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Mini Course - LabVIEW - Basics 1
2022/2/18
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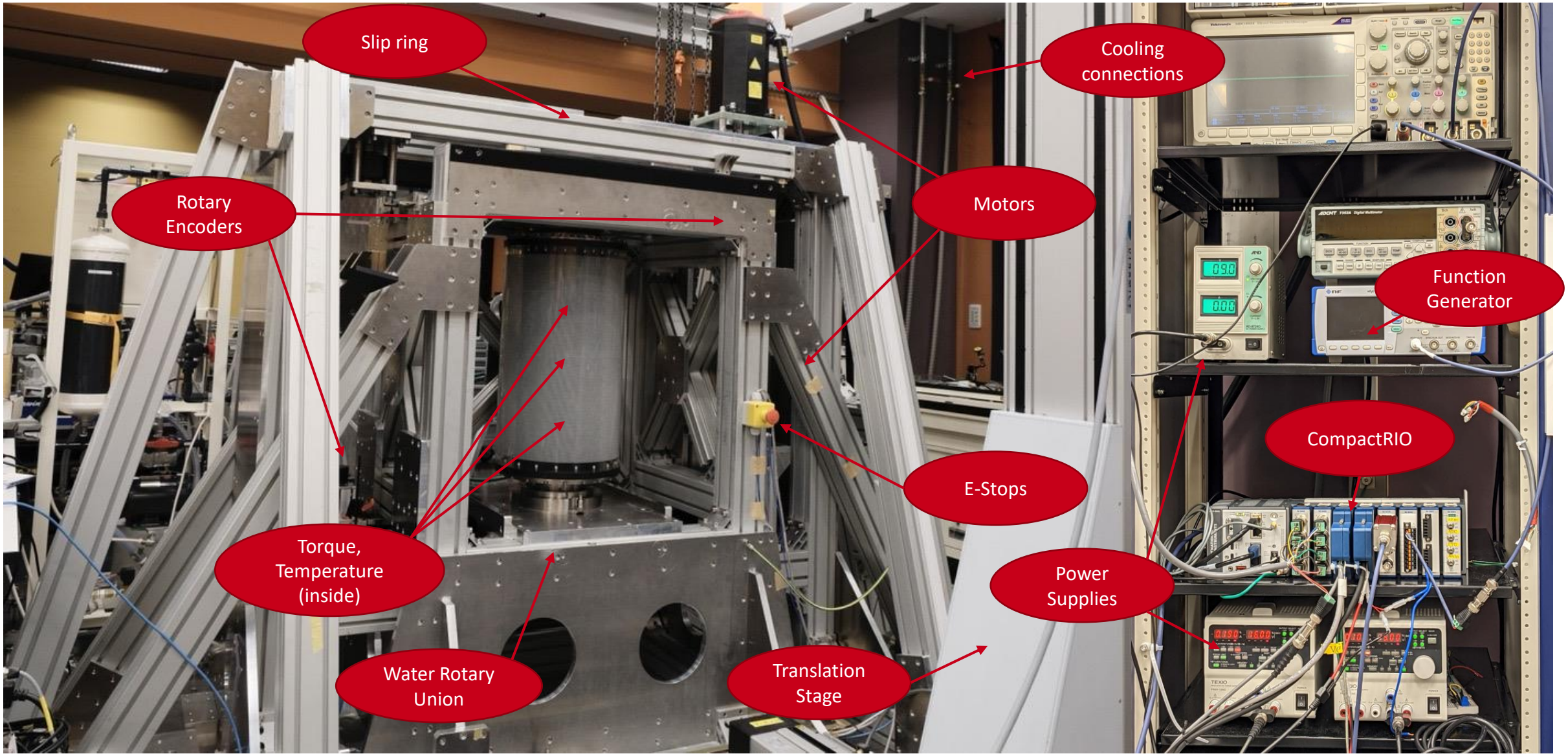
The Taylor-Couette Experiment

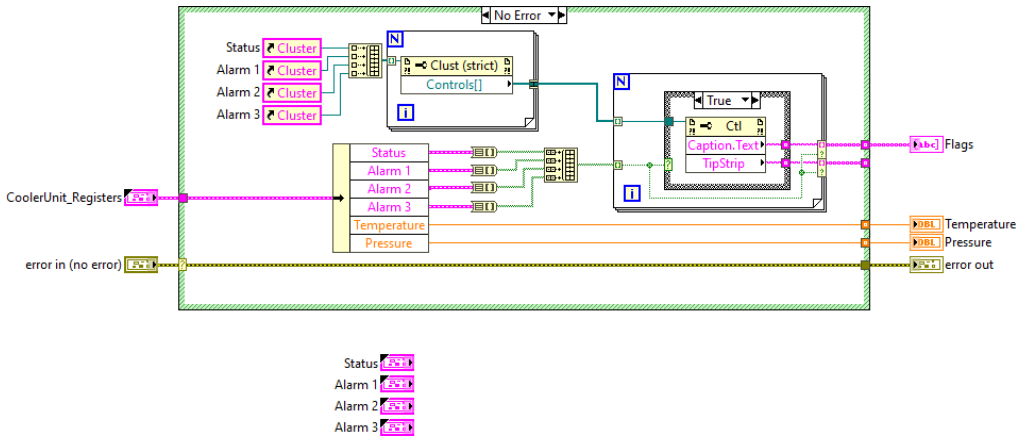
An Overview



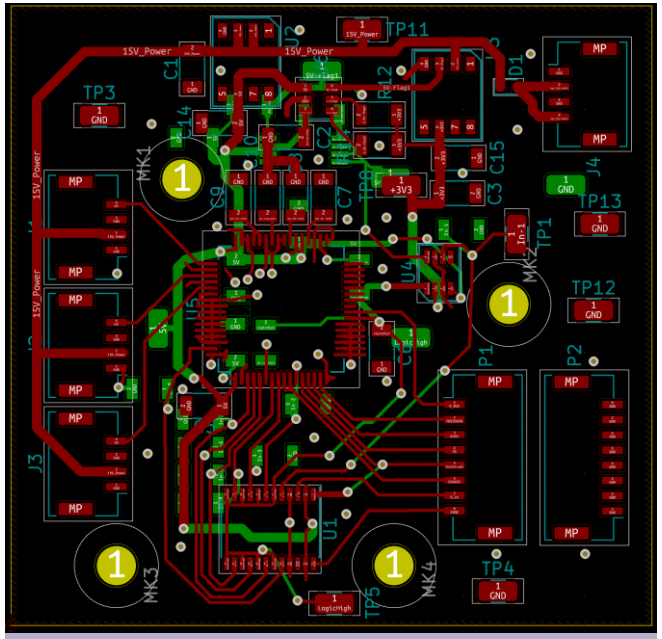
Cooler Unit

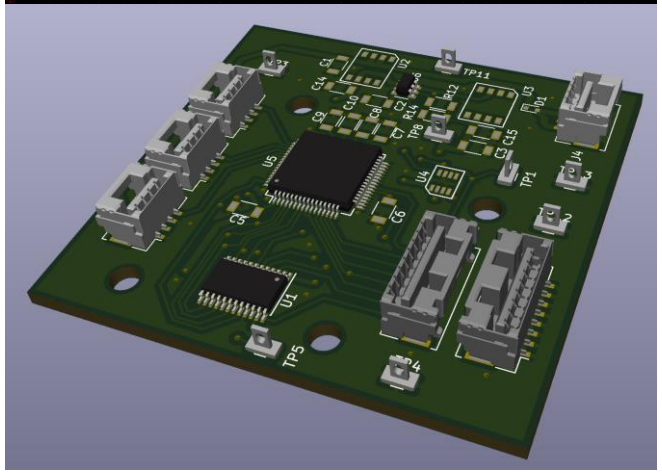
HRSH150-W-20

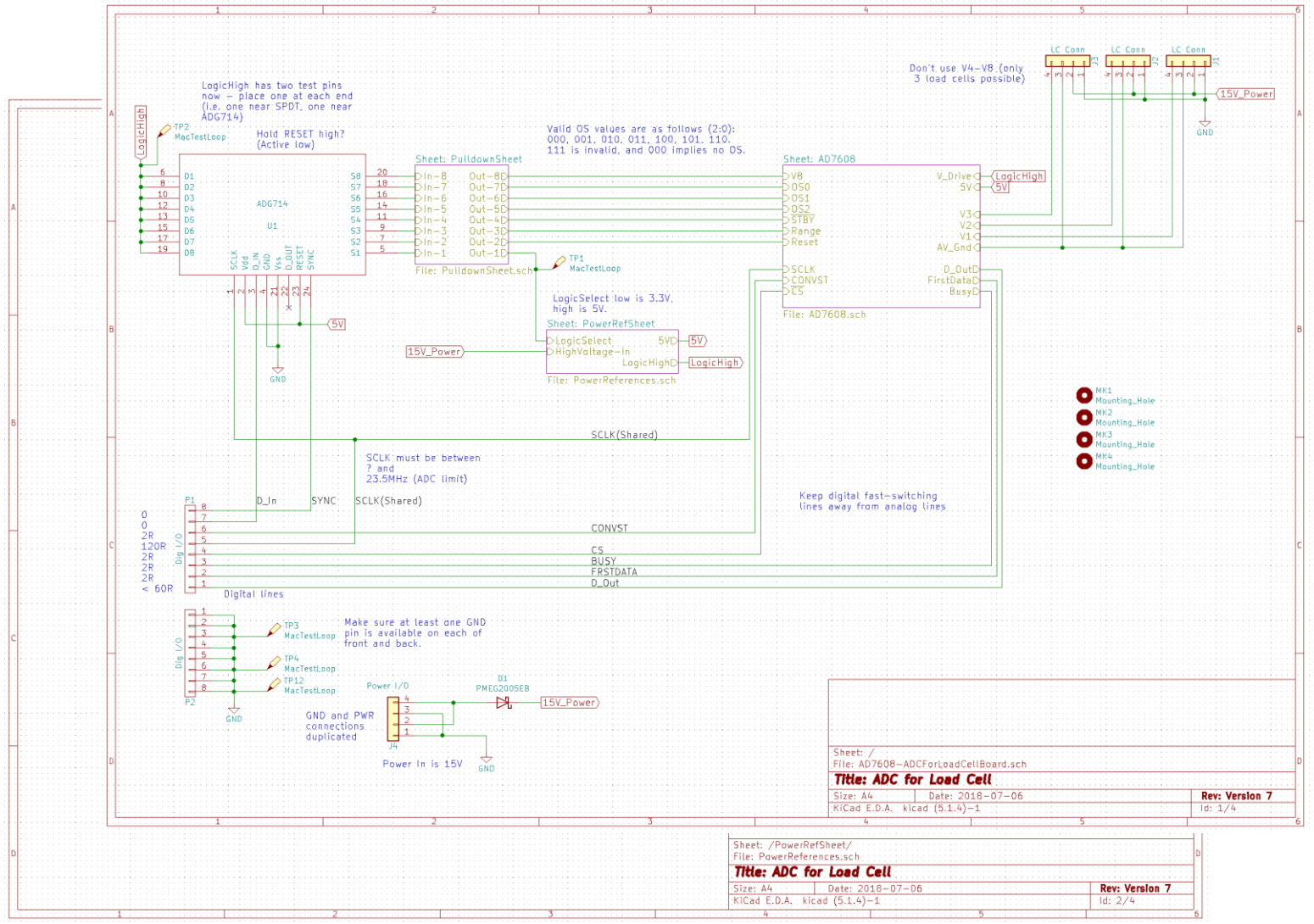
- 15.7kW cooling capacity
- 3.5kW heating capacity
- ±0.1°C stability
- Serial communication using MODBUS

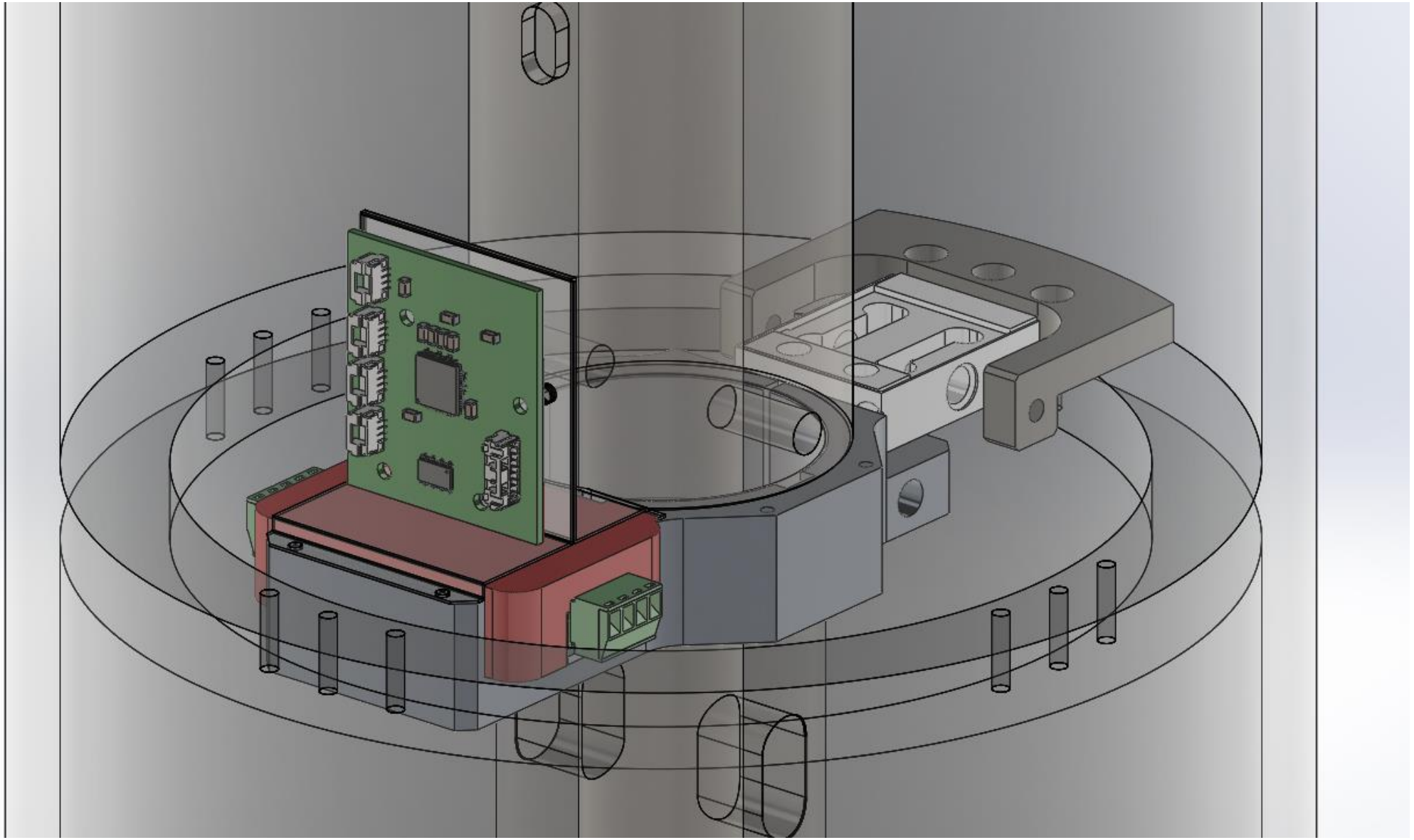


Torque Measurement



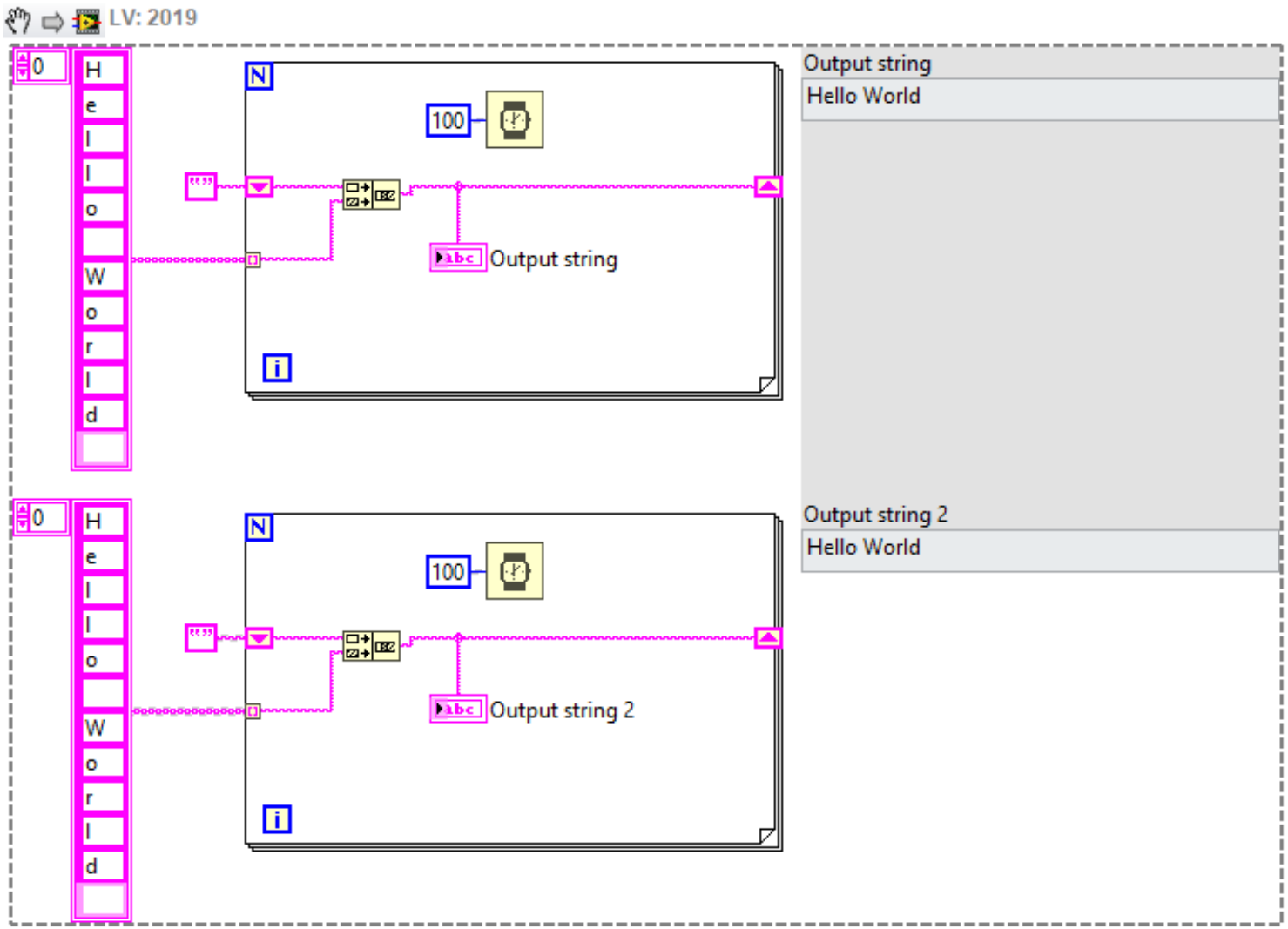






Dataflow!!

- The most important part of LabVIEW is not hardware connectivity
- It is Dataflow!
- Nodes can be executed as soon as their inputs are available



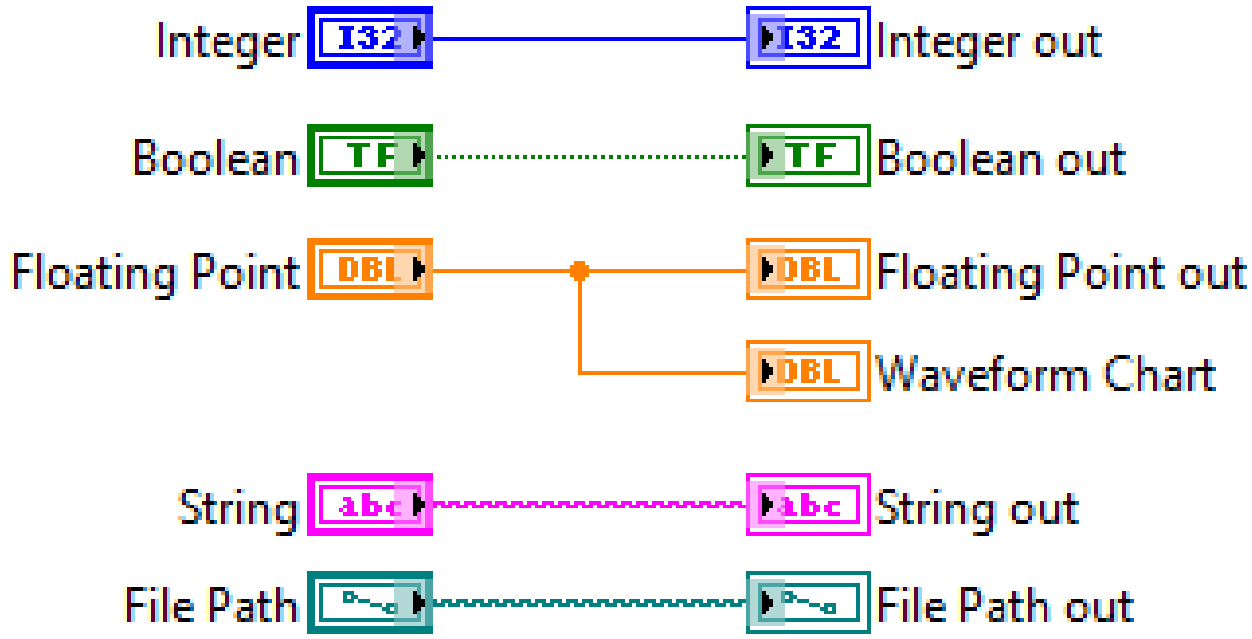
Let’s take a look at the “palettes”

- Palettes
- Front Panel + Block Diagram
- Controls
- Indicators

- Project files

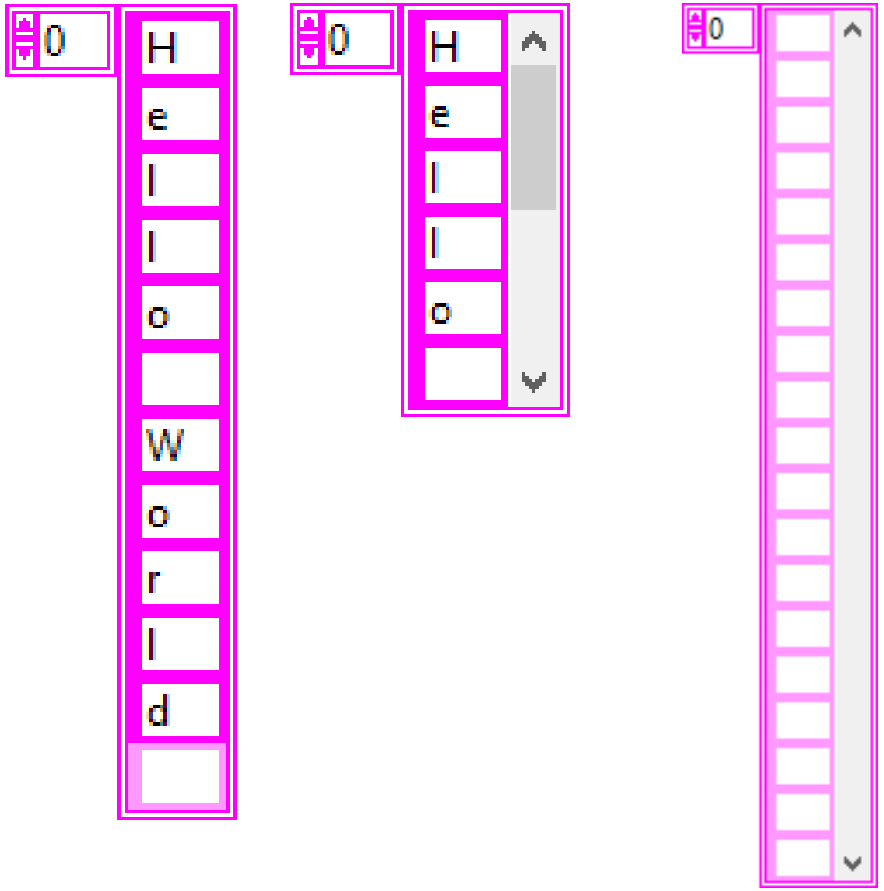
Datatypes

- LabVIEW is “statically typed” - type-checked at compile-time
- In most cases, you won’t notice it being compiled!
- There is a “variant” type for dynamic types, but you can mostly avoid it ☺
- Different types are shown with different wire colours



Arrays

- An array is a list of values of a specific type
- Arrays can be empty
- The number of displayed elements is not the same as the size!
- The order of elements in an array is preserved - they are not automatically sorted

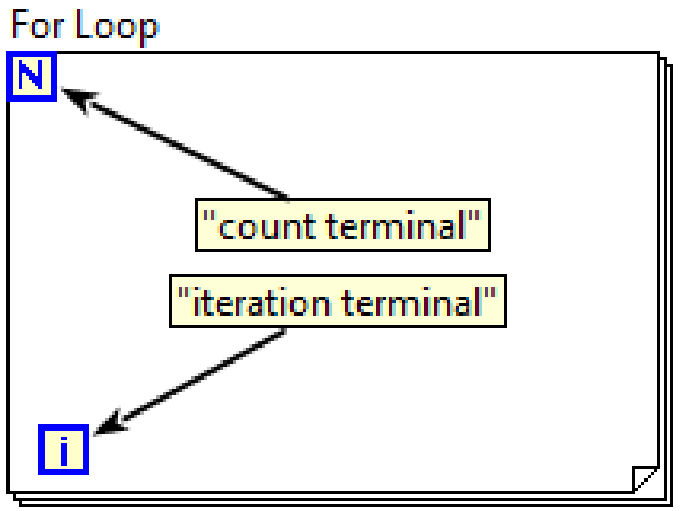


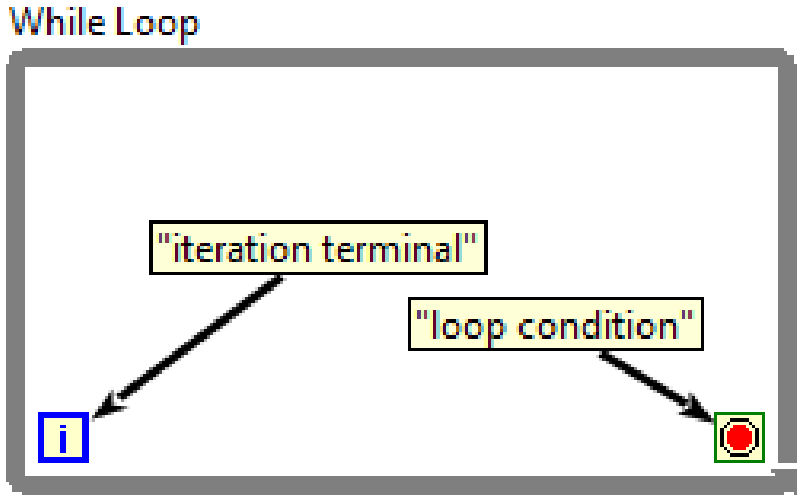
Volunteers?

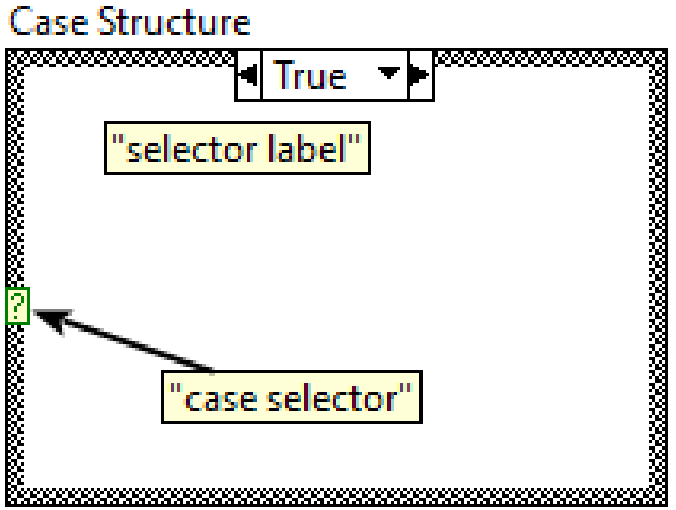
- Create a numeric array control
- Connect it to an “Array Size” node
- Connect the output of that function to an Indicator
- Demonstrate that the display size doesn’t change the array size!

Key “Structures”

- For Loop
- While Loop
- Case Structure

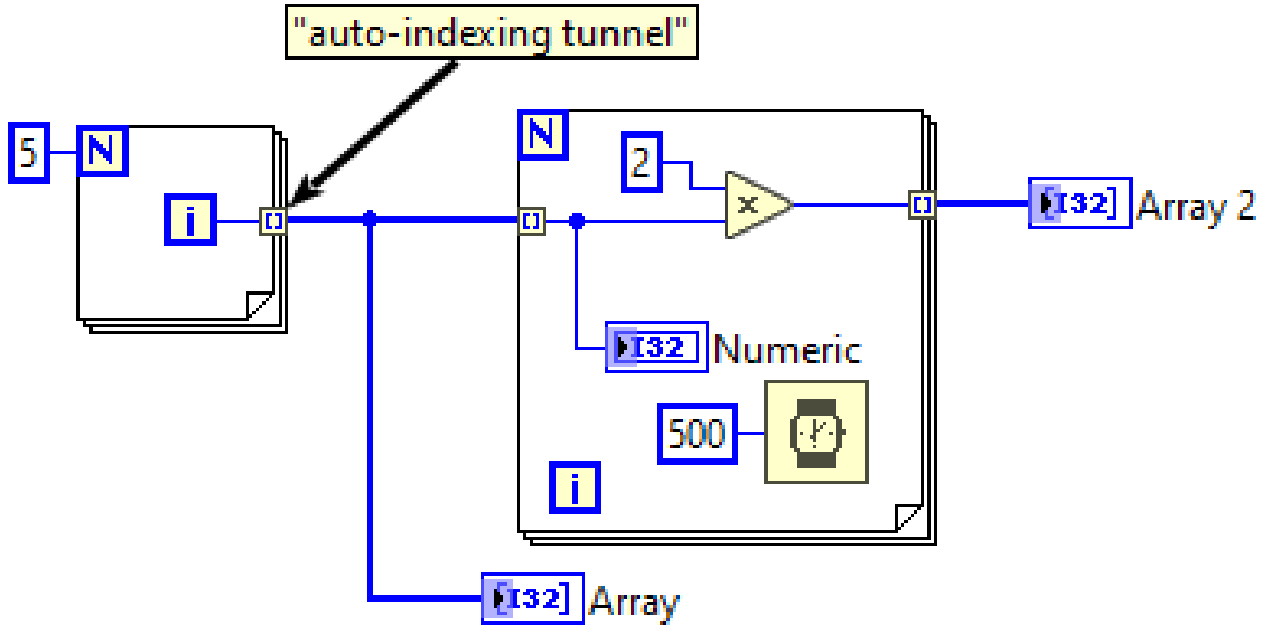






For Loops

- Execute a ‘known’ number of times
- Can automatically iterate over array elements
- Can automatically create arrays with an element per iteration output



Exercise

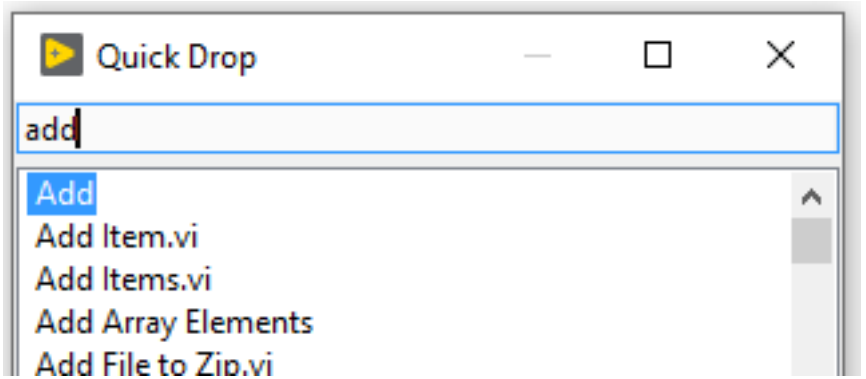
1. Create an array using a For loop, output the values 0 to 10.

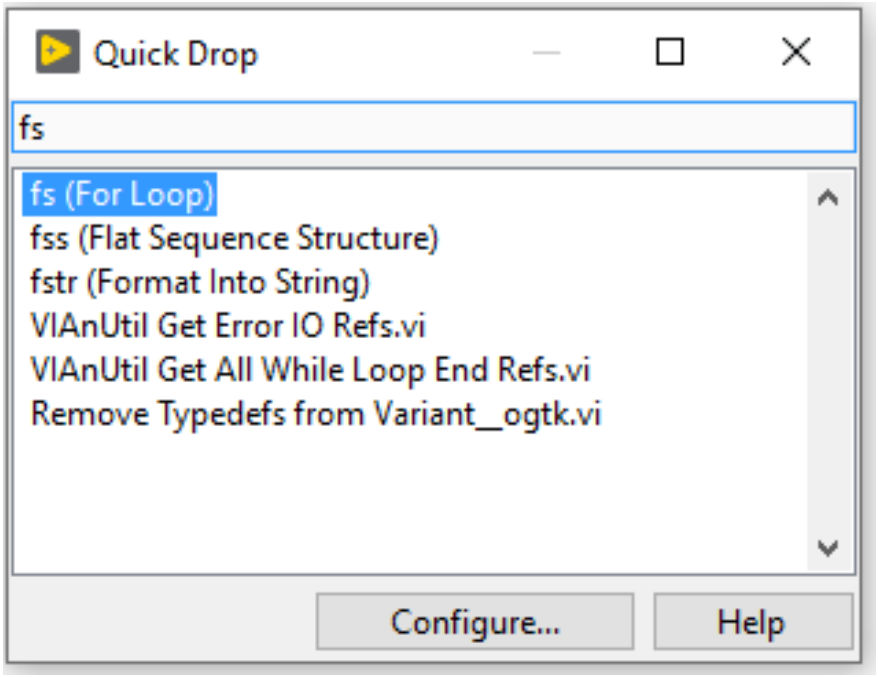
2. Output values 2 to 20.
   a) Use one For loop
   b) Use two For loops

   In each case, put the result in a Numeric Array Indicator

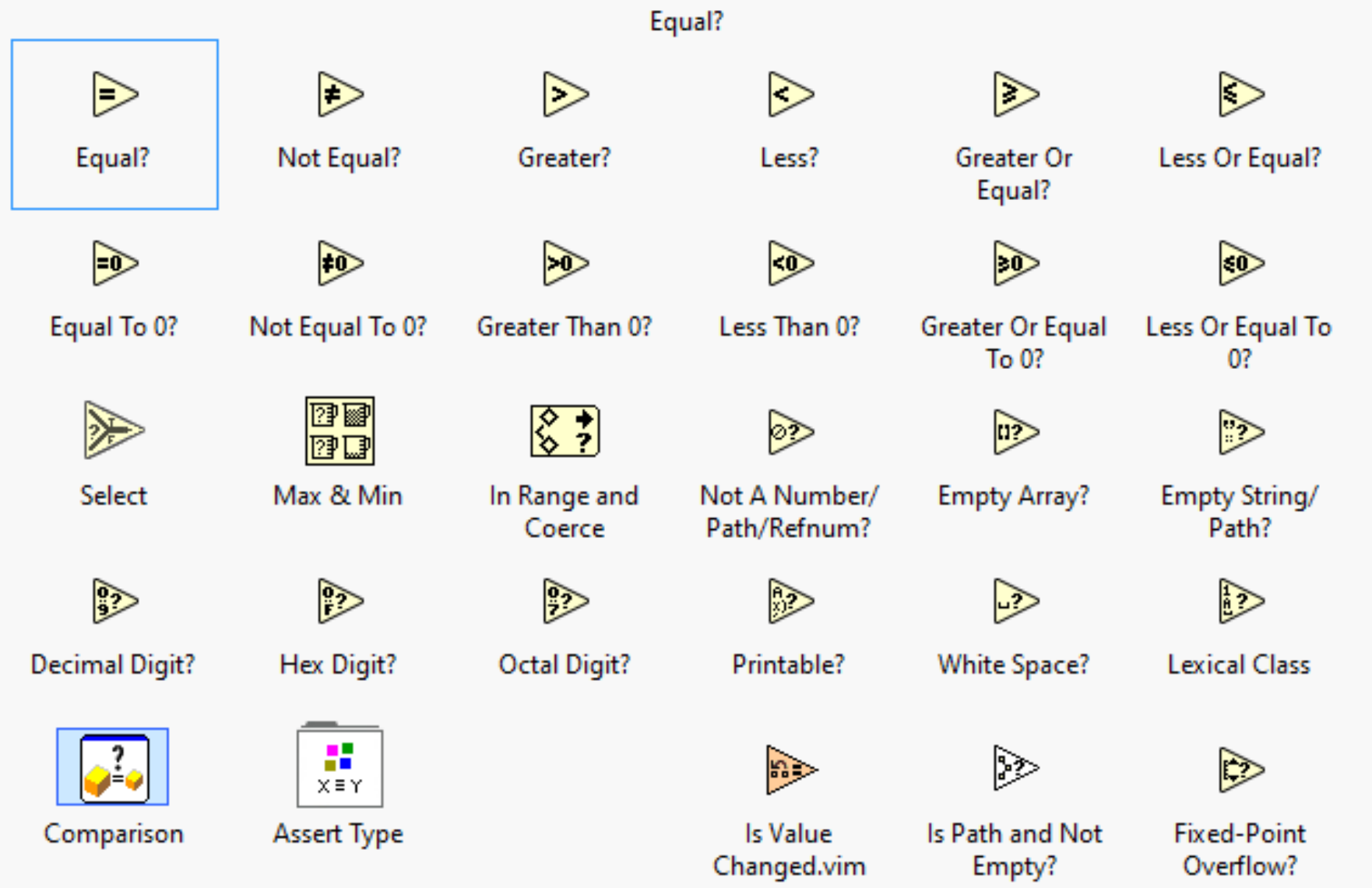
Aside: Quick Drop

- The palettes are quite slow for programming…
- Ctrl + Space brings up “Quick Drop”
- You can type the name of the function you want (or some shortcut letters) and get it more quickly!





Comparisons



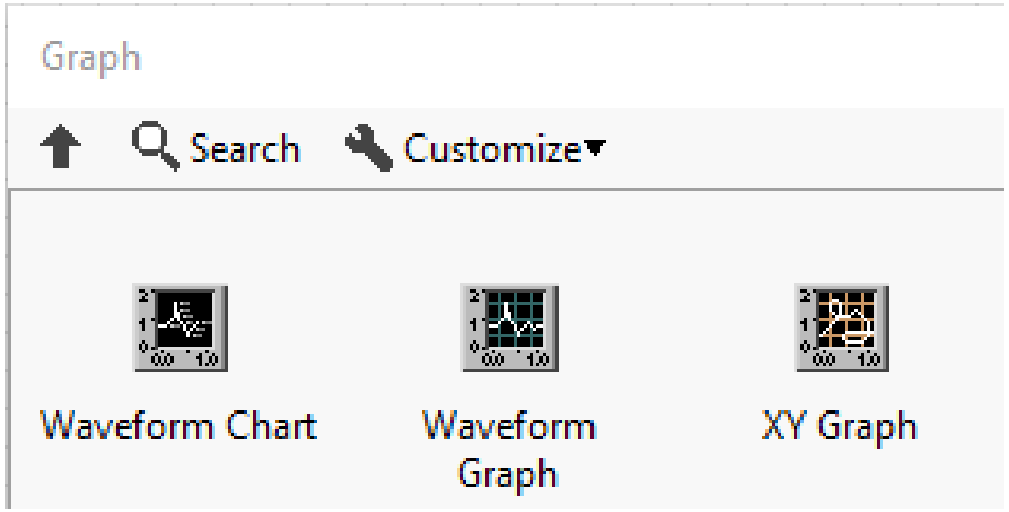
Exercise

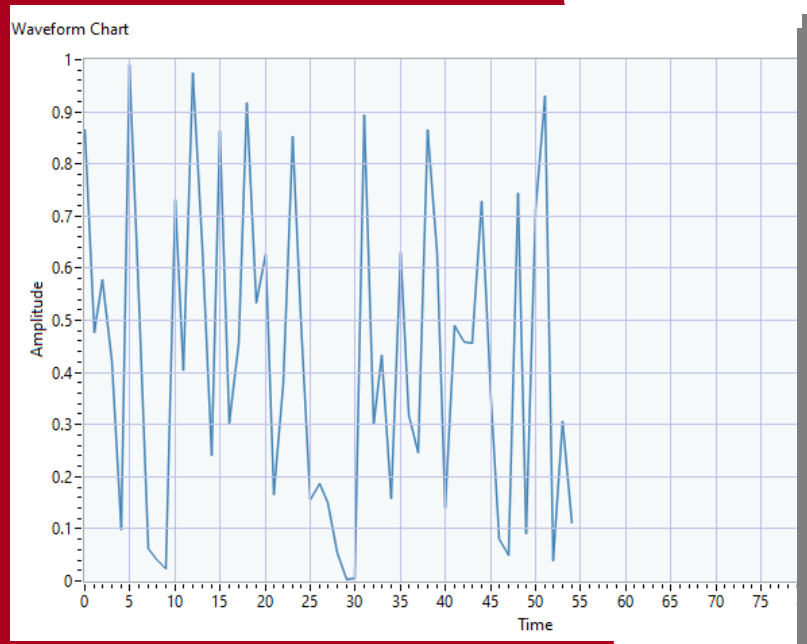
Create an array using a While loop, output the values 0 to 10.

To create an indexing tunnel with a While loop, wire the value out of the side, and then right click on the tunnel, choose “Tunnel Mode” > “Indexing”

Charts and Graphs

- Charts have history
- Graphs display only their current value!
- Charts can take one value at a time





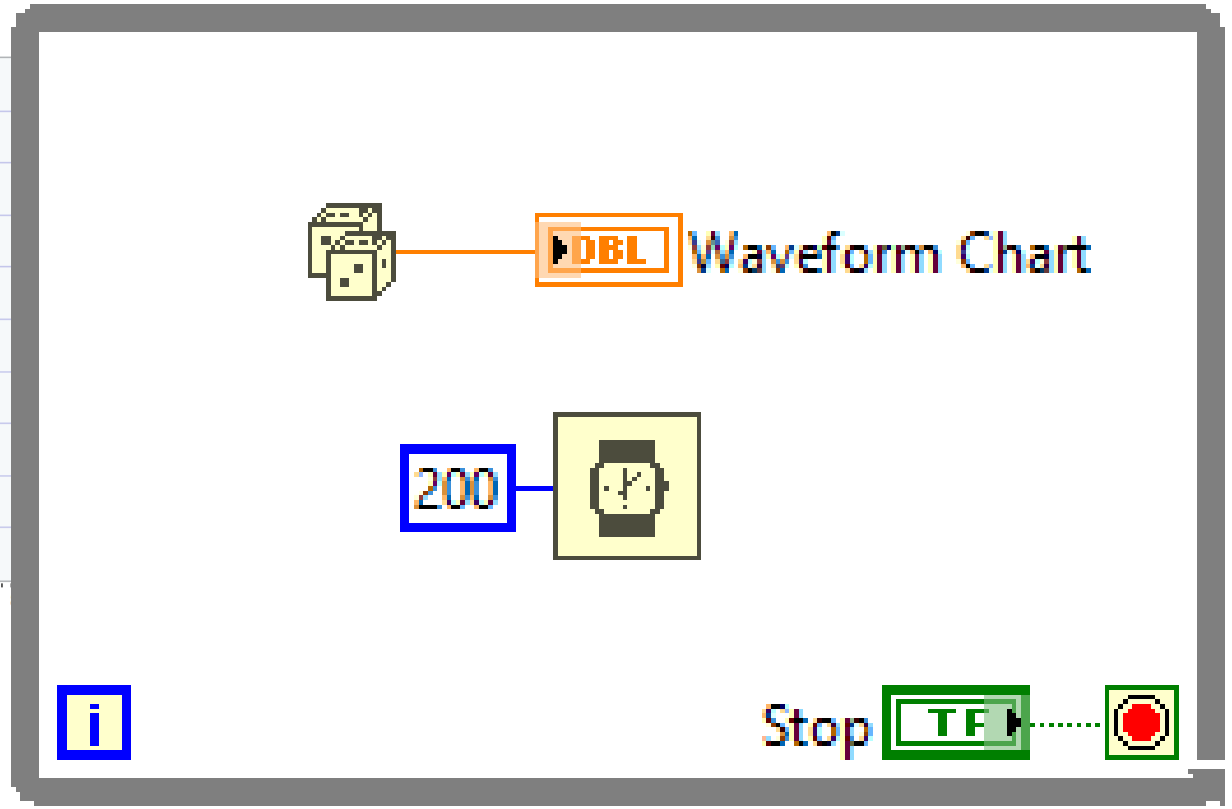


Chart Demo

Chart Exercise

Create a VI like the previous demo

Plot a new value every 500ms - use the Timing palette's "Wait (ms)" node

Have values randomly* distributed between 1 and 5

(*Algorithm Used by the LabVIEW Random Number (0 - 1) Function)

Chart Demo 2
Adding limits