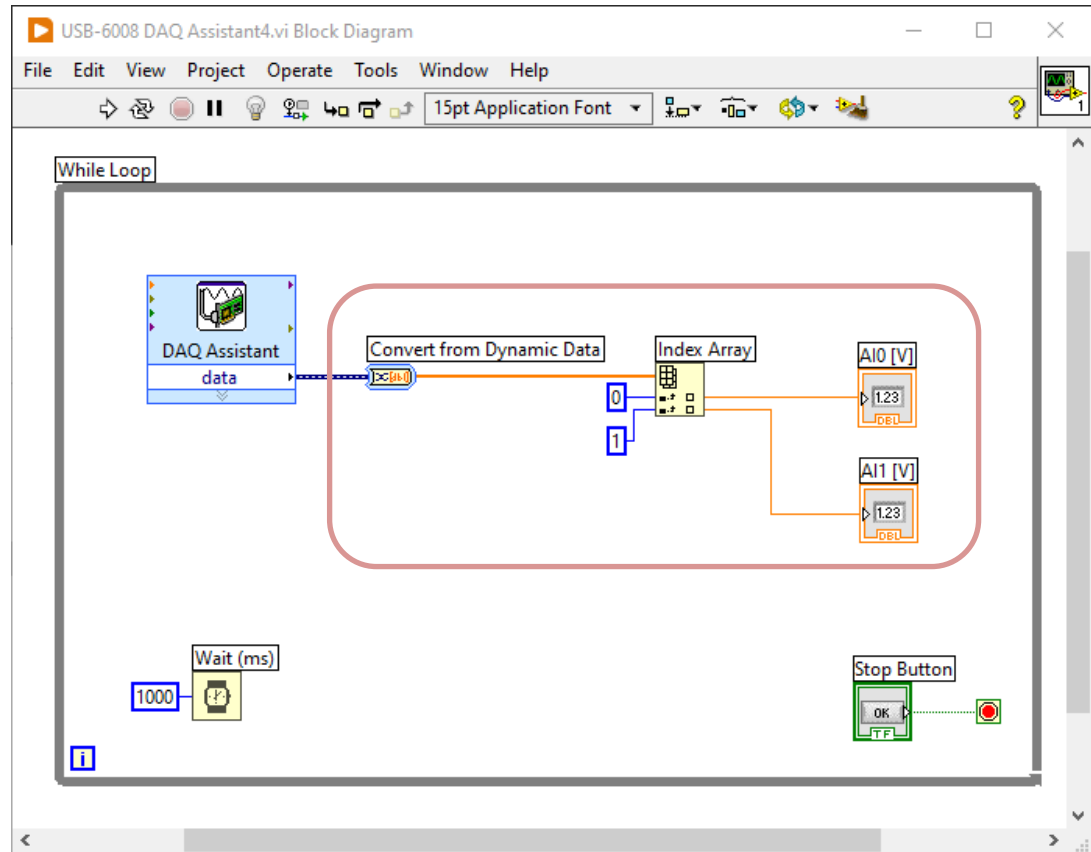
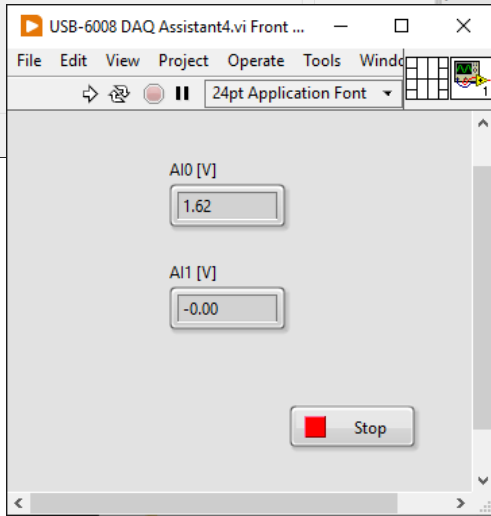
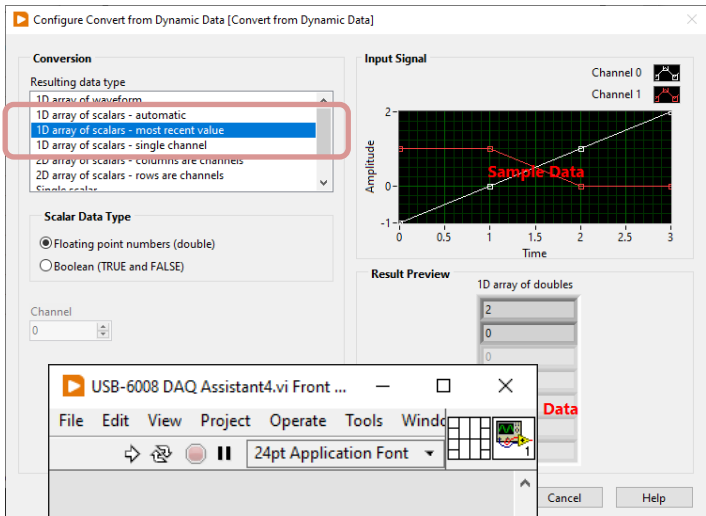




# Reading Multiple Channels



# Reading Multiple Channels



# Configure DAQ Settings using MAX

USB-600x

Hans-Petter Halvorsen



# Different options using DAQmx

You have different options when setting up and connecting the DAQ device using DAQmx and LabVIEW:

1. Use the “DAQ Assistant” in LabVIEW  
(Configuration through a Wizard)
2. **Configure DAQ Settings using MAX**
3. Use the “Low-level” DAQmx VIs in LabVIEW  
(Full control of all details in your code)

# Configure DAQ Settings using MAX

The screenshot displays the NI MAX software interface. In the background, the 'NI USB-6008 "Dev2" - Measurement & Automation Explorer' window is open, showing a tree view of system components including 'My System', 'Data Neighborhood', 'NI-DAQmx Tasks', 'MyTemperatureTask', 'Devices and Interfaces', 'Integrated Webcam "cam0"', 'Logitech Webcam C930e "cam"', 'NI USB-TC01 "Dev1"', 'NI USB-6008 "Dev2"', 'Network Devices', 'Historical Data', 'Scales', 'Software', and 'Remote Systems'. The 'Settings' tab is selected for the 'NI USB-6008 "Dev2"' device.

In the foreground, the 'Create New ...' dialog box is open. It has a title bar with a green 'x' icon and the text 'Create New ...'. The dialog is divided into two main sections. The left section, titled 'Settings', contains a 'Name' field with the text 'MyVoltageTask' and a 'Vendor' field. The right section, titled 'NI-DAQmx Device Basics', contains a 'What do you want to do?' section with three options: 'Run the NI-DAQmx Test Panels', 'Remove the device', and 'View or change device configuration'. Below this, there is a 'Select the measurement type for the task.' section with a list box containing 'Acquire Signals' and 'Generate Signals'. The 'Acquire Signals' option is selected. At the bottom of the dialog, there are buttons for '< Back', 'Next >', 'Finish', and 'Cancel'.

The 'Create New ...' dialog box is also shown in a smaller, semi-transparent version in the background, indicating it was previously open.

# Configure DAQ Settings using MAX

The screenshot displays the NI Measurement & Automation Explorer (MAX) interface. The left pane shows the project tree with 'MyVoltageTask' selected under 'NI-DAQmx Tasks'. The main pane shows the 'Configuration' tab for 'Voltage Input Setup'. The 'Signal Input Range' section has 'Max' set to 5 and 'Min' set to 0. The 'Scaled Units' dropdown is set to 'Volts'. The 'Terminal Configuration' dropdown is set to 'Differential'. The 'Custom Scaling' dropdown is set to '<No Scale>'. The 'Timing Settings' section shows 'Acquisition Mode' set to '1 Sample (On Demand)', 'Samples to Read' set to '1k', and 'Rate (Hz)' set to '1k'. A help panel on the right provides information about measuring voltage, including a note that SignalExpress does not support 1 Sample (HW Timed) mode.

MyVoltageTask - Measurement & Automation Explorer

File Edit View Tools Operate Help

Save Run Add Channels Remove Channels

Channel Value

Channel	Value
Voltage	0

Table Display Type

Configuration Triggering Advanced Timing Logging

Channel Settings

Voltage

Click the Add Channels button (+) to add more channels to the task.

Voltage Input Setup

Settings

Signal Input Range

Max 5 Min 0

Scaled Units

Volts

Terminal Configuration

Differential

Custom Scaling

<No Scale>

Timing Settings

Acquisition Mode

1 Sample (On Demand)

Samples to Read

1k

Rate (Hz)

1k

Measuring Voltage

Most measurement devices are designed for measuring, or reading, voltage. Two common **voltage measurements** are DC and AC.

DC voltages are useful for measuring phenomena that change slowly with time, such as temperature, pressure, or strain.

AC voltages, on the other hand, are waveforms that constantly increase, decrease, and reverse polarity. Most powerlines deliver AC voltage.

Depending on your configuration, some of these timing modes may not be available.

**1 Sample (On Demand)** specifies that the task acquire or generate one sample.

**1 Sample (HW Timed)** specifies that the task acquire or generate one sample on an edge of a hardware clock.

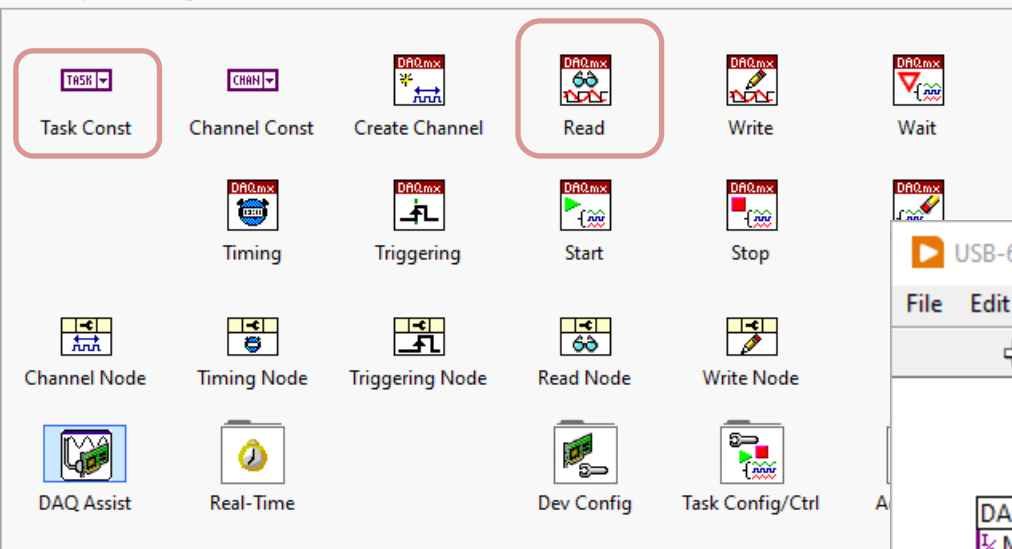
**Note** SignalExpress does not support 1 Sample (HW Timed) mode.

**N Samples** specifies that the task acquire or generate a finite number of samples, specified by **Samples To Read/Write**.

# Configure DAQ Settings using MAX

DAQmx - Data Acquisition

↑ Search Customize



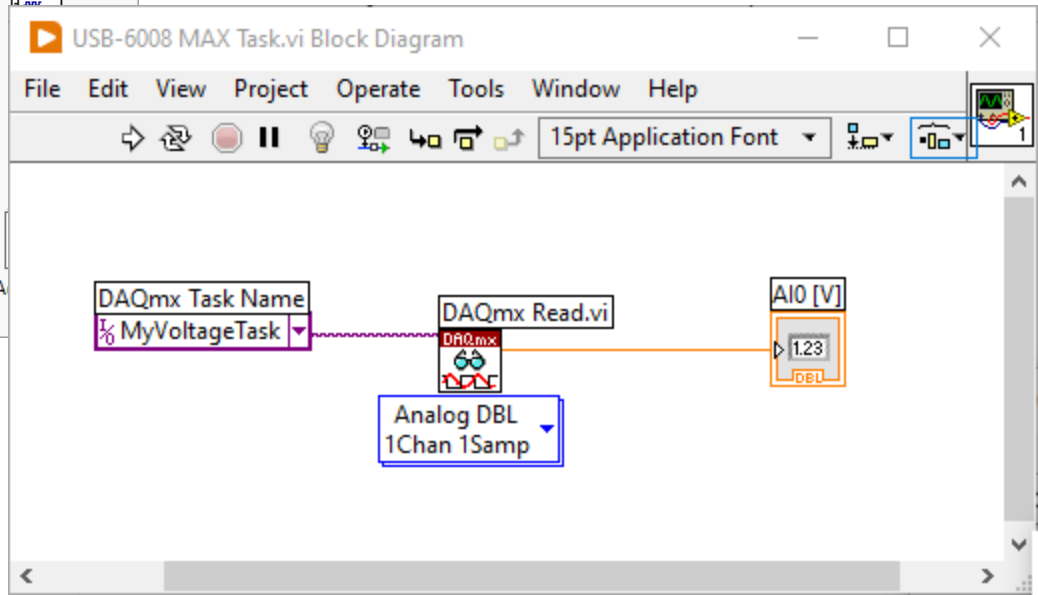
The image shows the DAQmx - Data Acquisition tool palette. It contains various icons for configuring data acquisition tasks. The 'Read' icon is highlighted with a red box. The 'Task Const' icon is also highlighted with a red box. The 'DAQ Assist' icon is highlighted with a blue box. The 'Real-Time' icon is highlighted with a yellow box. The 'Dev Config' icon is highlighted with a green box. The 'Task Config/Ctrl' icon is highlighted with a red box.

Task Const Channel Const Create Channel Read Write Wait

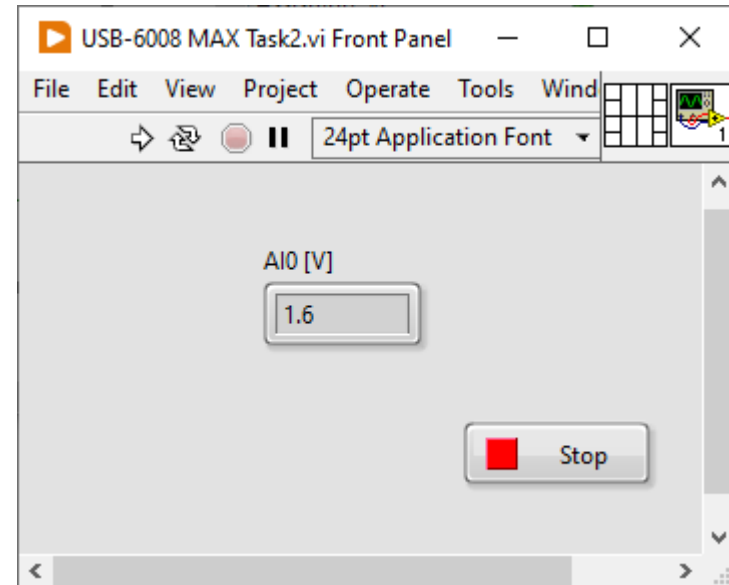
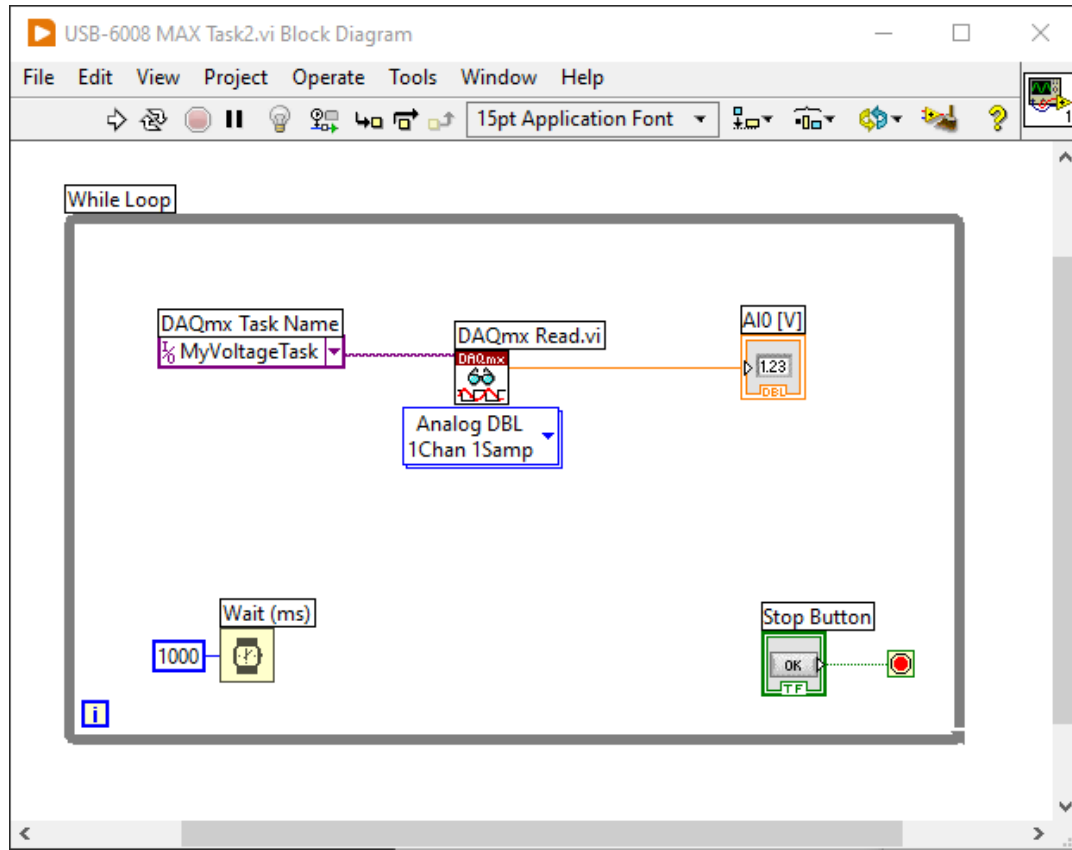
Timing Triggering Start Stop

Channel Node Timing Node Triggering Node Read Node Write Node

DAQ Assist Real-Time Dev Config Task Config/Ctrl



# While Loop





# While Loop v2 – Start/Stop Task

LabVIEW Help 2022.0.0f118 6/28/2022 10:39:07 PM

Hide Locate Back Forward Options

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- Property and Method Reference
- Taking Measurements
- Controlling Instruments
- Control Design and Simulation Mo
- DSC Module
- MathScript RT Module


## DAQmx Start Task (VI)

**Owning Palette:** [DAQmx - Data Acquisition VIs and Functions](#)  
**Installed With:** NI-DAQmx

Transitions the [task](#) to the running [state](#) to begin the measurement or generation. [Using this VI](#) is required for some applications and is optional for others.

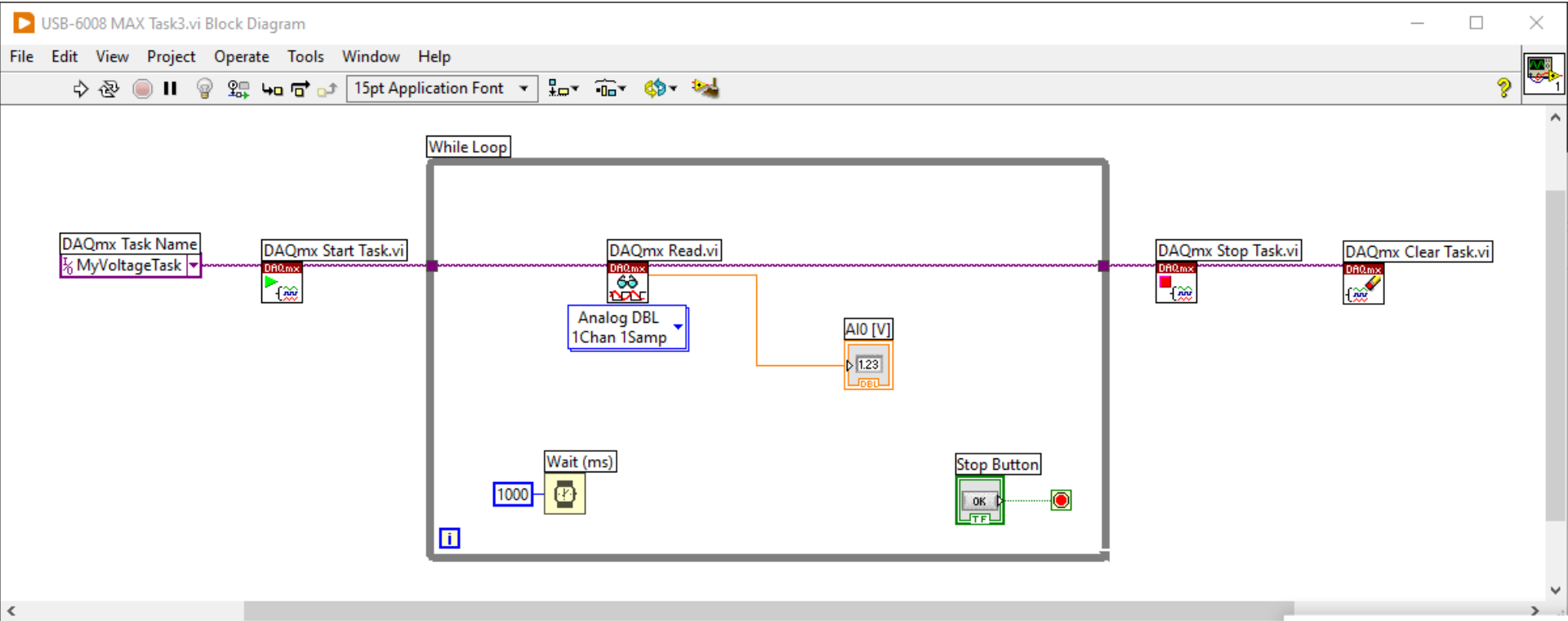
If you do not use this VI, a measurement task starts automatically when the [DAQmx Read](#) VI runs. The **autostart** input of the [DAQmx Write](#) VI determines if a generation task starts automatically when the DAQmx Write VI runs.

If you do not use the DAQmx Start Task VI and the [DAQmx Stop Task](#) VI when you use the DAQmx Read VI or the DAQmx Write VI multiple times, such as in a loop, the task starts and stops repeatedly. Starting and stopping a task repeatedly reduces the performance of the application.



Increase speed by using Start Task VI

# While Loop v2 – Start/Stop Task



# Using “Low-level” DAQmx VIs

USB-600x

Hans-Petter Halvorsen

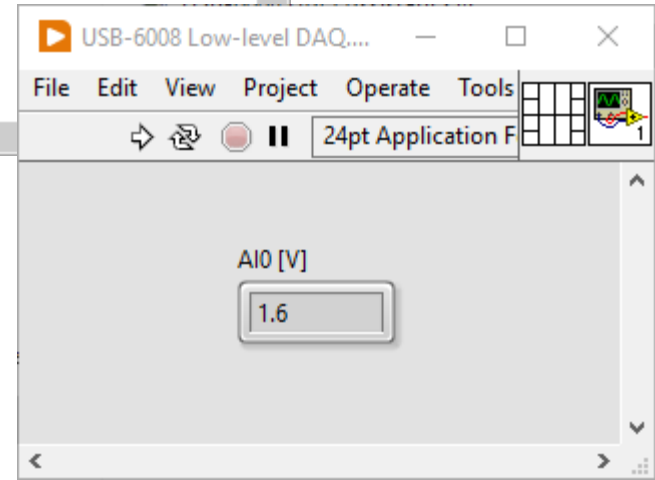
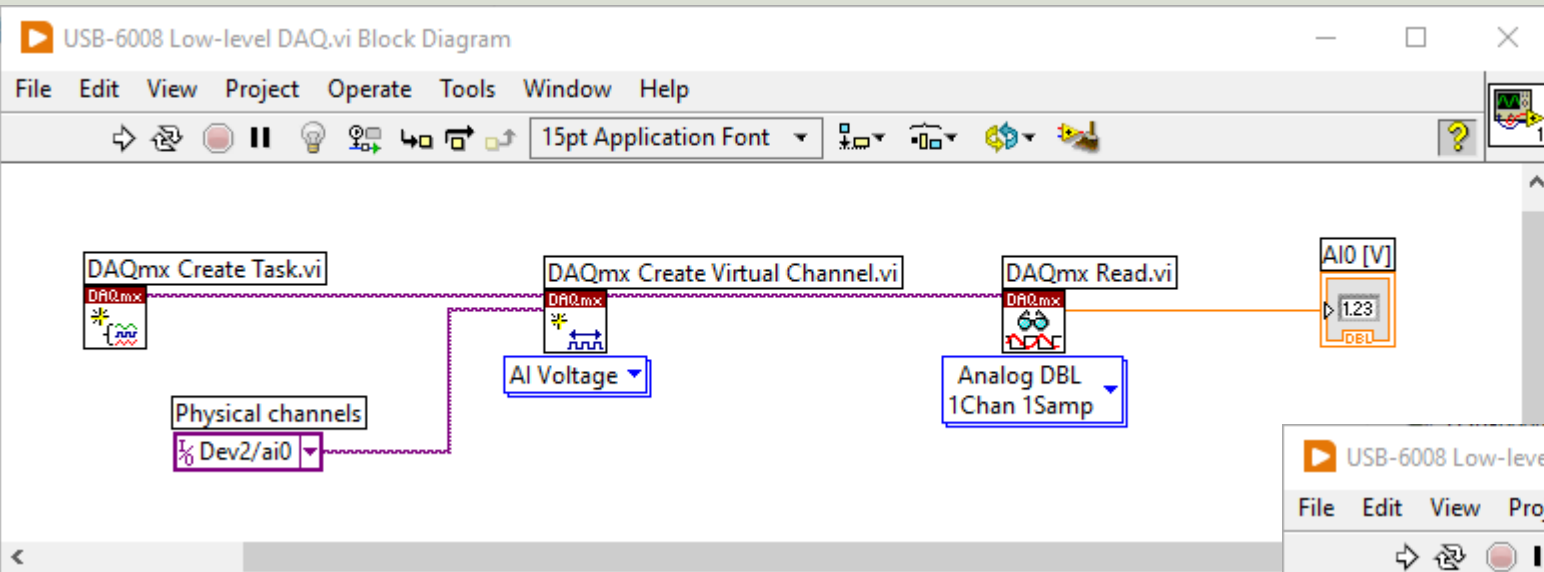


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# Using “Low-level” DAQmx VIs



# Configure Additional Settings

Context Help

**DAQmx Create Channel (AI-Voltage-Basic).vi**

input terminal configuration

minimum value

maximum value

task in

**physical channels**

name to assign

units

error in

custom scale name

task out

error out

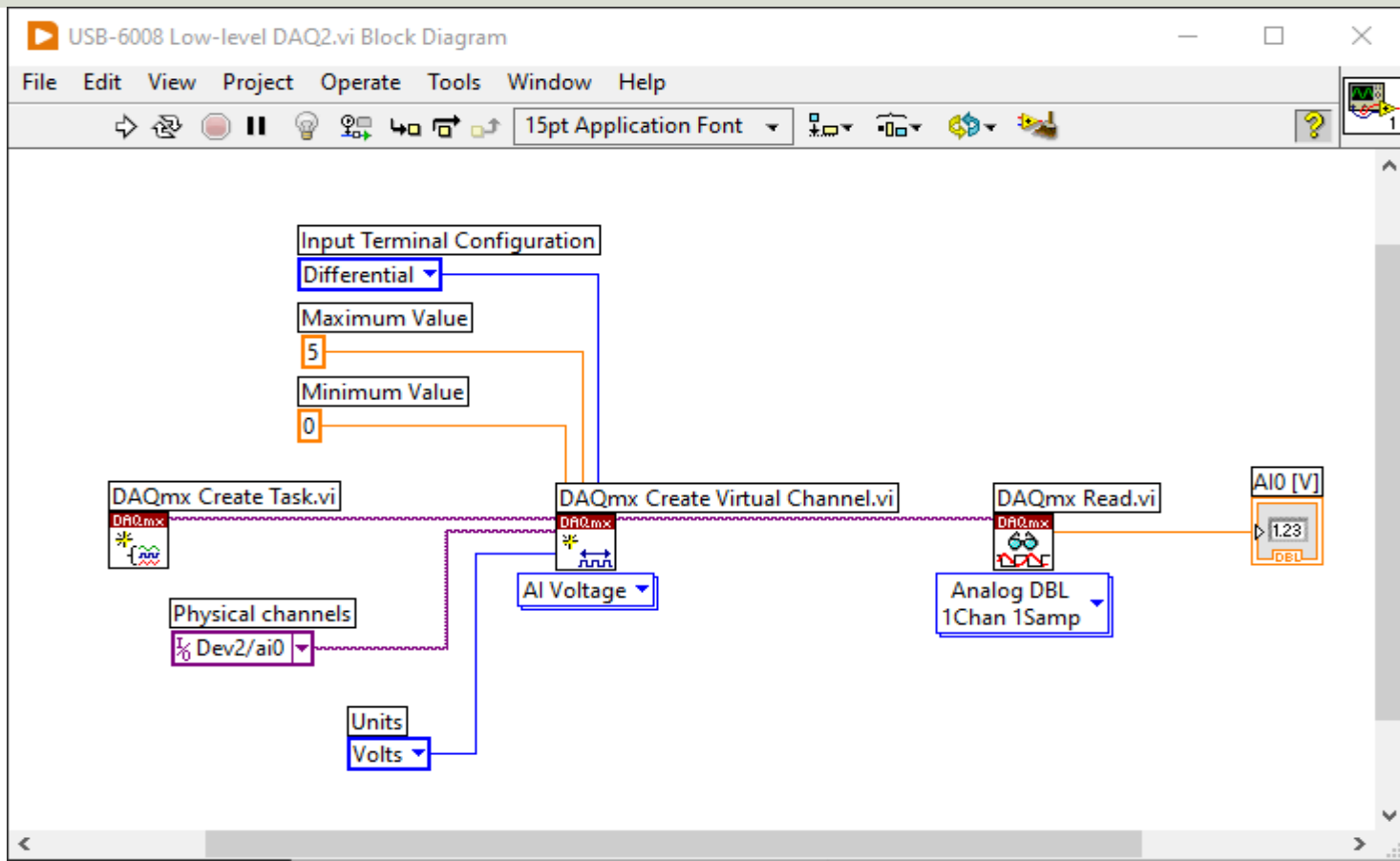
Creates channel(s) to measure voltage. If the measurement requires the use of internal excitation or you need excitation to scale the voltage, use the AI Custom Voltage with Excitation instance of this VI.

[Detailed help](#)

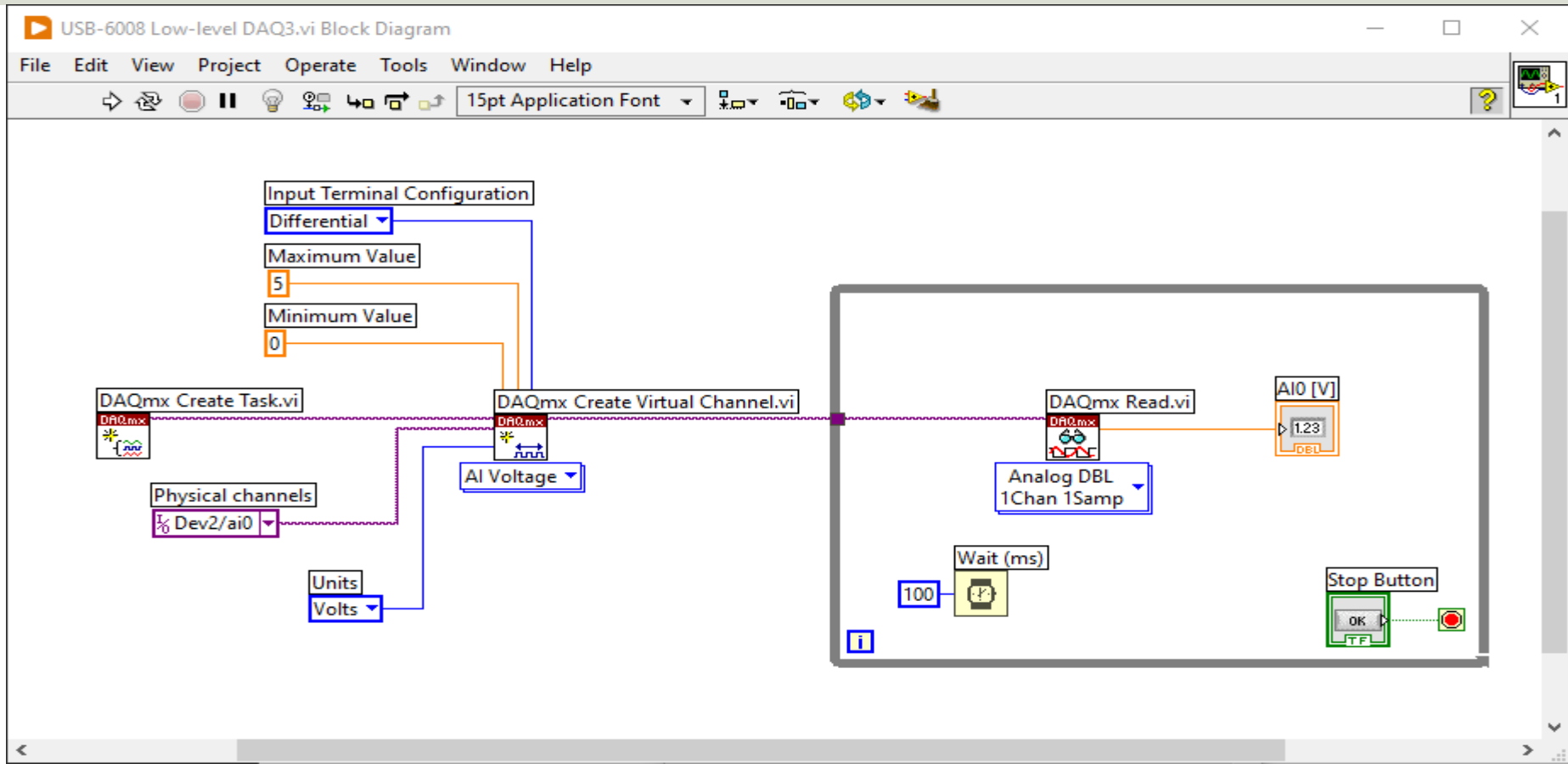
In the previous example we just used the default setting.

If you need to change some of the default setting, just right-click on the select input and create a constant

# Configure Additional Settings

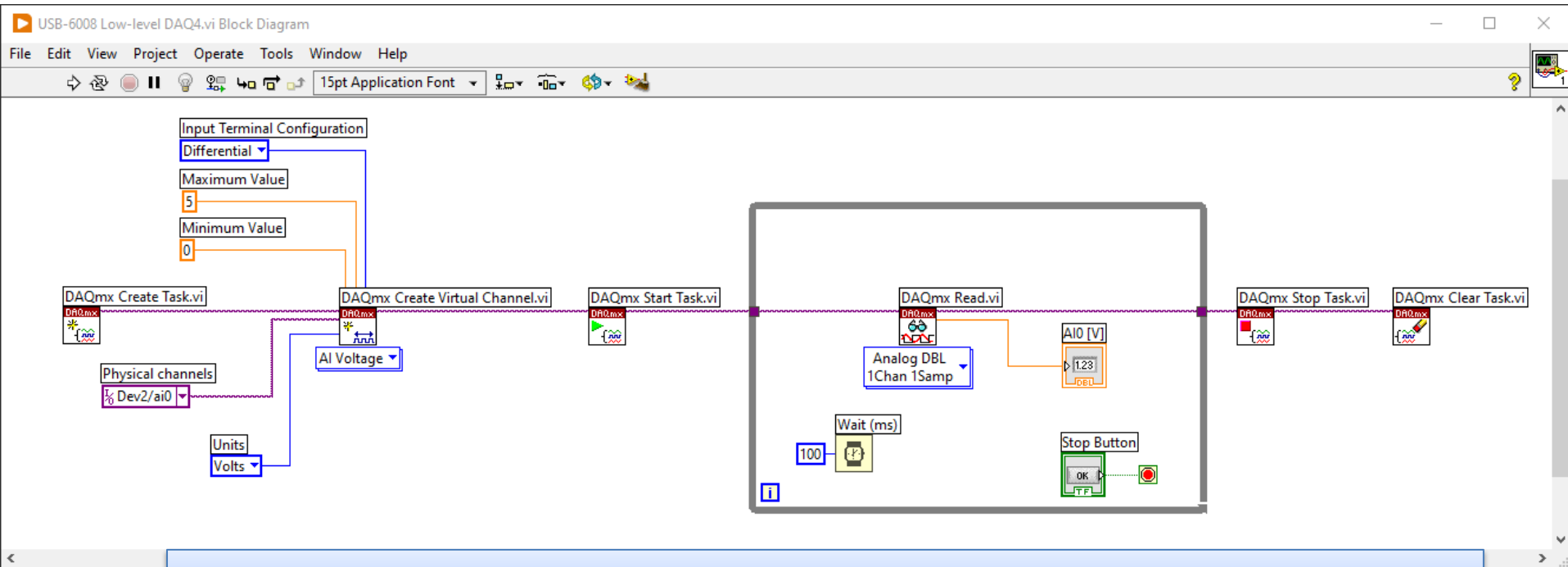


# While Loop





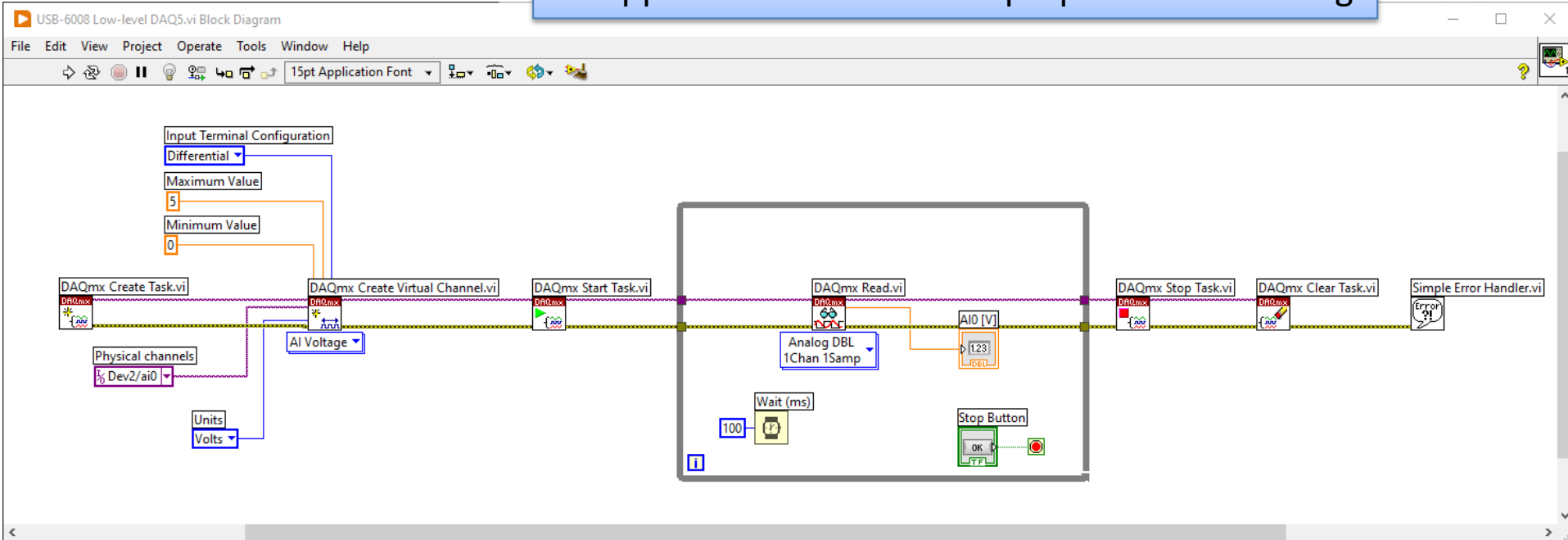
# While Loop with Start/Stop Task



Increase **speed** by using “Start Task” and “Stop Task” VIs outside the While Loop

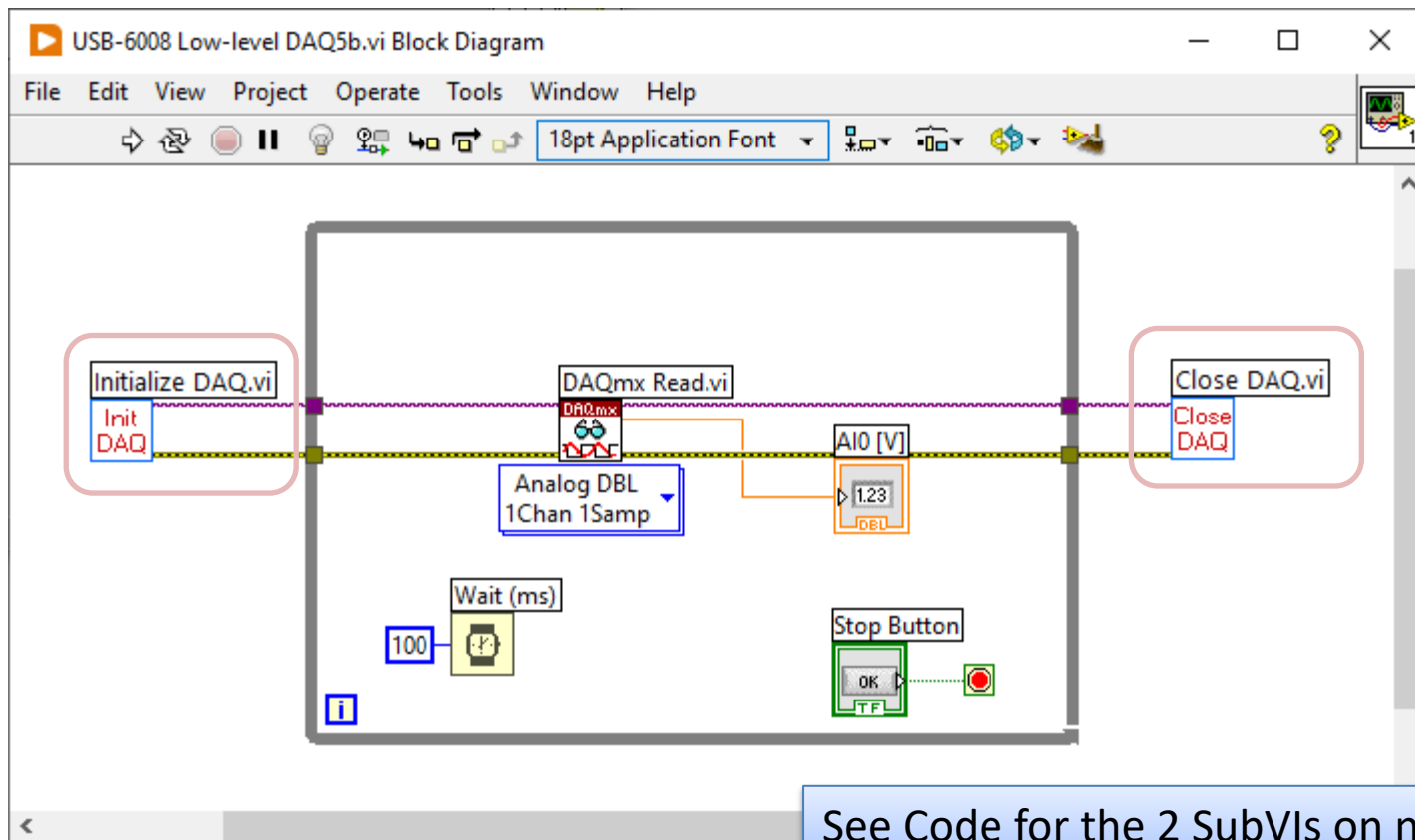
# Final Application with Error Handling

All Applications should have proper Error Handling

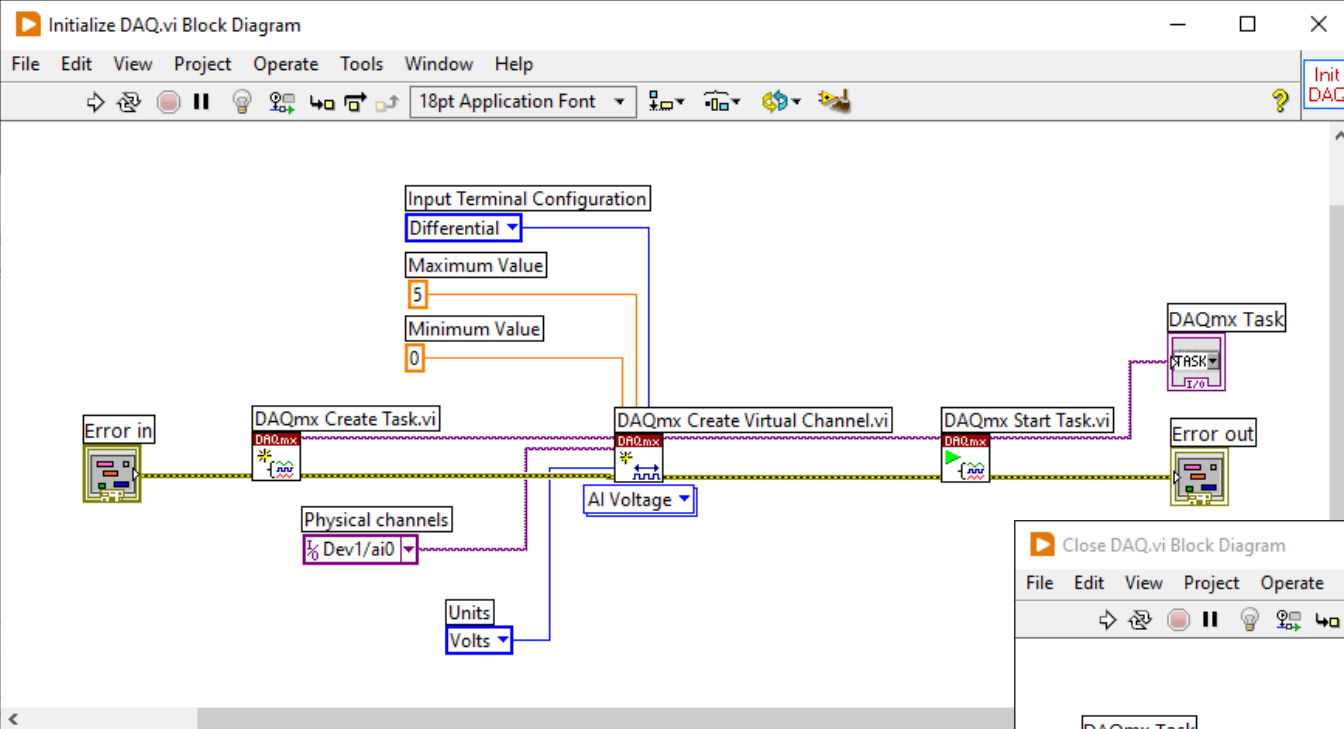


Further Improvements: Use the **State Machine** programming principle in your Application

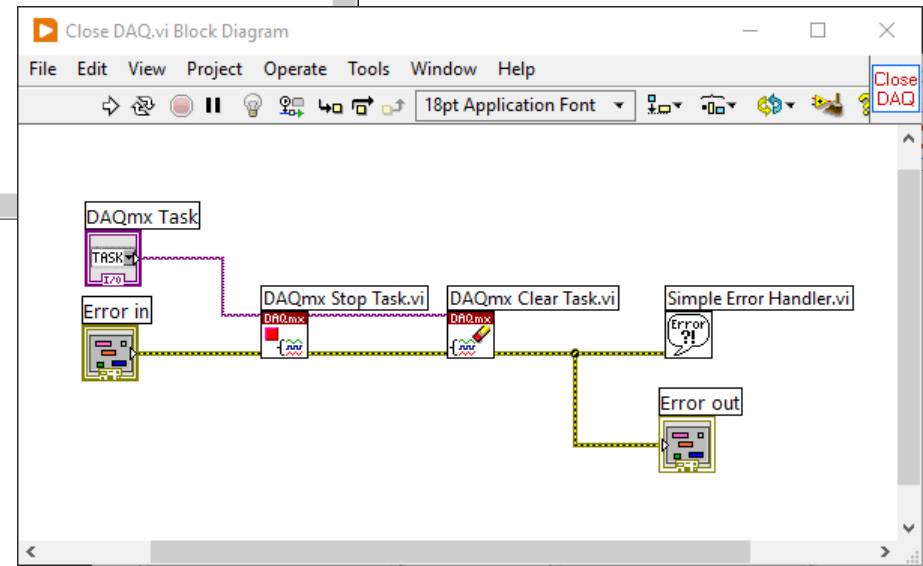
# Improved Solution: Create and use SubVIs



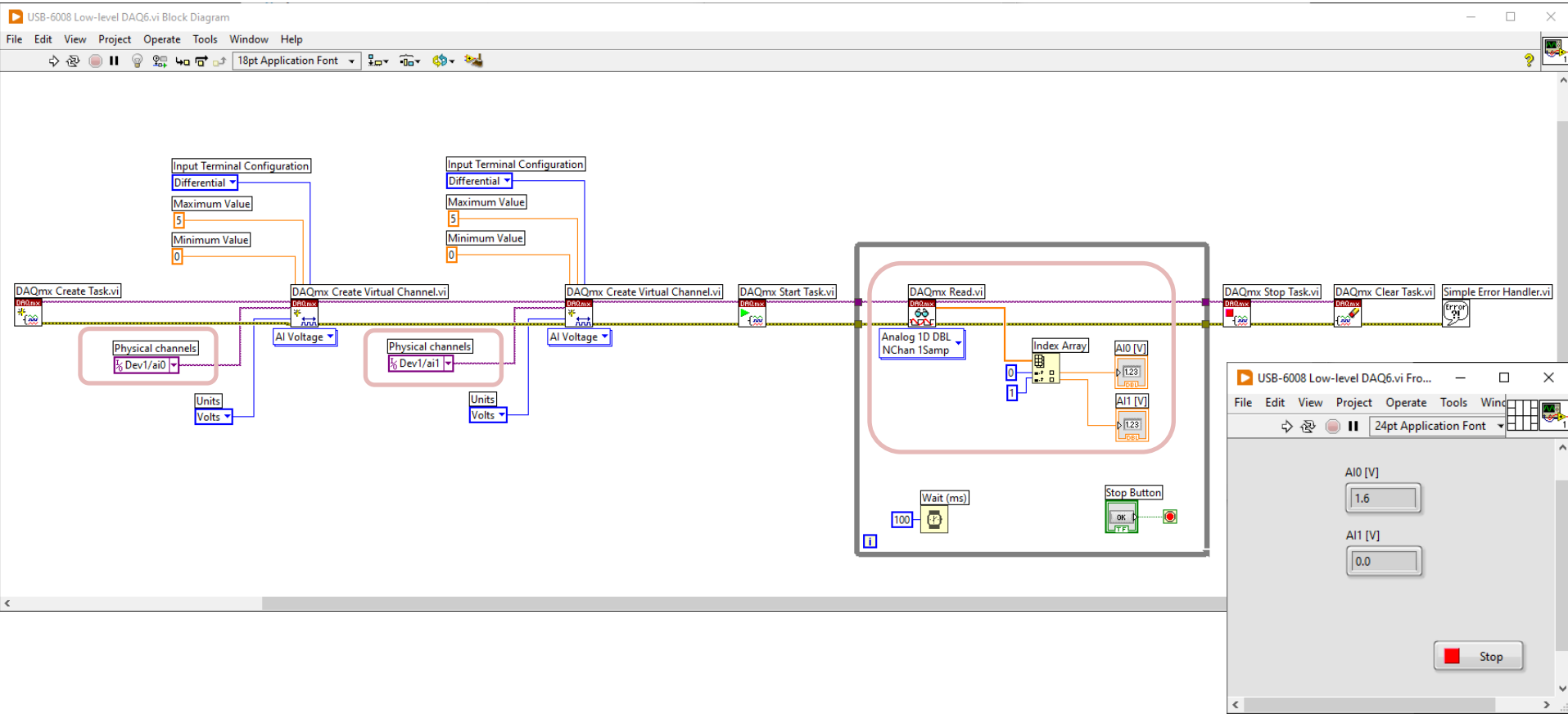
See Code for the 2 SubVIs on next page



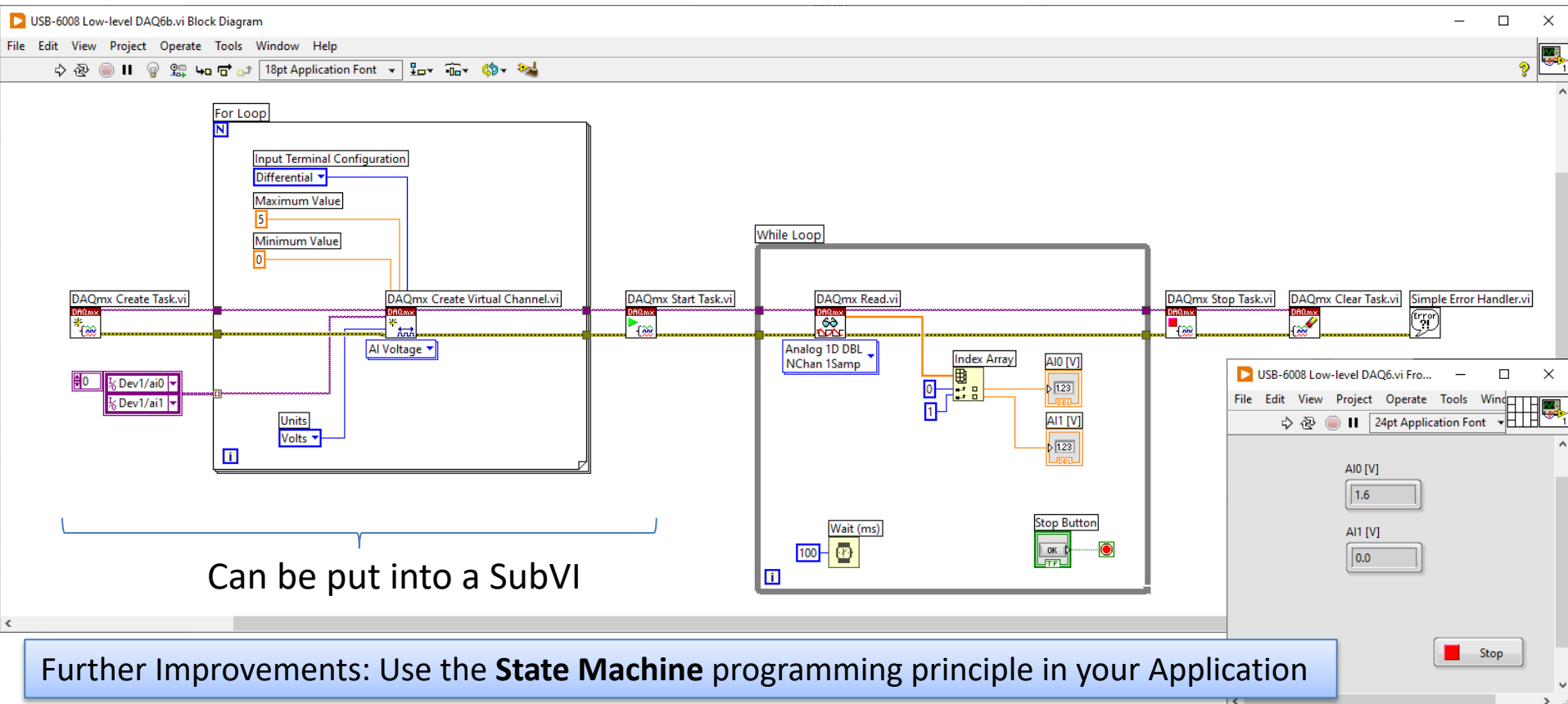
# SubVIs



# Reading Multiple Channels



# Reading Multiple Channels – Alt B

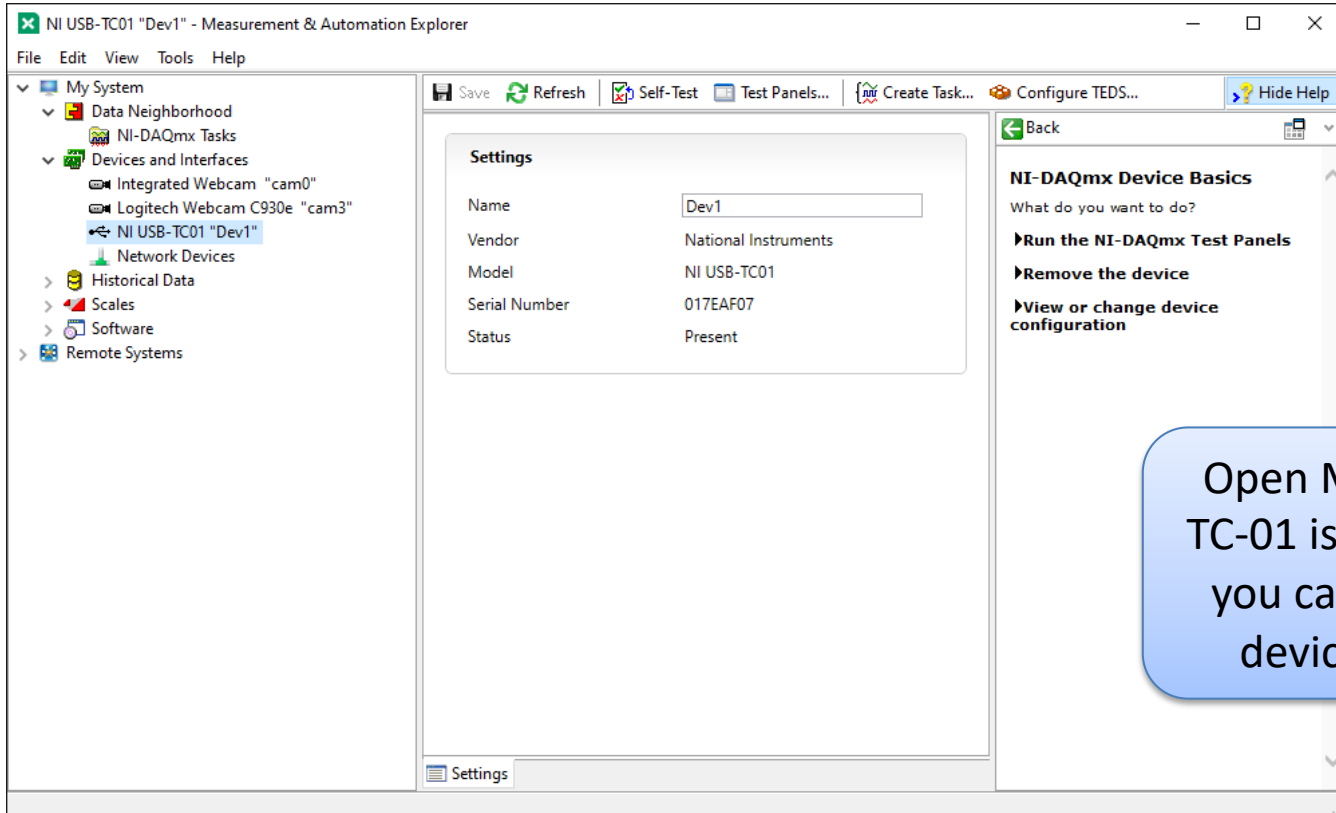


# TC-01 Thermocouple



Hans-Petter Halvorsen

# TC-01 and MAX



Open MAX and make sure the TC-01 is installed Properly. Here you can also test to see if the device is working properly



# DAQ Assistant

TC-01 Thermocouple

Hans-Petter Halvorsen



# DAQ Assistant

DAQmx - Data Acquisition

↑ Search Customize

Task Const Channel Const Create Channel Timing Triggering Channel Node Timing Node Triggering Node

DAQ Assist Real-Time

TC-01 DAQ Assistant.vi Front Panel \*

File Edit View Project Operate Tools Window

24pt Application Font

Temperature

21.5

TC-01 DAQ Assistant.vi Block Diag...

File Edit View Project Operate Tools Window

15pt Appli

DAQ Assistant data

Temperature




123

DEL

**Select the measurement type for the task.**

A **task** is a collection of one or more virtual channels with timing, triggering, and other properties.

To have **multiple measurement types** within a single task, you must first create the task with one measurement type. After you create the task, click the **Add Channels** button to add a new measurement type to the task.

**Acquire Signals****Analog Input****Voltage****Temperature** Ix Thermistor RTD Thermocouple Vex Thermistor**Strain****Select the physical channel(s) to add to the task.**

If you have previously configured **global virtual channels** of the same measurement type as the task, click the **Virtual** tab to add or copy global virtual channels to the task. When you copy the global virtual channel to the task, it becomes a

virtual channel, and any changes to that global virtual channel are reflected in the task.

If you have TEDS configured, click the **TEDS** tab to add TEDS channels to the task.

For hardware that supports **multiple channels** in a task, you can select multiple channels to

**Physical****Supported Physical Channels**

Dev1 (USB-TC01)  
ai0

<Ctrl> or <Shift> click to select multiple channels.

&lt; Back

Next &gt;

Finish

Cancel

# DAQ Assistant



Undo Redo

Run

Add Channels

Remove Channels

{ Express Task

Connection Diagram



Hide Help

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**Measuring Temperature with a Thermocouple**

A **thermocouple** is created when two dissimilar metals touch, and the contact point produces a small open-circuit voltage that corresponds to temperature. Thermocouple measurements require sensing of the **cold-junction** temperature where the thermocouple wire is connected to the measurement system. Therefore, signal connection accessories should include an accurate cold-junction sensor, and should be designed to minimize any temperature gradients between the cold-junction sensor and thermocouple wire connections.

Other signal conditioning requirements include

Value is the temperature of the cold junction of the thermocouple when CJC Source is set to Constant. The temperature value uses the same units as Input Range.

**Configuration****Triggering****Advanced Timing****Logging****Channel Settings****Temperature****Details****Settings****Thermocouple Setup****Signal Input Range**

Max 100

Min 0

**Scaled Units**

deg C

**Thermocouple Type**

J

CJC Source

Constant

CJC Value

25

**Timing Settings****Acquisition Mode**

1 Sample (On Demand)

Samples to Read

100

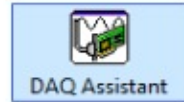
Rate (Hz)

1k

The TC-01 device has only one Analog Input called ai0

Select CJC Source = "Built-in"

# Note!!! – DAQ Assistant Error



DAQ Assistant

Do you get an Error like this when trying to use the DAQ Assistant?



## Workaround:

- Install LabVIEW 2021 SP1
- LabVIEW 2021 SP1 does not need to be activated, it is sufficient to install LabVIEW 2021 on your system and not activate it
- Installing just the LabVIEW 2021 SP1 run-time engine will not be sufficient, the LabVIEW ADE needs to be installed

In “LabVIEW 2022 Q3” to “LabVIEW 2023 Q3” there is a bug with the DAQ Assistant. **To fix that you need to install the LabVIEW 2021 SP1 core component.** See information on this web page from NI:

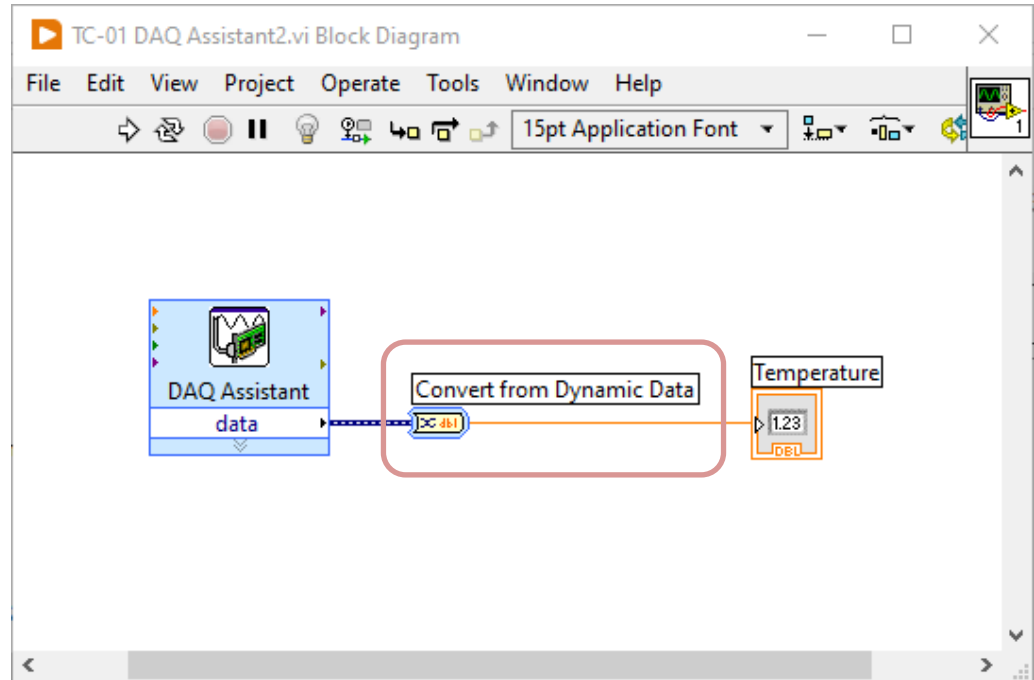
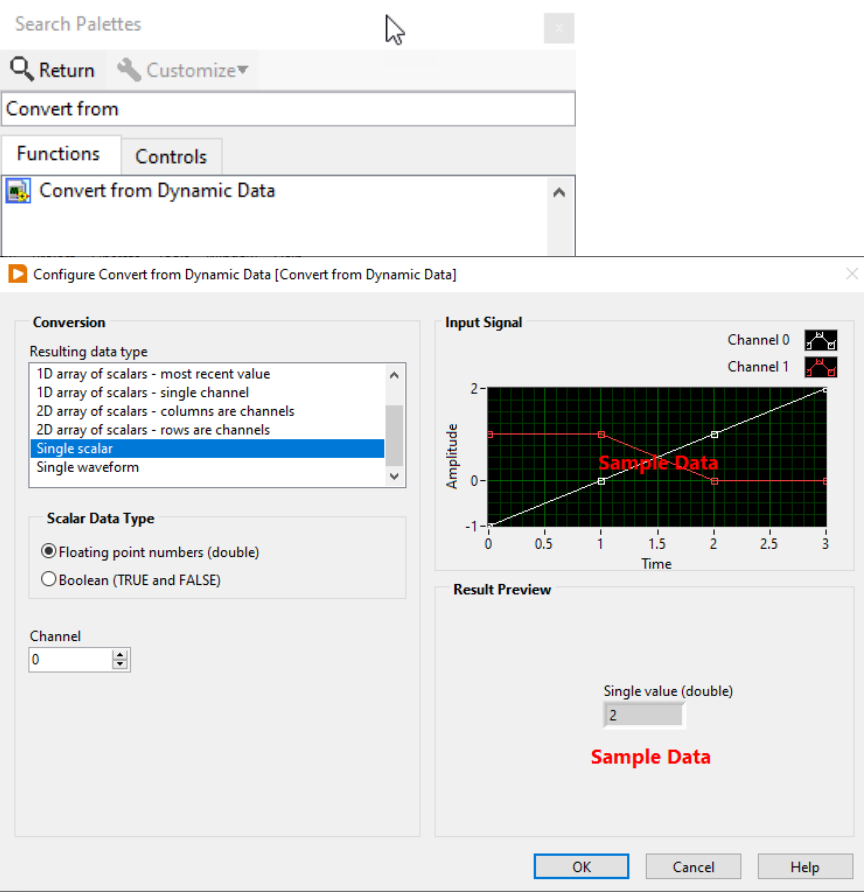
<https://knowledge.ni.com/KnowledgeArticleDetails?id=kA03q0000019gTMCA&l=en-NO>

Another solution is to use, e.g., the lower level DAQ functions in LabVIEW, see upcoming examples in this Tutorial.

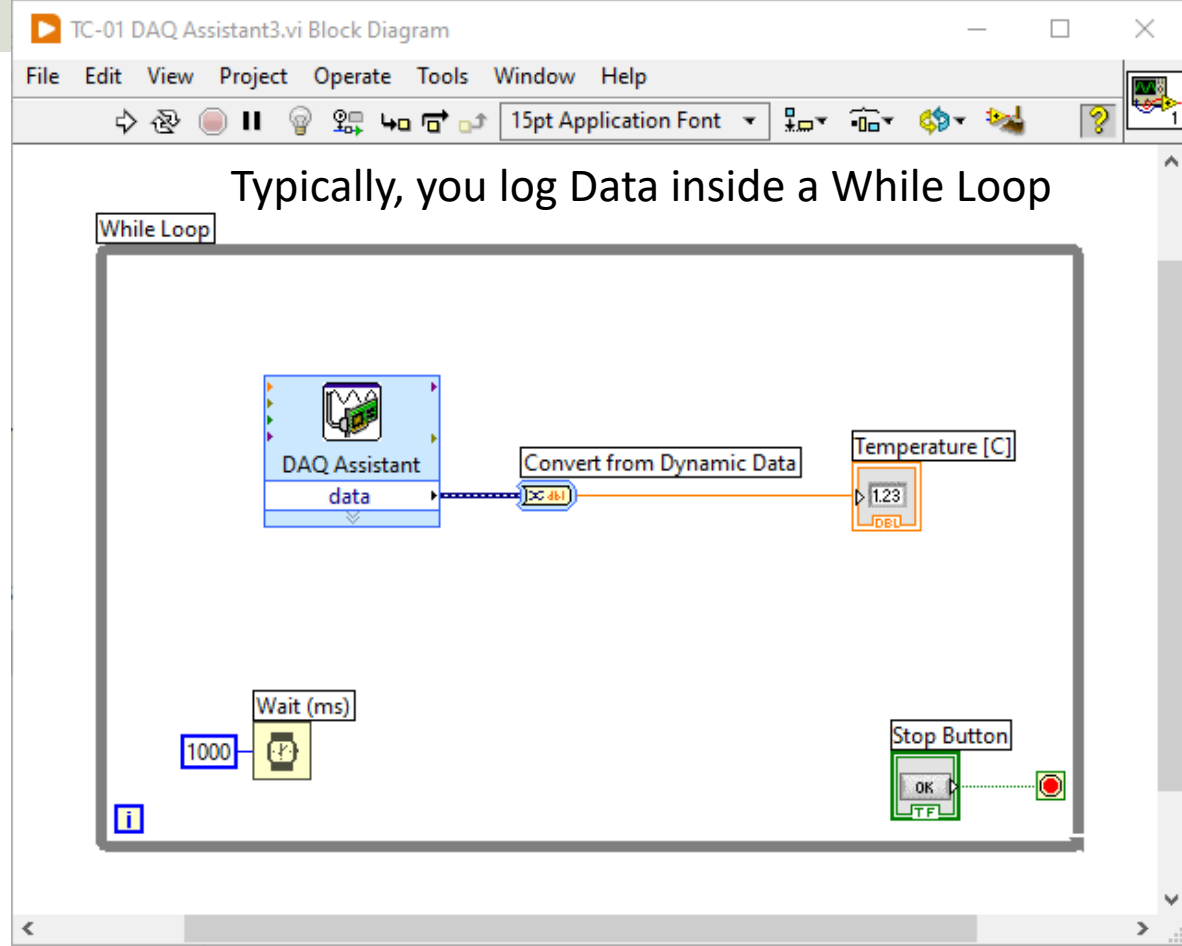
I have been in contact with NI, and it is expected that this error will be fixed in upcoming versions of LabVIEW

This Bug/Issue has been fixed in LabVIEW 2024 Q1 and NI-DAQmx 2024 Q1 (and newer)

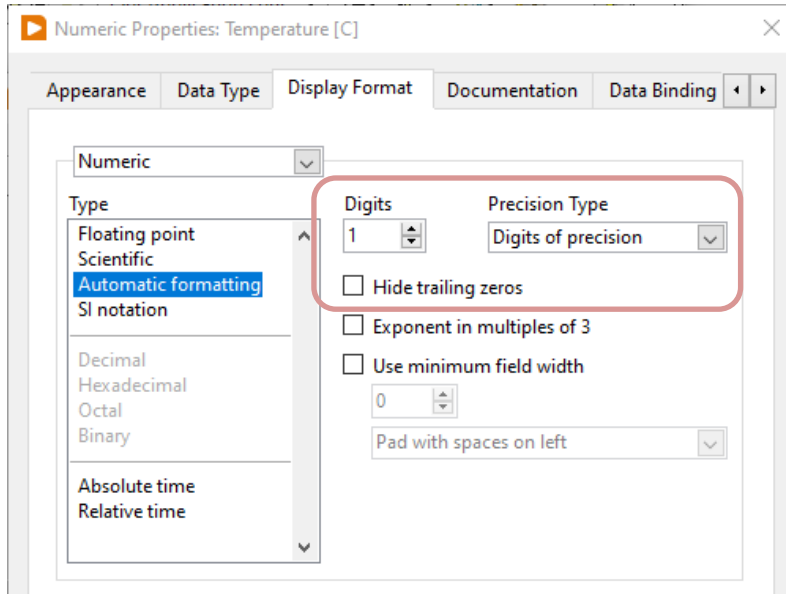
# Convert from Dynamic Data



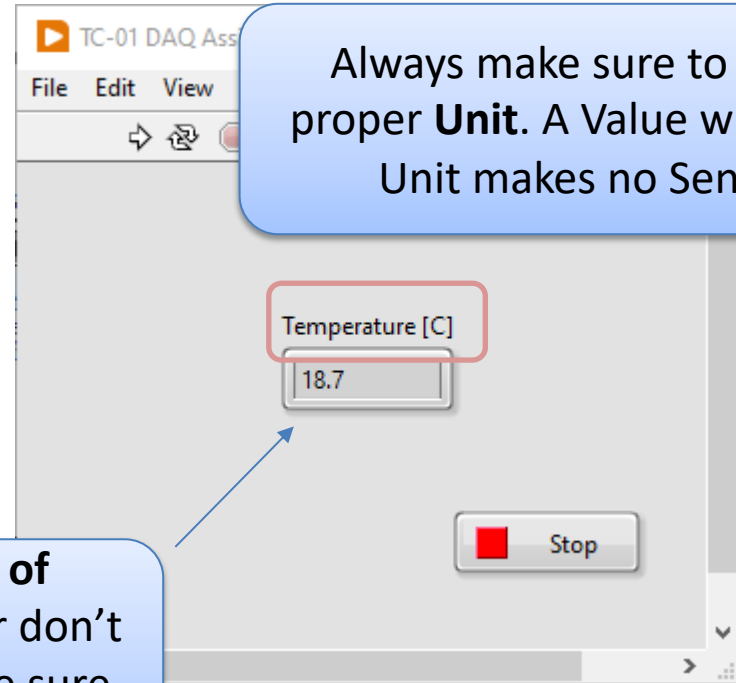
# While Loop



# Number of Decimals and Units



Make sure to select a proper **Number of Decimals**. Typically, a Temperature Sensor don't have an Accuracy with 10 Decimals. Make sure to read the Datasheet for the selected Sensor



Always make sure to add a proper **Unit**. A Value without a Unit makes no Sense!

# Configure DAQ Settings using MAX

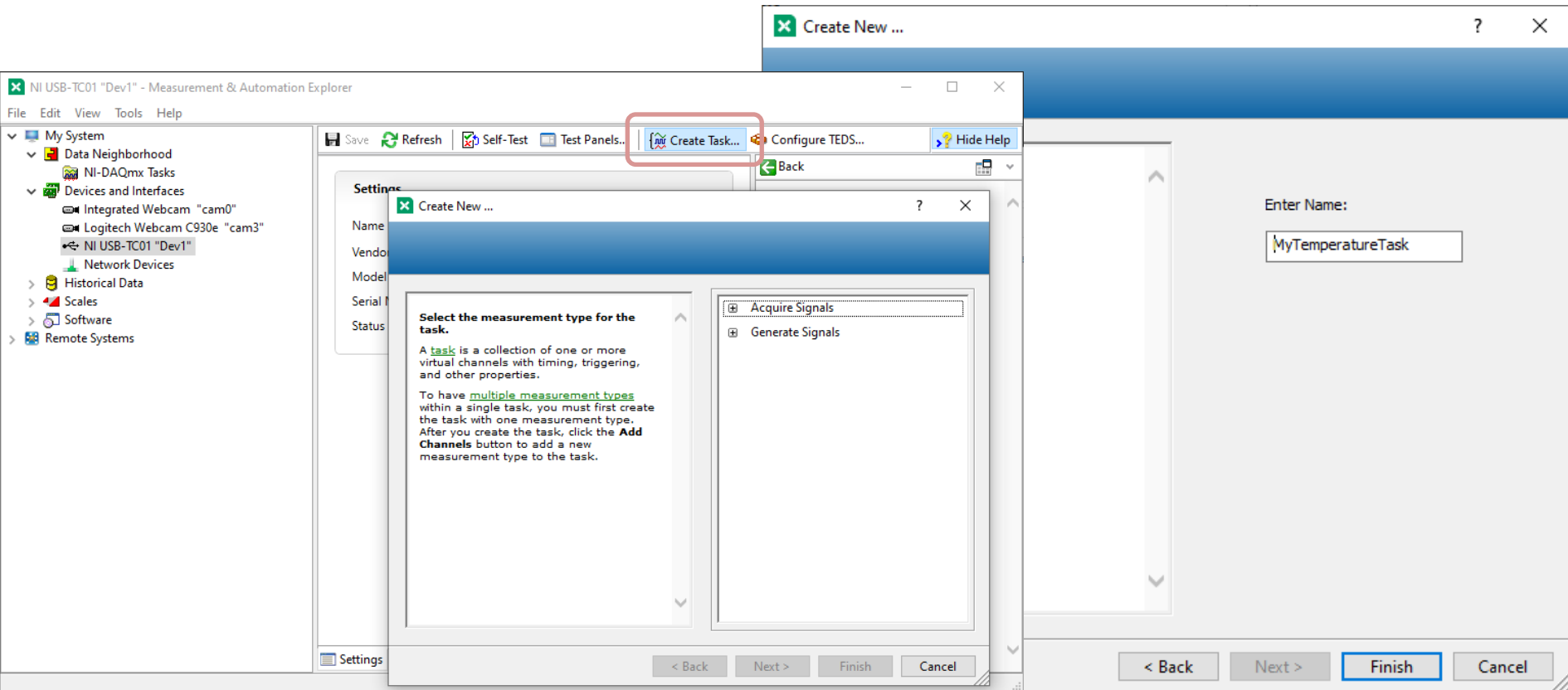
TC-01 Thermocouple

Hans-Petter Halvorsen





# Configure DAQ Settings using MAX



# Configure DAQ Settings using MAX

The screenshot displays the NI Measurement & Automation Explorer (MAX) interface. The left sidebar shows a tree view with 'My System' expanded, containing 'Data Neighborhood', 'NI-DAQmx Tasks', 'MyTemperatureTask', 'Devices and Interfaces', 'Integrated Webcam "cam0"', 'Logitech Webcam C930e "cam"', 'NI USB-TC01 "Dev1"', 'Network Devices', 'Historical Data', 'Scales', 'Software', and 'Remote Systems'. The main window is titled 'MyTemperatureTask - Measurement & Automation Explorer' and contains a menu bar (File, Edit, View, Tools, Operate, Help) and a toolbar (Save, Run, Add Channels, Remove Channels). A table at the top shows the current channel configuration:

Channel	Value
Temperature	18,655326

Below the table is a 'Display Type' dropdown set to 'Table'. The 'Configuration' tab is active, showing 'Channel Settings' and 'Timing Settings'. The 'Channel Settings' section includes a list of channels with 'Temperature' selected, and a 'Thermocouple Setup' dialog box. The 'Thermocouple Setup' dialog has the following settings:

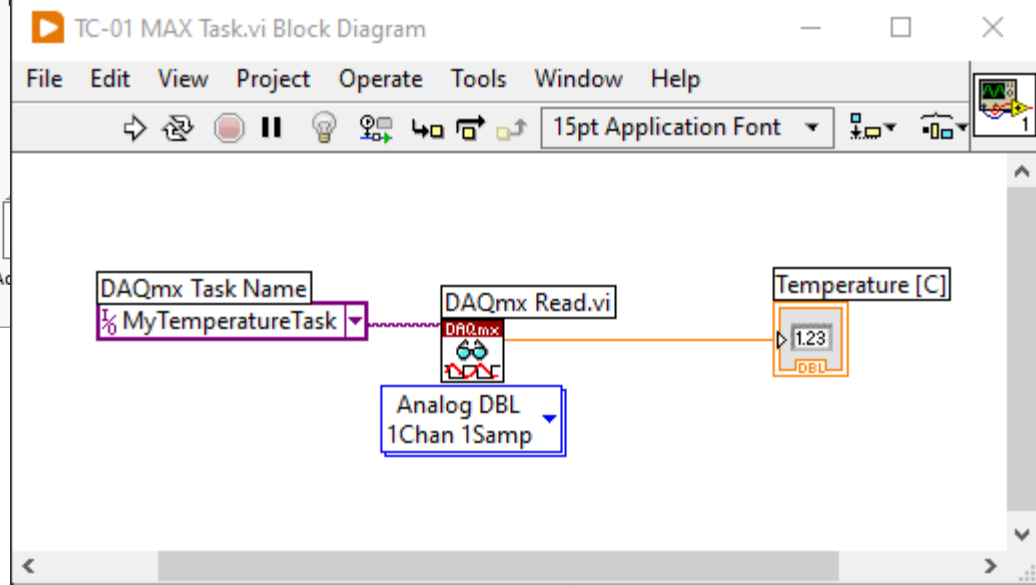
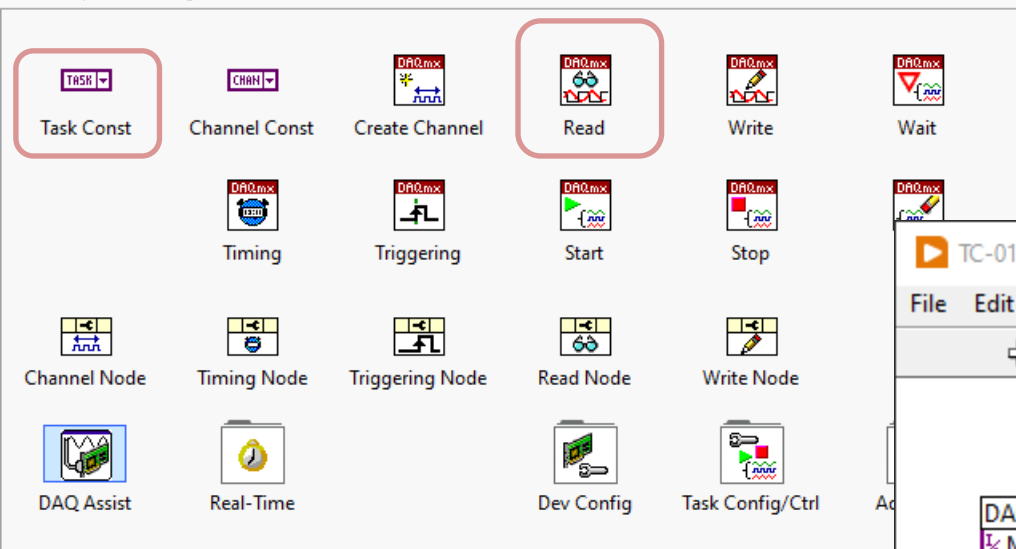
- Signal Input Range: Max 100, Min 0
- Scaled Units: deg C
- Thermocouple Type: J
- CJC Source: Constant
- CJC Value: 25

The 'Timing Settings' section shows 'Acquisition Mode' set to '1 Sample (On Demand)', 'Samples to Read' set to 100, and 'Rate (Hz)' set to 1k. A right sidebar contains a 'Measuring Temperature with a Thermocouple' section with a description of thermocouples and a 'Scaled Units' section.

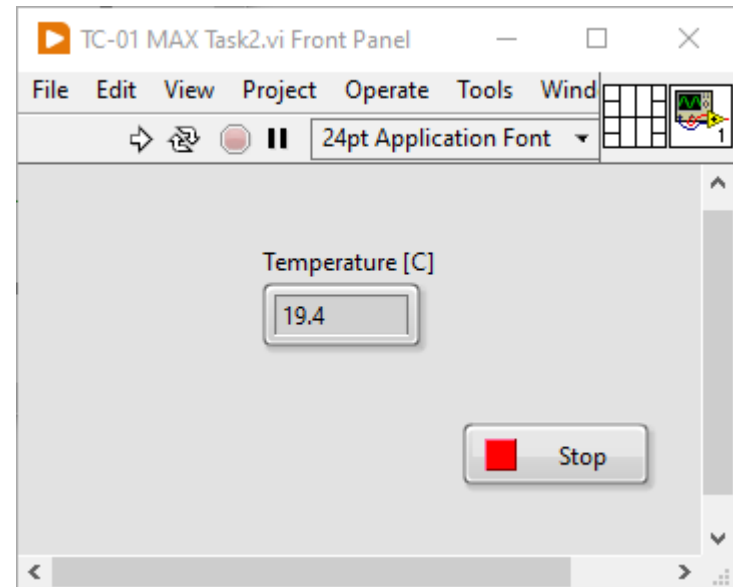
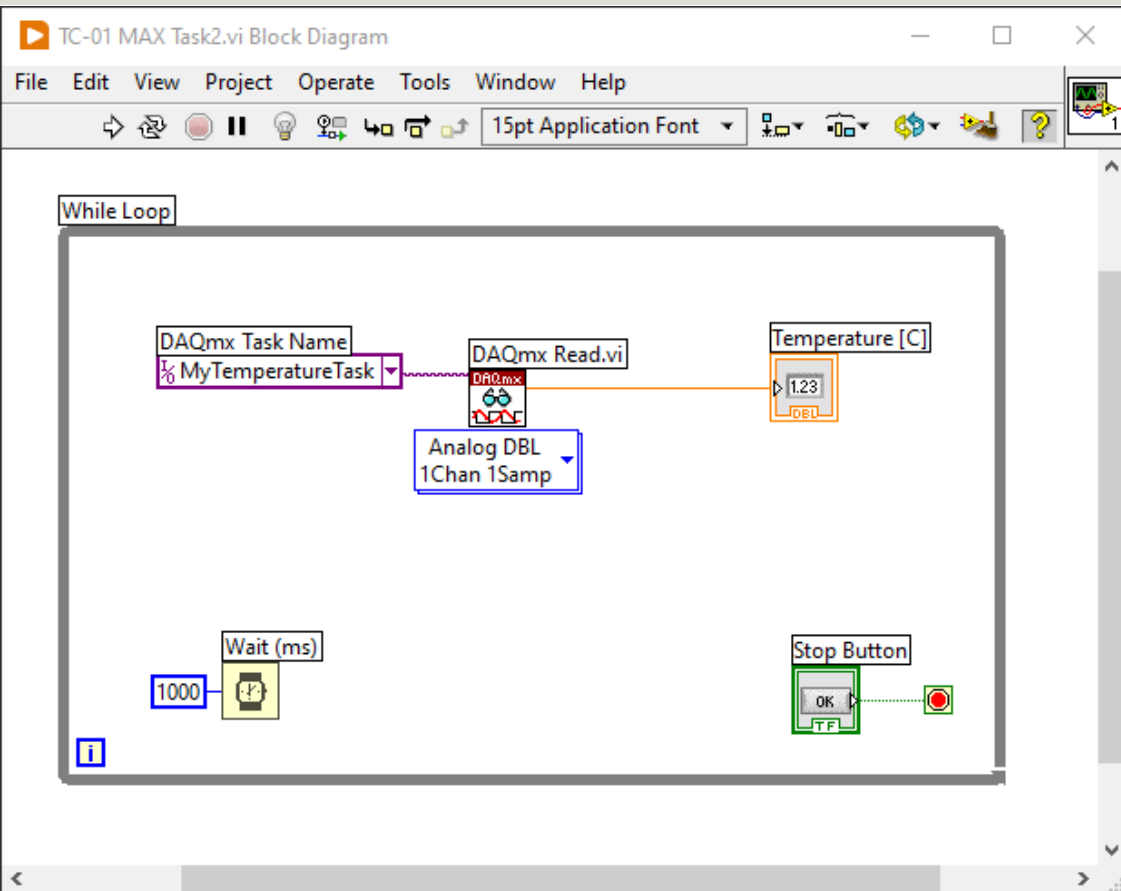
# Configure DAQ Settings using MAX

DAQmx - Data Acquisition

↑ Search Customize



# While Loop



# While Loop v2 – Start/Stop Task

LabVIEW Help 2022.0.0f118 6/28/2022 10:39:07 PM

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- DSC Module
- MathScript RT Module


## DAQmx Start Task (VI)

Owning Palette: [DAQmx - Data Acquisition VIs and Functions](#)  
Installed With: NI-DAQmx

Transitions the [task](#) to the running [state](#) to begin the measurement or generation. [Using this VI](#) is required for some applications and is optional for others.

If you do not use this VI, a measurement task starts automatically when the [DAQmx Read](#) VI runs. The **autostart** input of the [DAQmx Write](#) VI determines if a generation task starts automatically when the DAQmx Write VI runs.

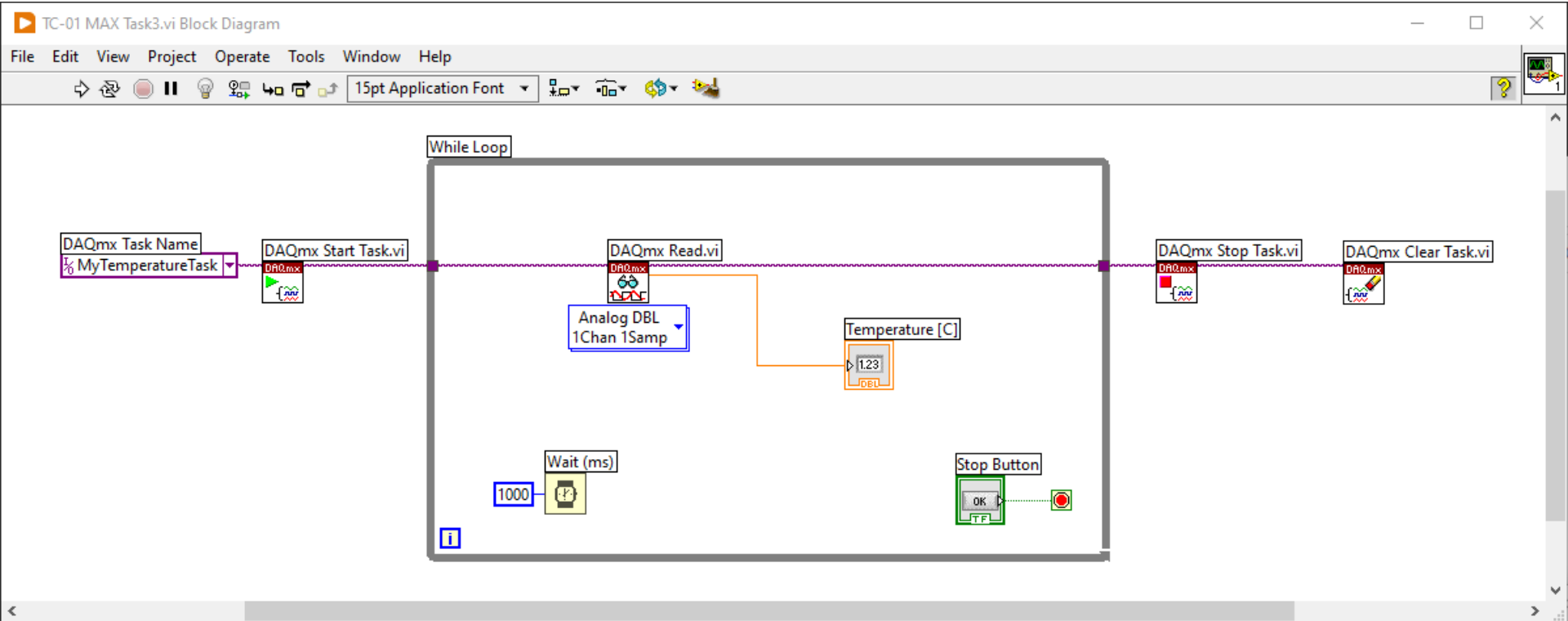
If you do not use the DAQmx Start Task VI and the [DAQmx Stop Task](#) VI when you use the DAQmx Read VI or the DAQmx Write VI multiple times, such as in a loop, the task starts and stops repeatedly. Starting and stopping a task repeatedly reduces the performance of the application.



The diagram shows the DAQmx Start Task VI block. It has four inputs: 'task/channels in' (top left), 'error in' (bottom left), 'task out' (top right), and 'error out' (bottom right). The block is labeled 'DAQmx' and contains a green play button icon.

Increase **speed** by using “Start Task” and “Stop Task” VIs outside the While Loop

# While Loop v2 – Start/Stop Task



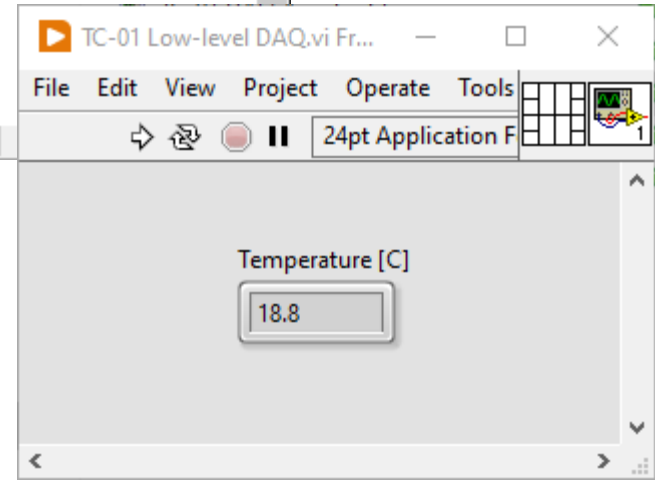
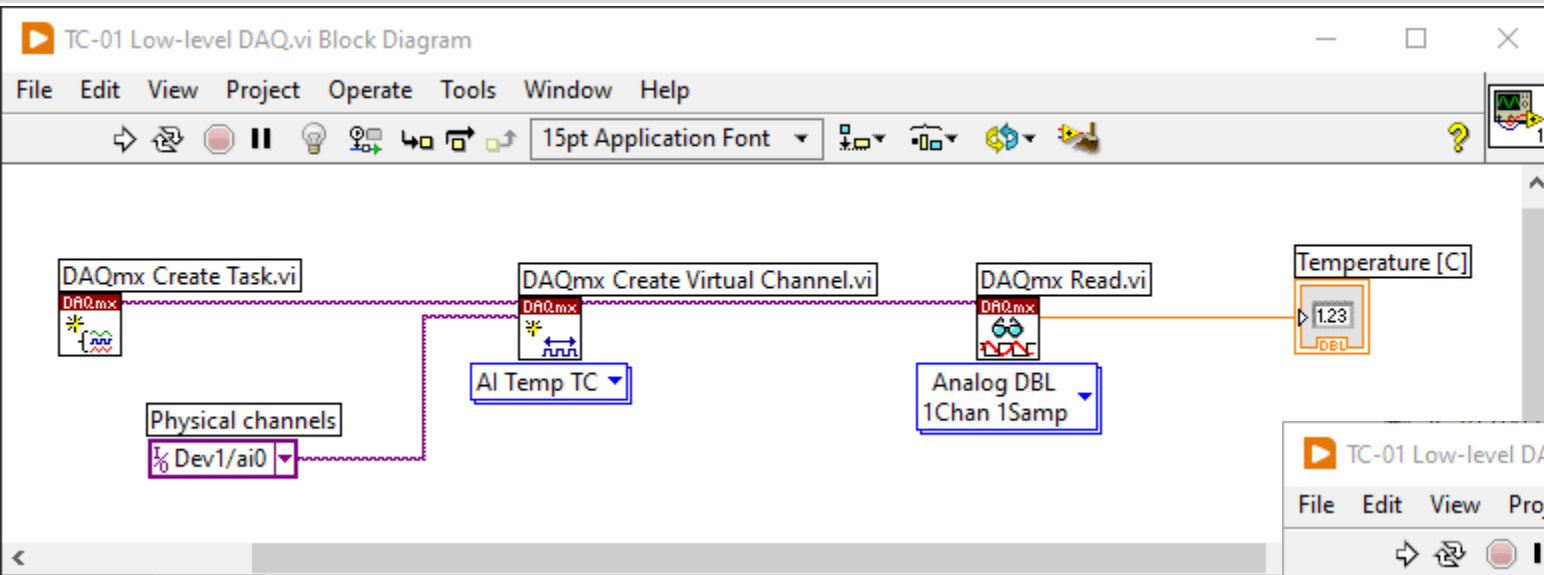
# Using “Low-level” DAQmx VIs

TC-01 Thermocouple

Hans-Petter Halvorsen

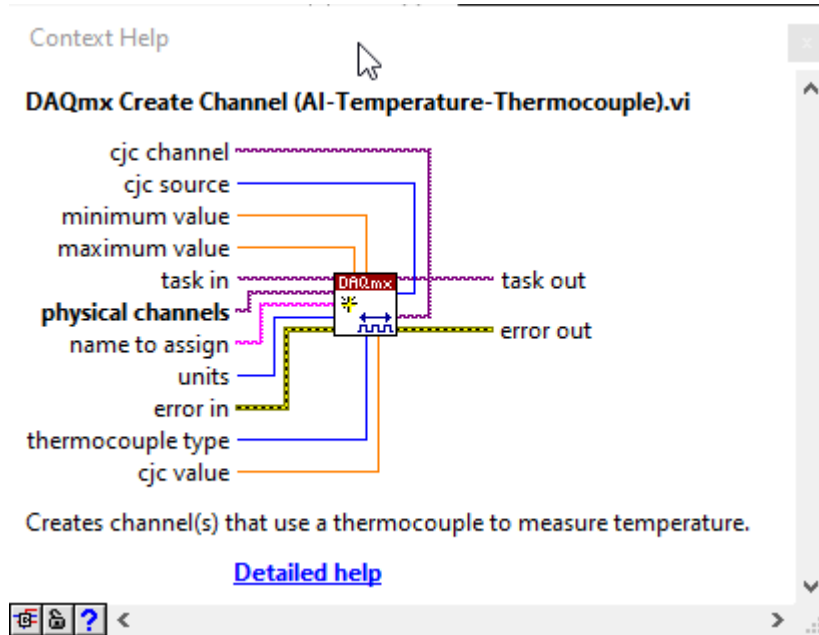


# Using “Low-level” DAQmx VIs





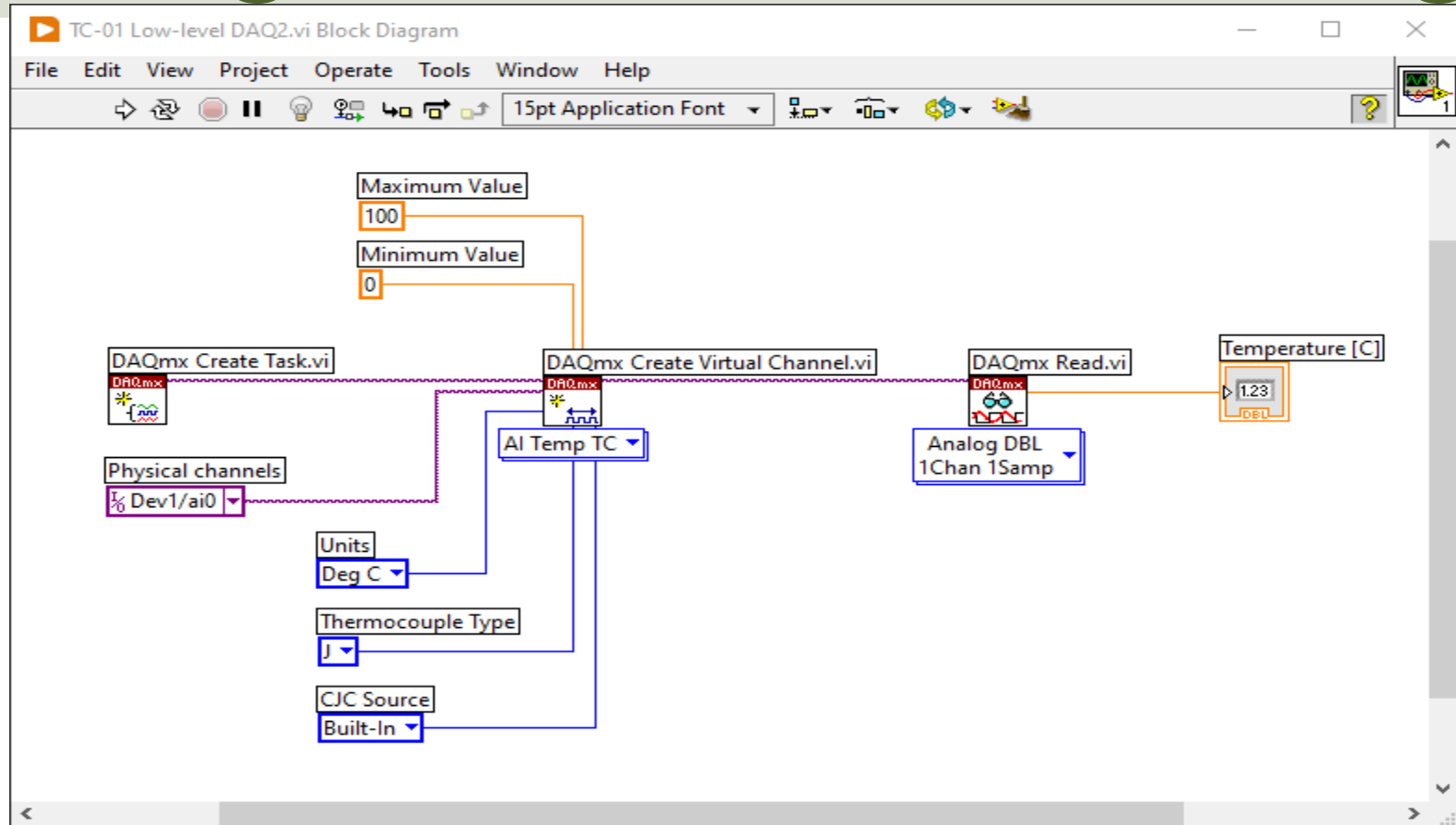
# Configure Additional Settings



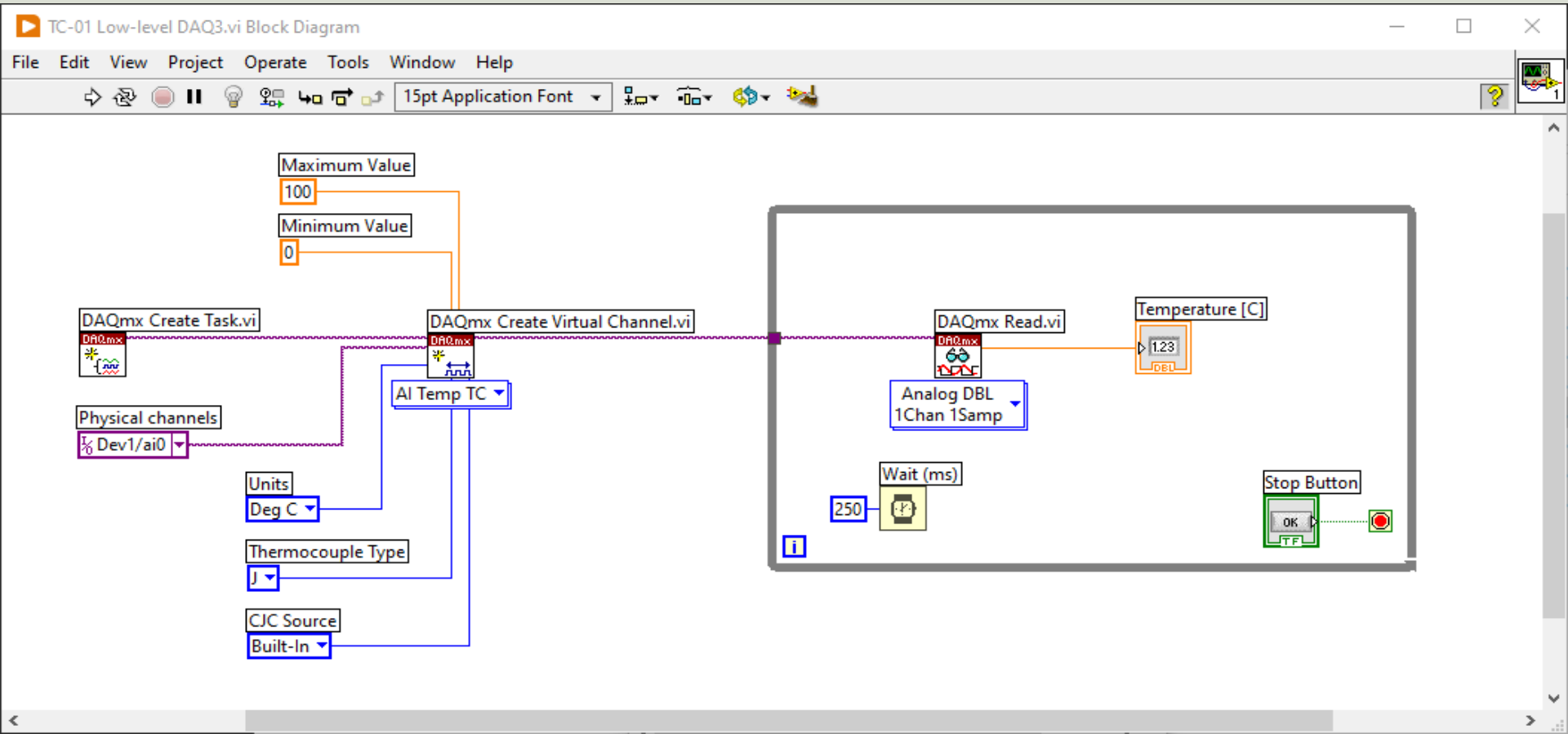
In the previous example we just used the default setting.

If you need to change some of the default setting, just right-click on the select input and create a constant

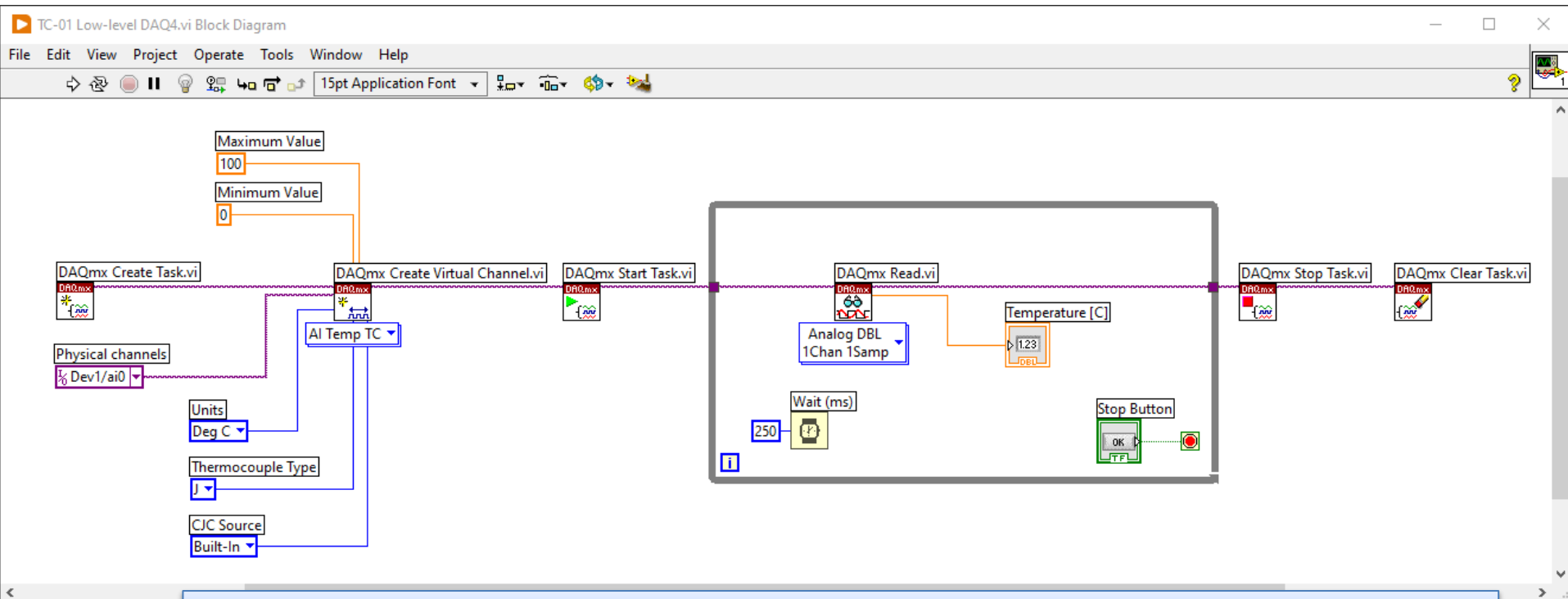
# Configure Additional Settings



# While Loop



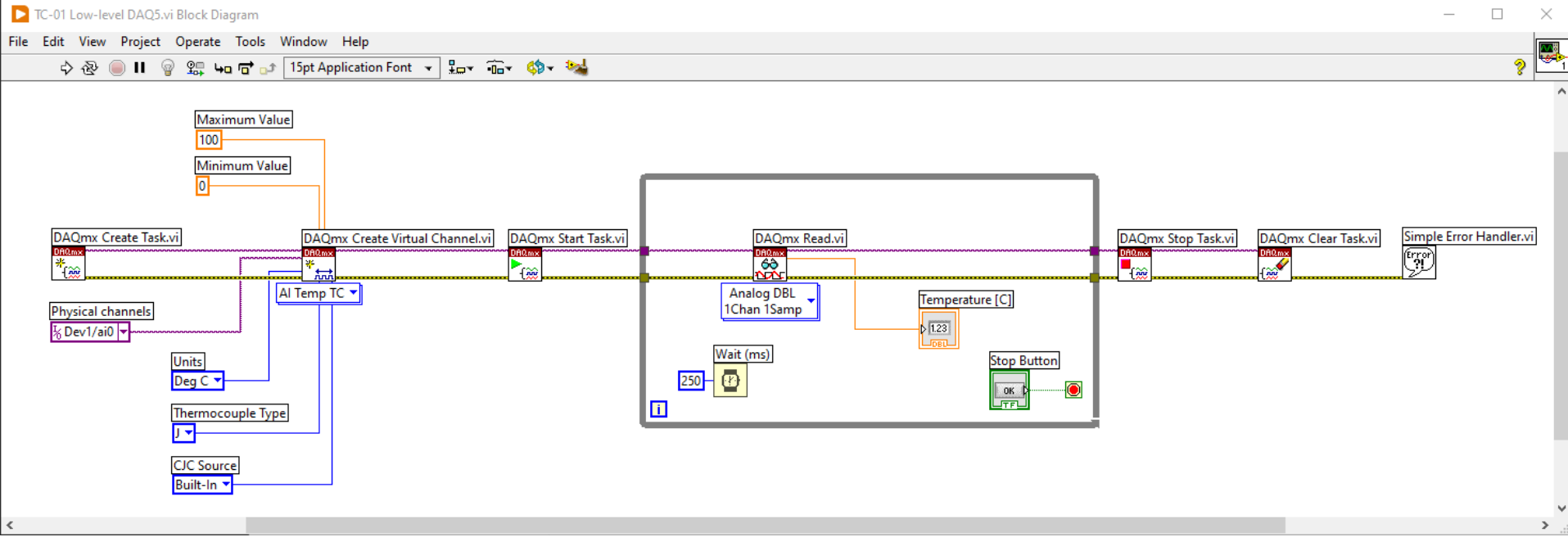
# While Loop with Start/Stop Task



Increase **speed** by using "Start Task" and "Stop Task" VIs outside the While Loop

# Final Application with Error Handling

All Applications should have proper Error Handling



Further Improvements: Use the **State Machine** programming principle in your Application

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Web: <https://www.halvorsen.blog>

