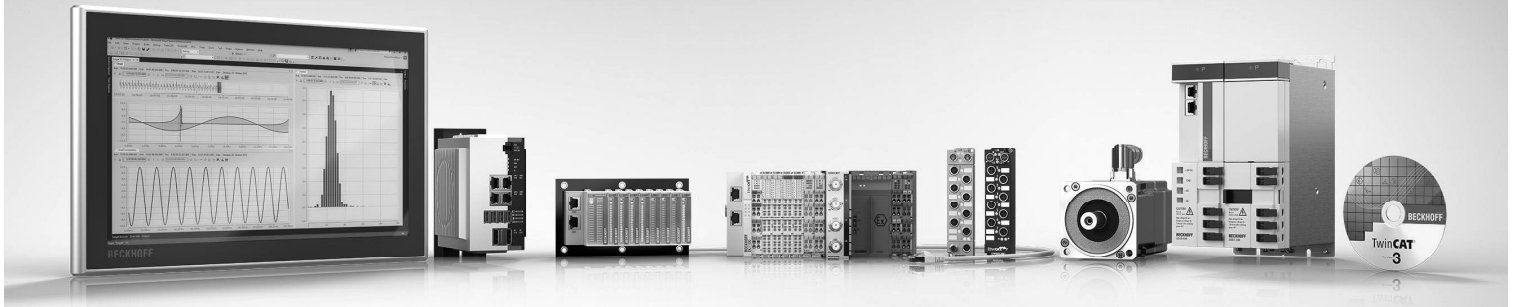


TwinCAT 3 PLC Training



Module 5 – Running in Simulation

Overview of Course

Introduction and Quick Start

- Modules 1 – 4

Programming Basics


- **Modules 5 – 13**

Diagnostics and Hardware

- Modules 14 – 16

5. **Running in Simulation**
6. Introduction to IEC61131-3
7. Programs
8. Function Blocks
9. Functions
10. Conditions
11. Structures and Arrays
12. Loops
13. Exercise

5.1 Adding a Visualization


In Module 3, we saw that it was possible to edit the values of variables by queueing up a change, then clicking on the  Write Values button.

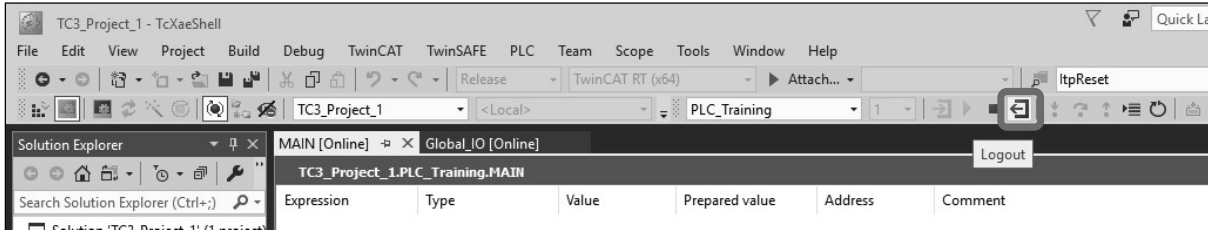
If we are going to be running for extended periods in Simulation, it's worth spending a little extra time adding a visualization to control the variables.

This allows us to simulate the inputs and check the outputs that our code is generating are as we expect.

5.1 Adding a Visualization

BECKHOFF

Before we start, we will need to ensure we're not online with the PLC by clicking on the  Logout button. The PLC will continue to run in the background.

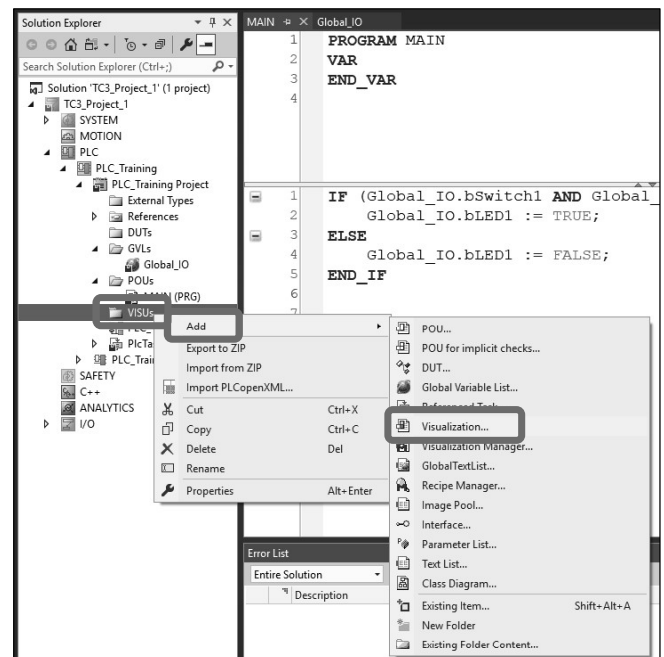


5.1 Adding a Visualization

BECKHOFF

To add a Visualization

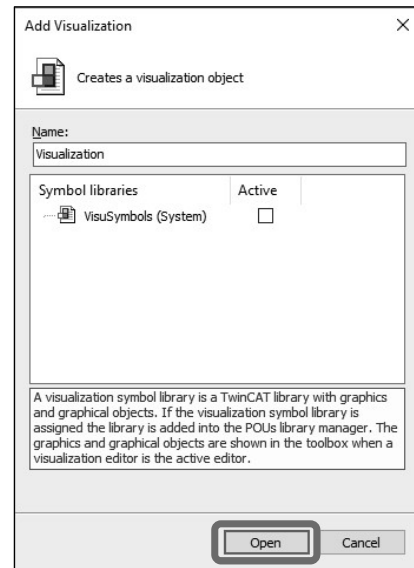
- Right-click on the VISUs folder,
- Select Add → Visualization...



5.1 Adding a Visualization

BECKHOFF

Accept the default name in the Add Visualization wizard that pops up, and click Open.

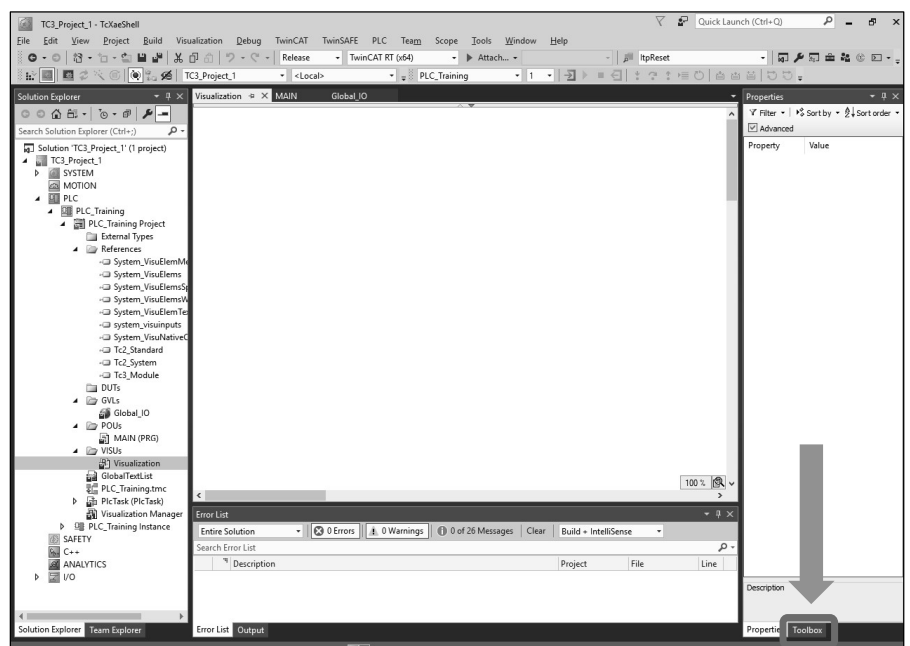


5.1 Adding a Visualization

BECKHOFF

The new Visualization opens automatically, with a blank canvas.

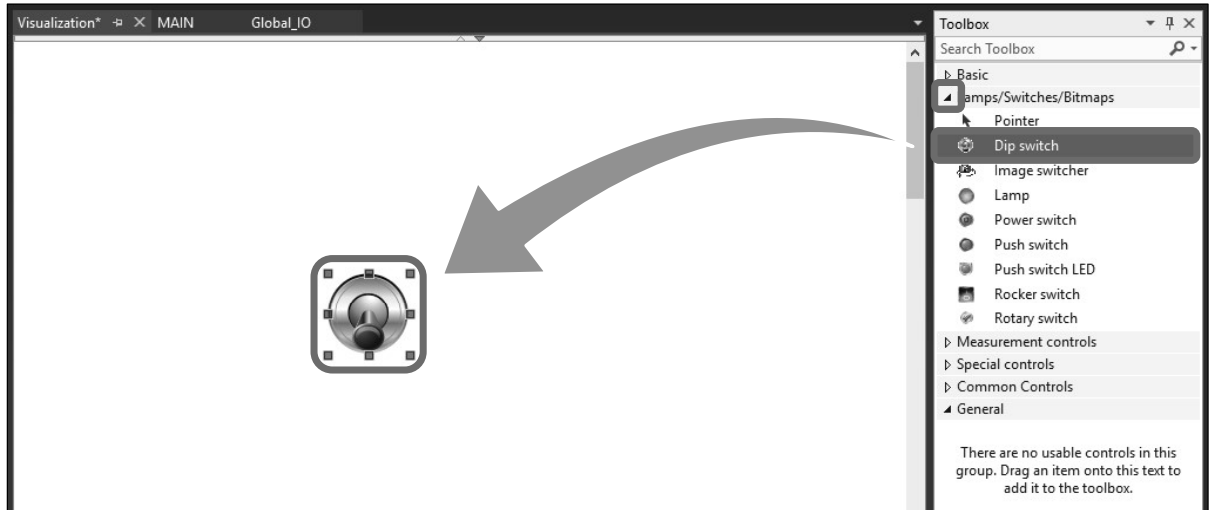
Open the Toolbox by selecting the tab in the bottom right-hand corner of the TcXAEShell window.



5.1 Adding a Visualization

BECKHOFF

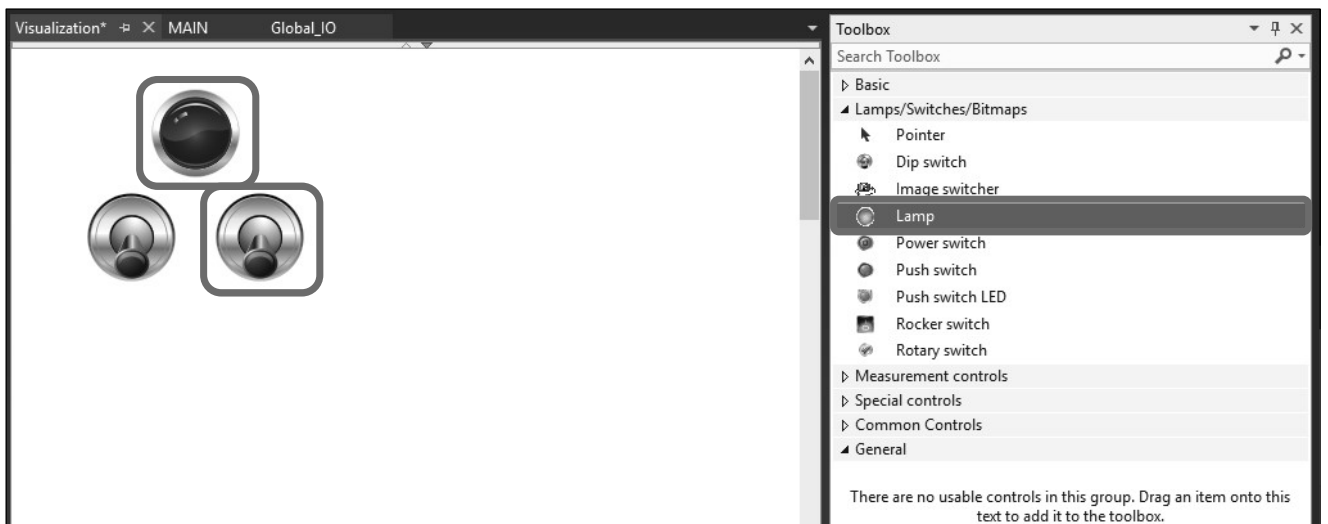
Expand the Lamps/Switches/Bitmaps collection in the toolbox and drag a Dip Switch element into the canvas.



5.1 Adding a Visualization

BECKHOFF

Drag a second Dip Switch and a Lamp onto the canvas and arrange as shown below.

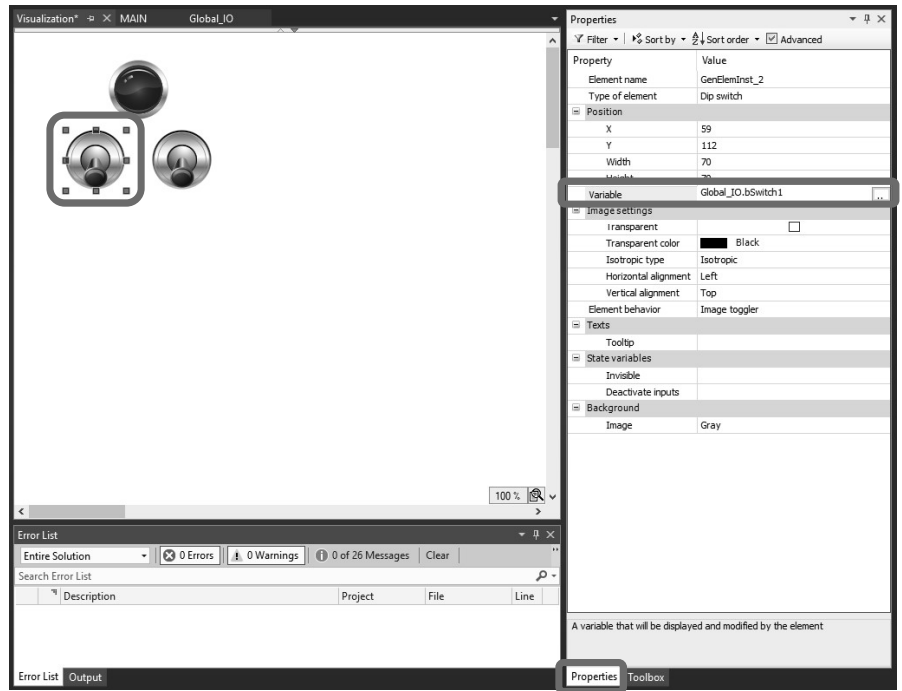


5.1 Adding a Visualization

BECKHOFF

Next step is connect the switches and lamp to the appropriate PLC variables.

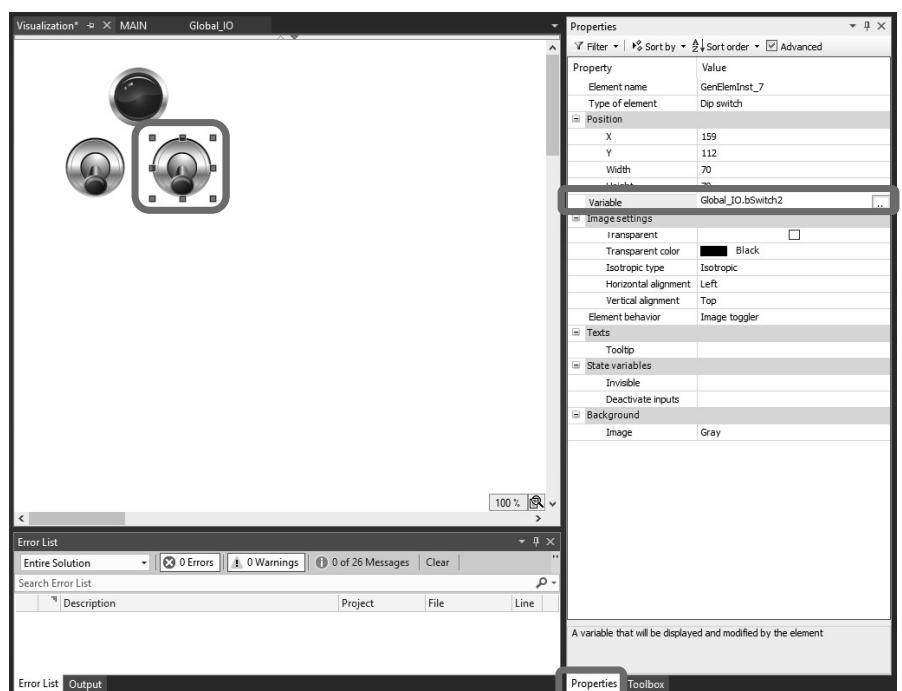
- Select the left-hand Dip Switch in the canvas, then go to the Properties window.
- Set the property called "Variable" to Global_IO.bSwitch1



5.1 Adding a Visualization

BECKHOFF

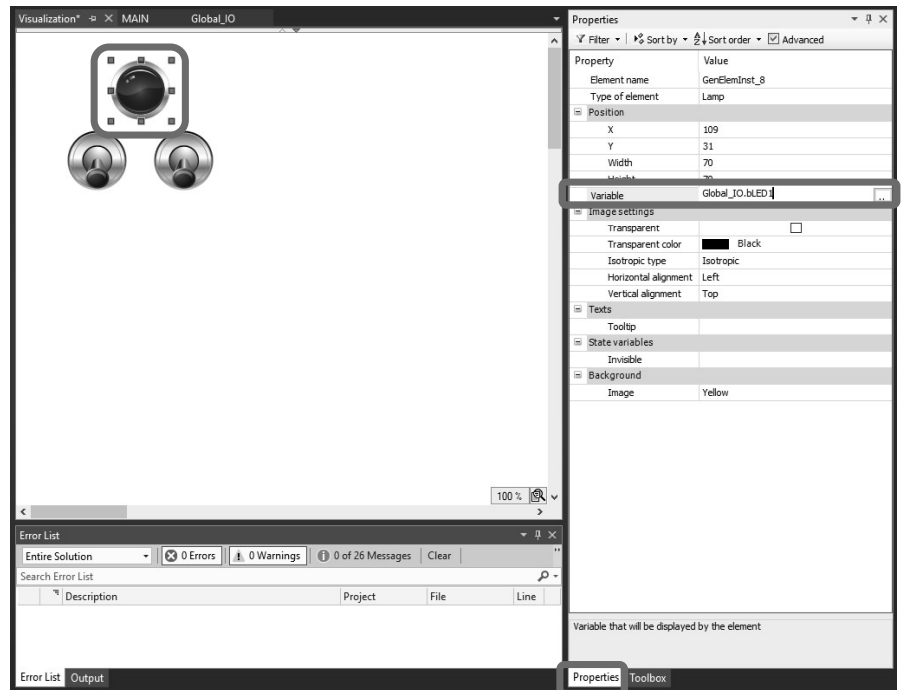
- Select the right-hand Dip Switch in the canvas, then go to the Properties window.
- Set the property called "Variable" to Global_IO.bSwitch2



5.1 Adding a Visualization

BECKHOFF

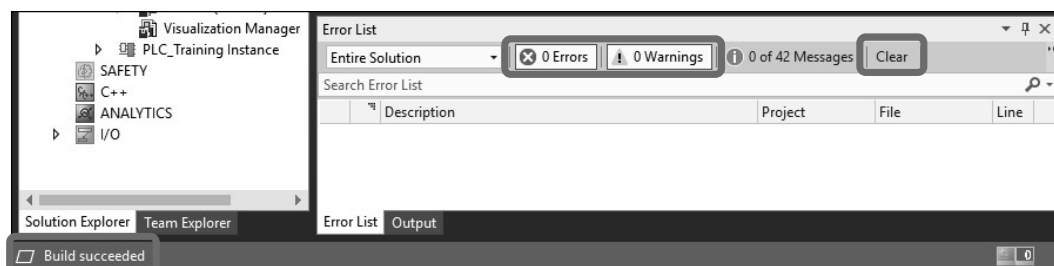
- Select the Lamp in the canvas, then go to the Properties window.
- Set the property called “Variable” to Global_IO.bLED1



5.1 Adding a Visualization


BECKHOFF

Build your modified project using the keyboard shortcut Ctrl+Shift+B, and check for errors in the Error List at the bottom of the TcXAEShell window.

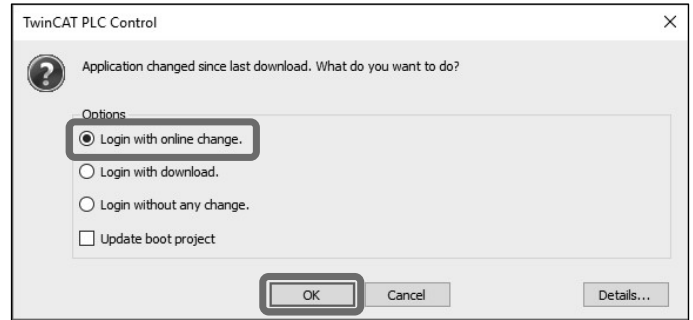


5.1 Adding a Visualization

BECKHOFF

Log in to the PLC by using the  Login button in the toolbar.

This time, because there is already a PLC project running on the PLC, you will be prompted to update the running code. Ensure that Login with online change is selected and click OK.



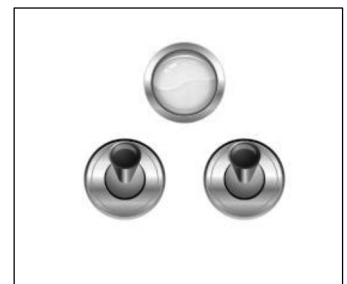
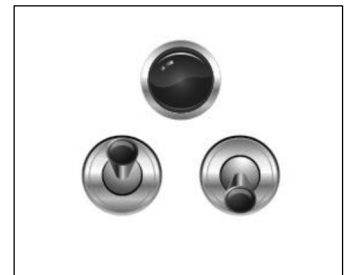
5.1 Adding a Visualization

BECKHOFF

The visualization becomes active after logging in, and allows you to control the connected variables as though you were using a hardware digital input.

Toggle the two Dip Switches and observe the behaviour of the Lamp.

Also check the values of the variables by opening your MAIN program after changing the position of the Dip Switches.



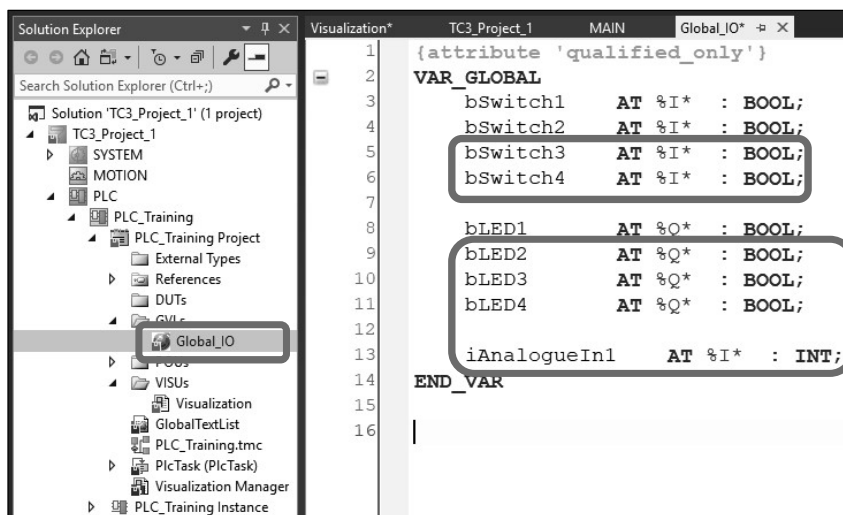
5.1 Expanding the simulated I/O

BECKHOFF

In the following Course Modules we'll make use of a few additional digital inputs and outputs.

After logging out of the PLC, please add the highlighted variables to the Global_IO Global Variable List.

Once you've added these, please build your solution using the Ctrl+Shift+B keyboard shortcut and check that you have no errors.



5.1 Expanding the simulated I/O

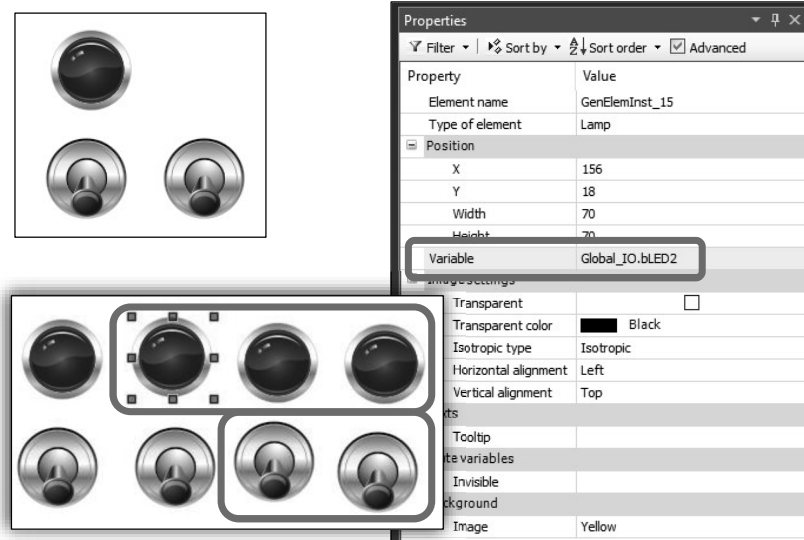
BECKHOFF

Open the Visualization again.

Move the Lamp over to the left to line up with the first Dip Switch.

Then add another two Dip Switches and three Lamps, and connect them to the new variables we've just created.

Don't worry about getting the positioning of each element perfect, we'll do that next using the alignment tools.



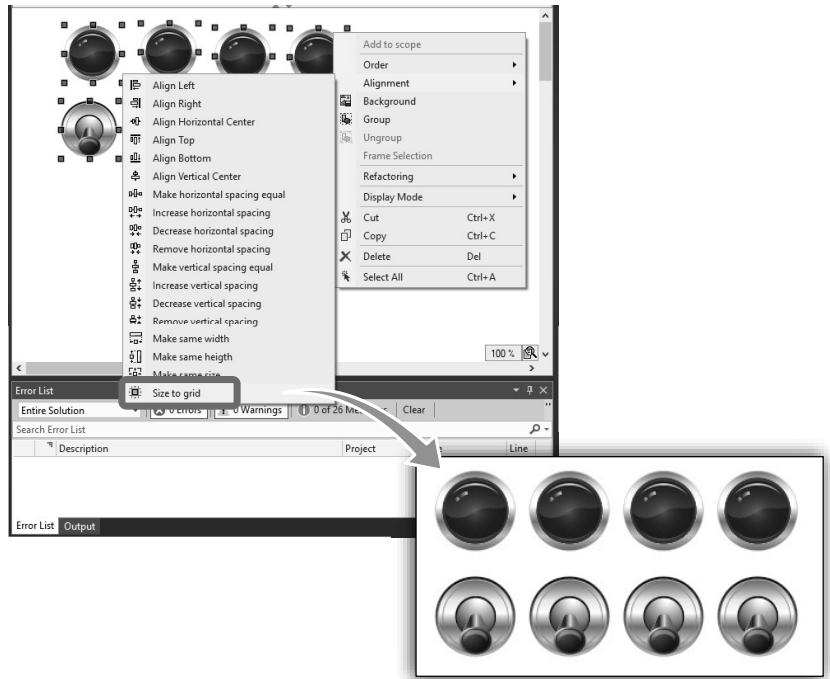
5.1 Expanding the simulated I/O

BECKHOFF

Once all the elements are in their approximate locations, and are linked to the correct variables, we can use some features to make their alignment perfect.

Select all the elements by clicking and dragging a selection box around them, then right click and select Alignment → Size to grid.

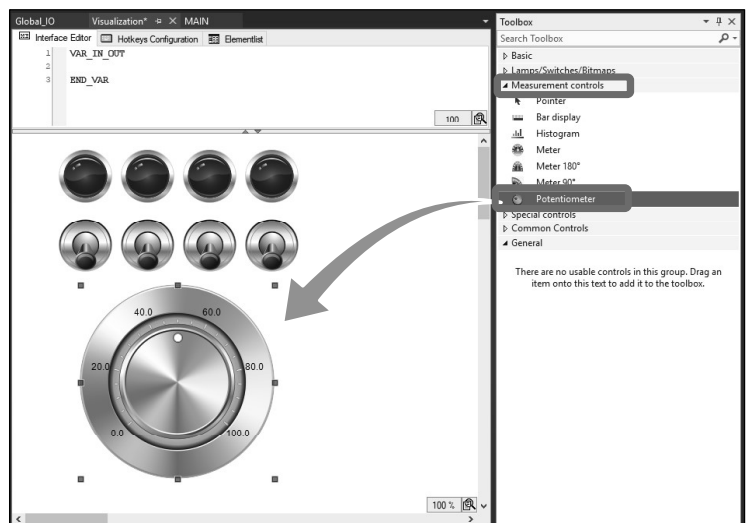
This aligns the elements to the nearest snap point.



5.1 Expanding the simulated I/O

BECKHOFF

In order to simulate the Analogue Input, we can use a Potentiometer, which can be found under the Measurement Controls collection in the toolbox.




5.1 Expanding the simulated I/O

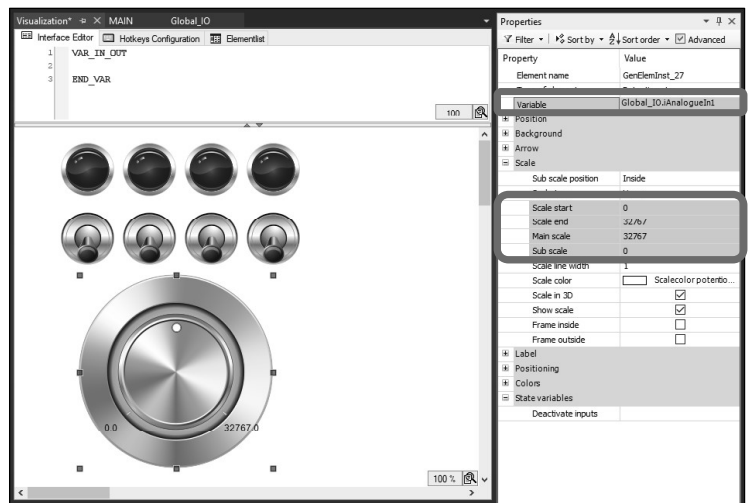
BECKHOFF

Set the following properties:

- Variable: Global_IO.iAnalogueIn1
- Scale Start: 0
- Scale End: 32767
- Main Scale: 32767
- Sub Scale: 0

These values will be explained in Module 9.

Build your solution, check for any errors, then  Login and check that the correct variables are linked to the visual elements.



Module 5 Recap

BECKHOFF

- Adding a visualization makes running in simulation much easier.
- Hardware inputs and outputs can be represented as buttons, switches, lamps, indicator gauges and sliders, and for the remainder of the course we will treat these as though they are hardware-based inputs.
- These visualizations can also be used to form a simple HMI for normal operation of the machine, running full screen on the Operators Interface display.