

Macros and Applications

Macros and Applications

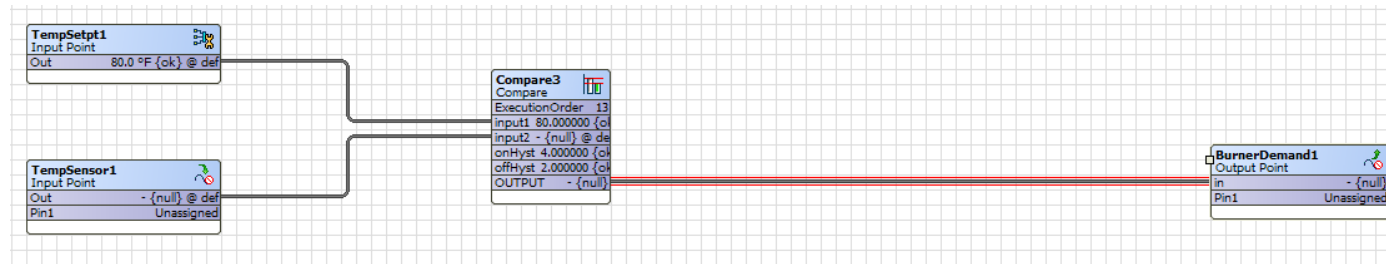
Macros and Applications are blocks containing logic that the Designer creates. It can be very useful to “package” certain logic that is used repeatedly across SLATE devices so that the same logic doesn’t have to be recreated from scratch each time.

An Application may contain “real” I/Os such as Binary Inputs/Outputs, Analog Inputs/Outputs, Software Inputs/Outputs... any interface to the outside world. An application may be a stand-alone block in your wire sheet or it can be integrated with other blocks on the same wire sheet.

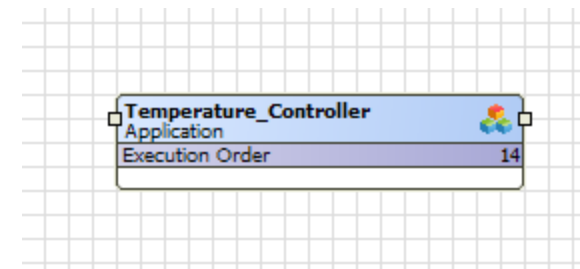
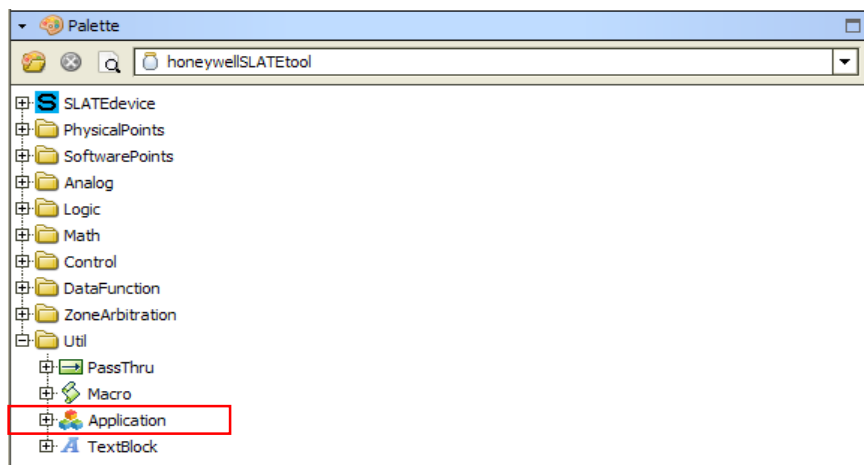
A Macro is similar to the Application but it can not contain any I/Os to the outside world. Macros generally contain only the logic portion and **MUST** be integrated into the wire sheet (at a minimum to get inputs and outputs) as it can not be a functioning stand-alone block on the wire sheet.

Macros and Applications

Let's look at our completed wire sheet and create an application from existing logic. A common set of blocks is the temperature controller.

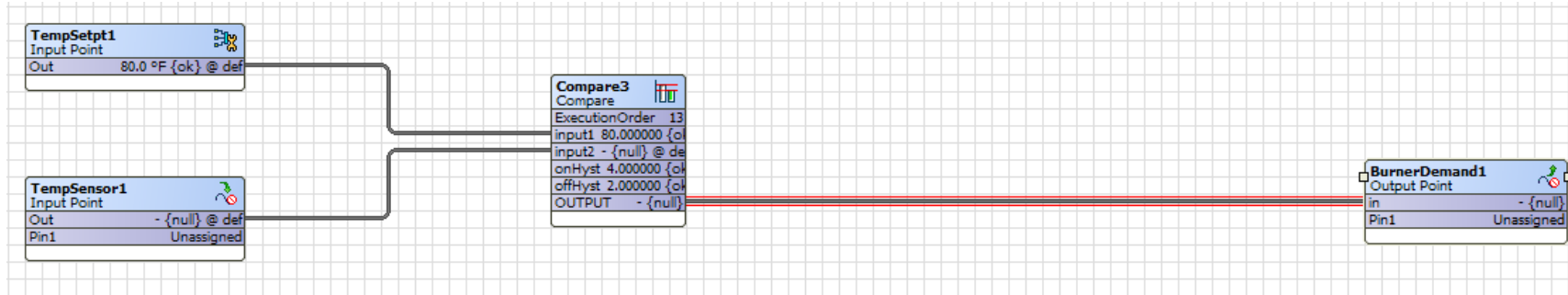


Begin by selecting and dragging an Application block on the wire sheet. The Application block can be found in the “Util” folder in the SLATE Palette. Name it “Temperature_Controller”

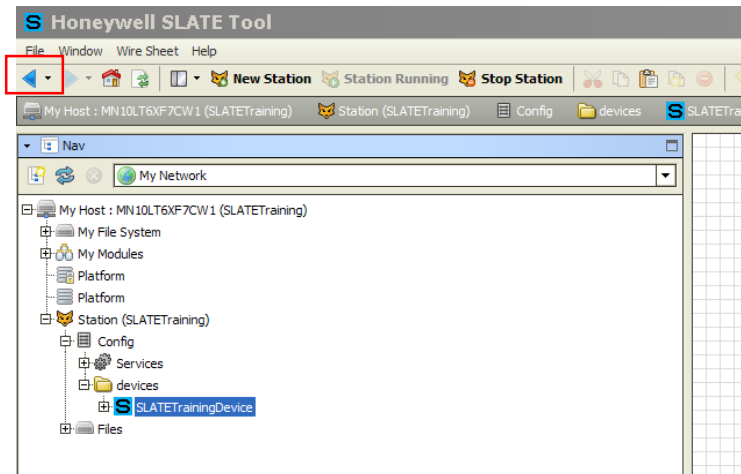


Macros and Applications

Next double click on the block header to access the wire sheet within the Application block and recreate the temperature controller blocks.

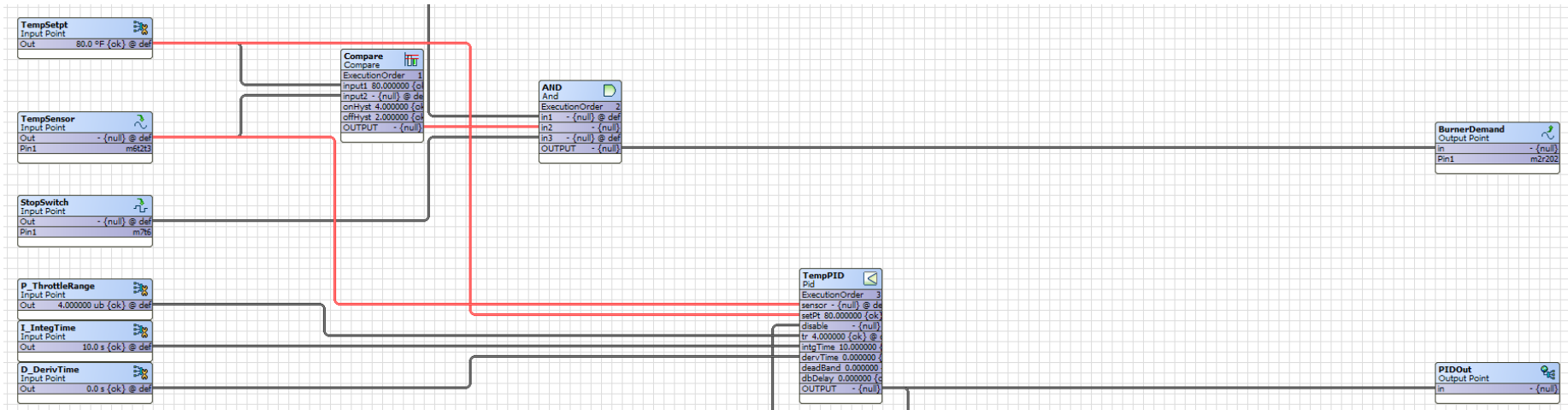


Use the back arrow in the top Niagara AX menu to return to the main wire sheet.



Macros and Applications

The result now is the reduction of 4 blocks to one Application block named “Temperature_Controller” which is a stand alone block on the main wire sheet. On this wire sheet however, we must integrate the “Temperature_Controller” block with additional blocks on the wire sheet which must access information from within the Application.



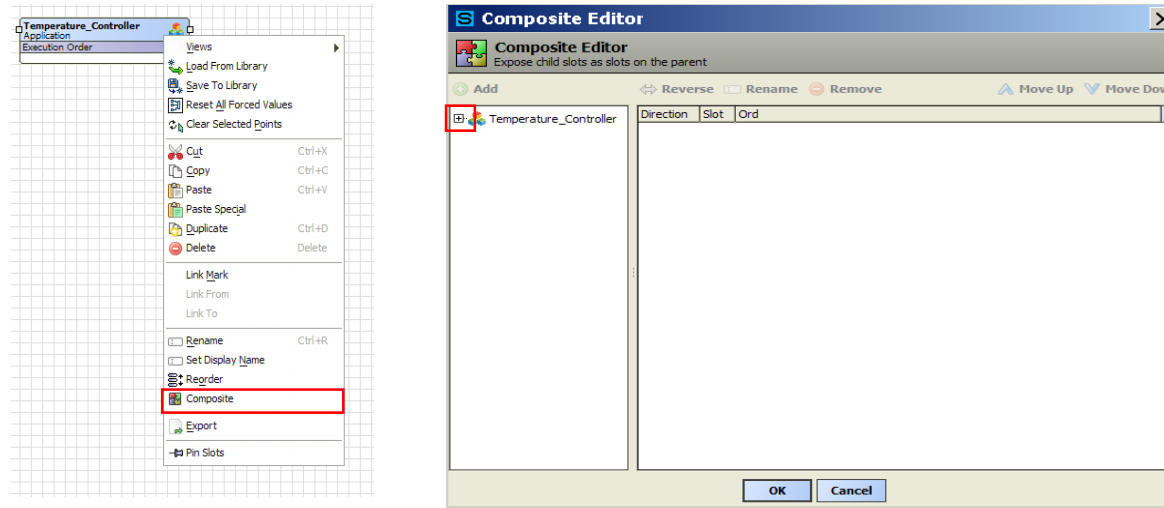
Let’s update our Application block so we can tap into it for integration into the wire sheet.

Right click the “Temperature_Controller” block header and select Composite.

Macros and Applications

Right click the “Temperature_Controller” block header and select Composite.

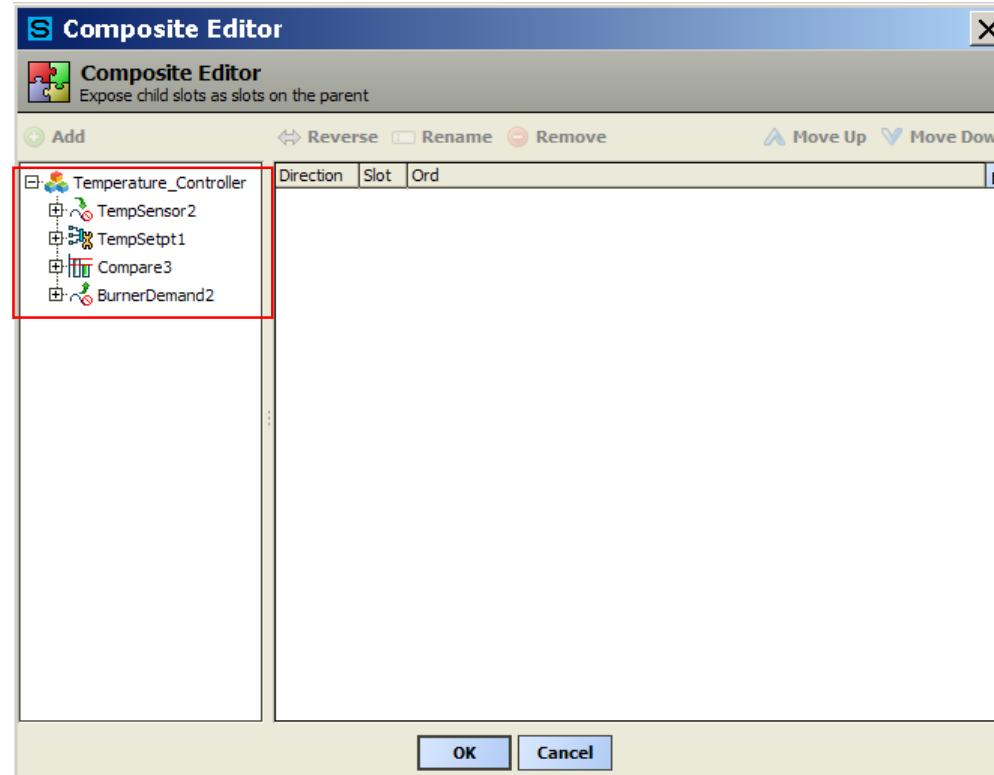
This allows the Application block to be accessed at various points within.



Expand “Temperature_Controller” within the Composite Editor (by clicking on the “+” to view all its components (blocks)).

Macros and Applications

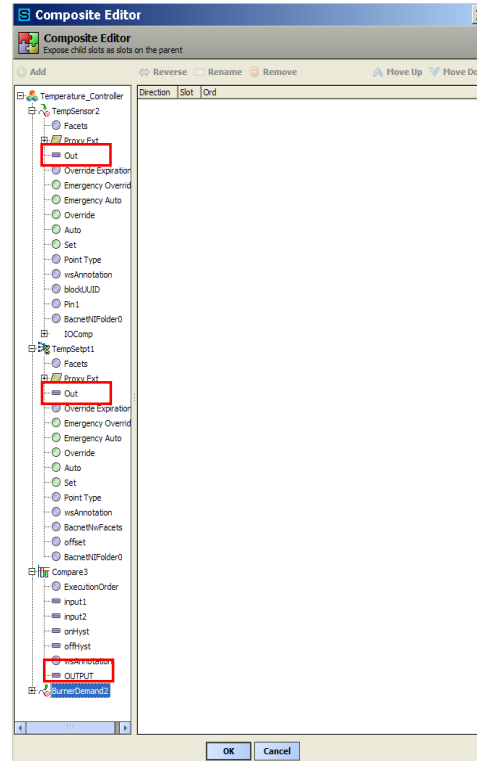
All the Application blocks are now visible.



In order to integrate this application into the wire sheet, we must tap into the “TempSensor”, “TempSetpt” and the output from the Compare block. We could also put the “BurnerDemand” block back on the main wire sheet. Expand each of these block and locate the “OUT” slot in each.

Macros and Applications

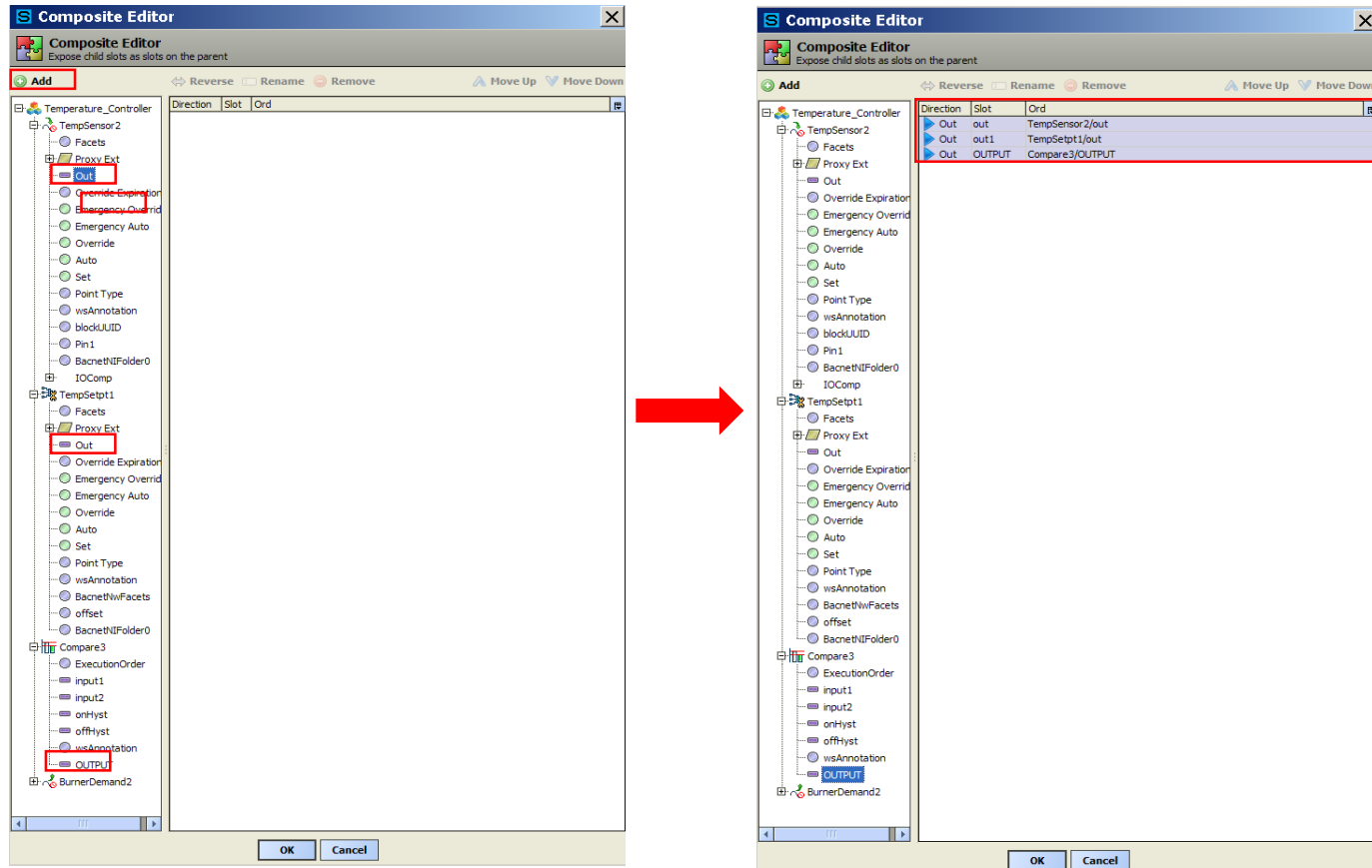
Expand each of these block and locate the “Out/OUTPUT” slot in each.



Left click on each and click the “Add” button at the top of the window.

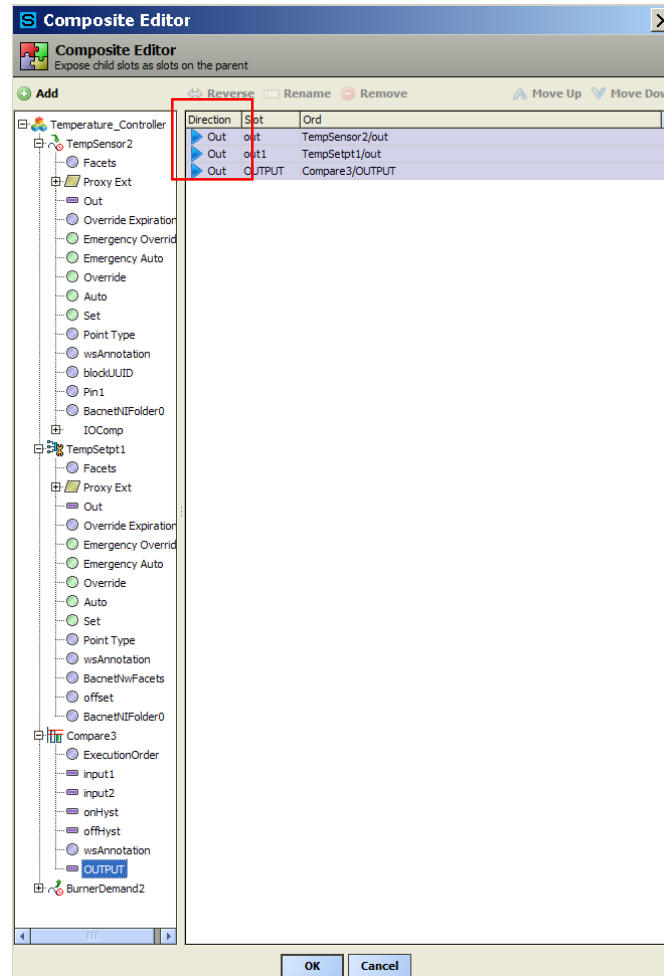
Macros and Applications

Left click on each and click the “Add” button at the top of the window.



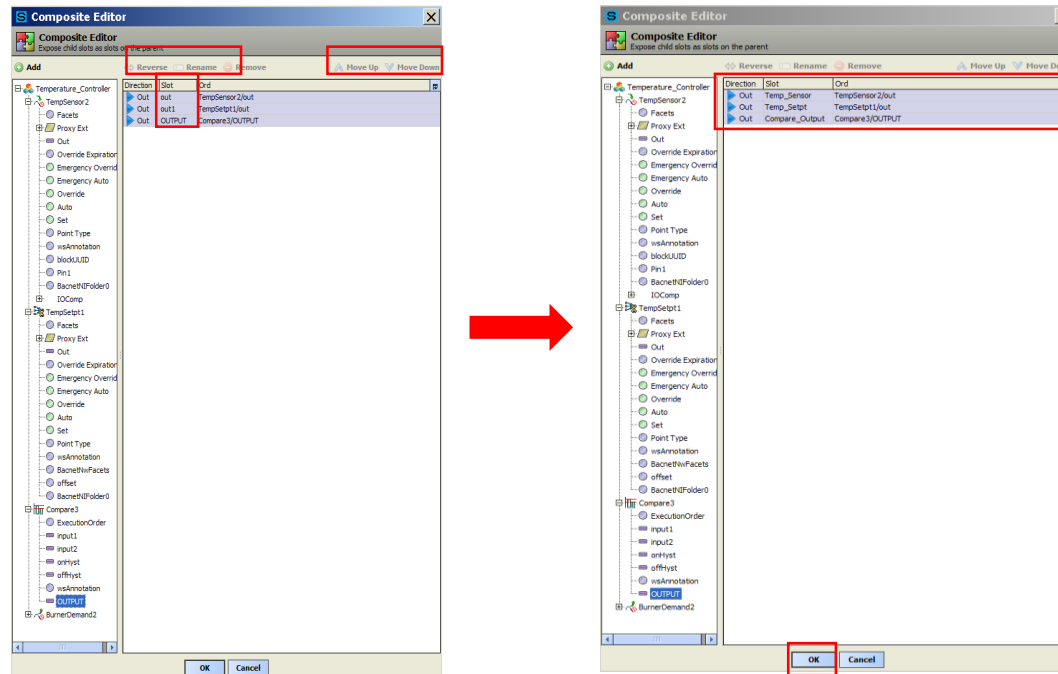
Macros and Applications

All the interfaces for the “Temperature_Controller” are outputs so the data in the Direction column can be left unchanged.



Macros and Applications

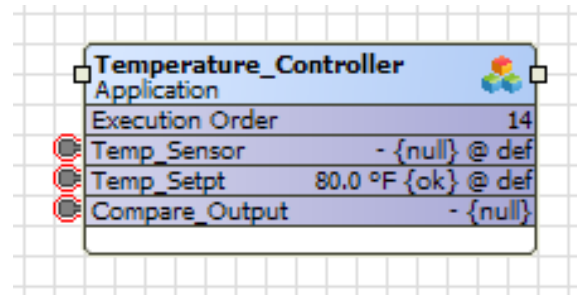
You can rename the slot name by highlighting the slot to be renamed and clicking the “Rename” button above. Let’s rename the outputs as: “Temp_Sensor”, “Temp_Setpt”, and “Compare_Output”. You can also switch the order in which they appear in the block by highlighting the slot to be moved and clicking the “Move Up” or the “Move Down” buttons.



Click the “OK” button when finished to return to the main wire sheet.

Macros and Applications

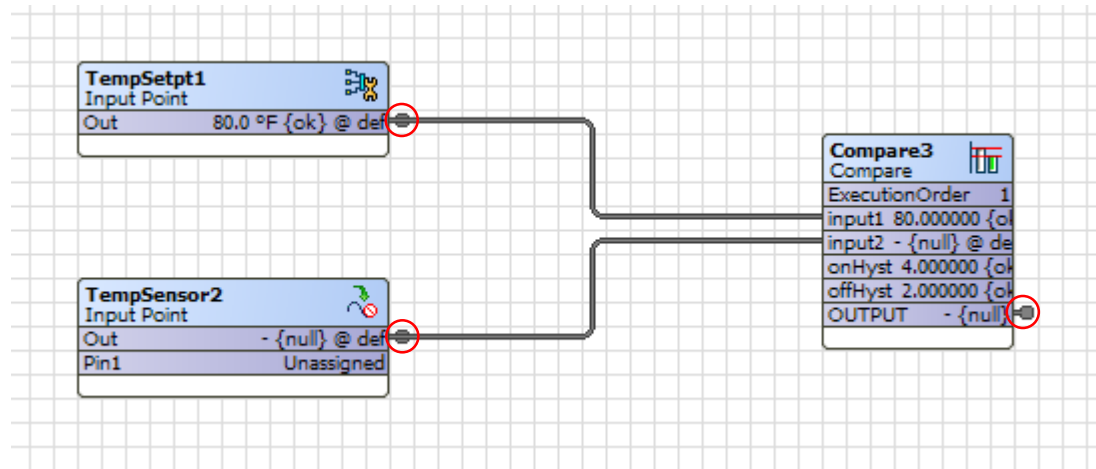
We now have our “Temperature_Controller” Application block with its three outputs. Notice the bolts on the left side of the blocks. This is an indication that these slots are outputs as the bolts occupy the side of the block that would normally receive a link if it were an input.



Since this block also contains the “BurnerDemand” block we should go back into the block and remove the “BurnerDemand” from the Application block. We do this because there is an “AND” block between the Compare block within the Application and the “BurnerDemand”. Double click on the “Temperature_Control” application block to expose the wire sheet and delete the “BurnerDemand” block. To delete the “BurnerDemand” block, right click on the header and select “Delete”.

Macros and Applications

To delete the “BurnerDemand” block, right click on the header and select “Delete”.

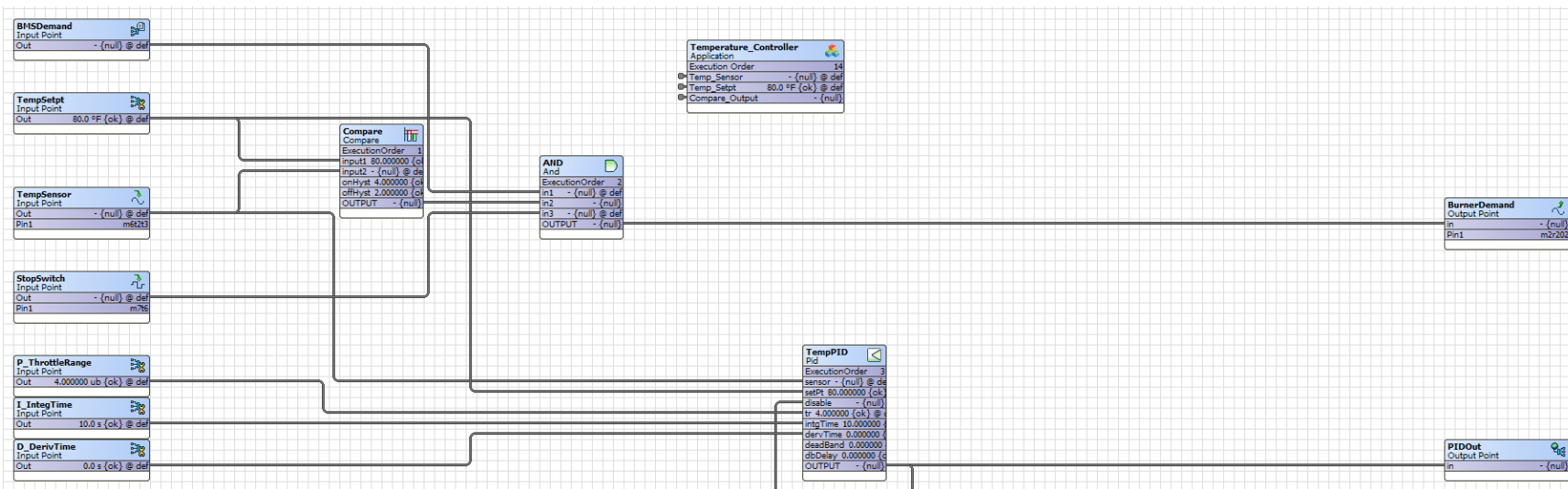


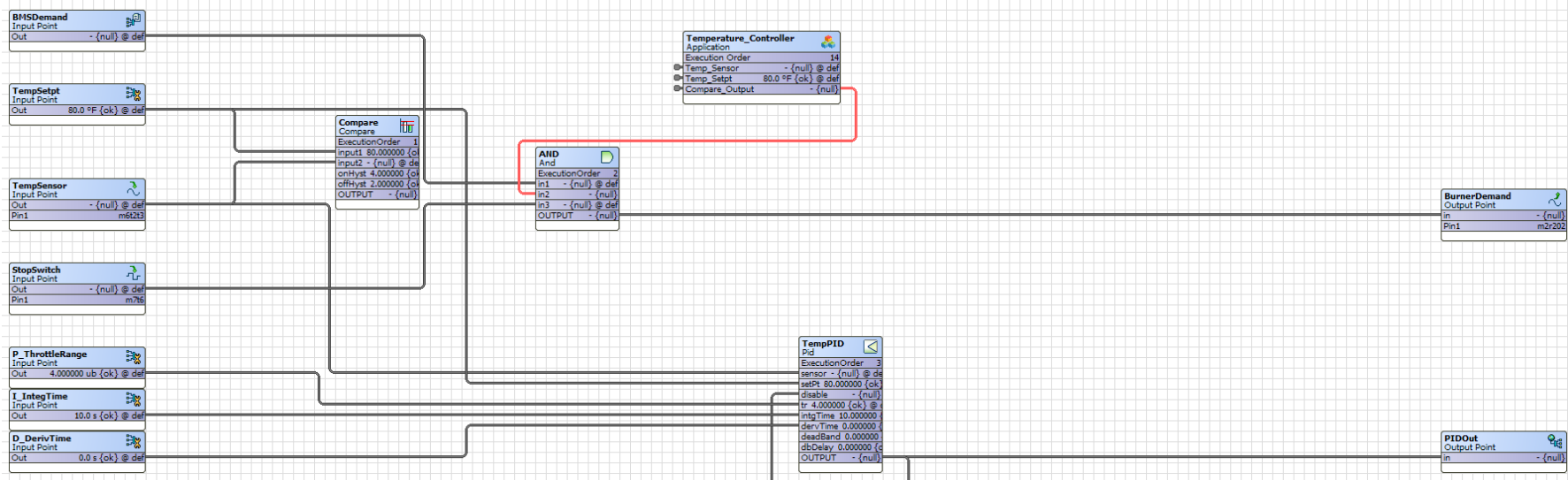
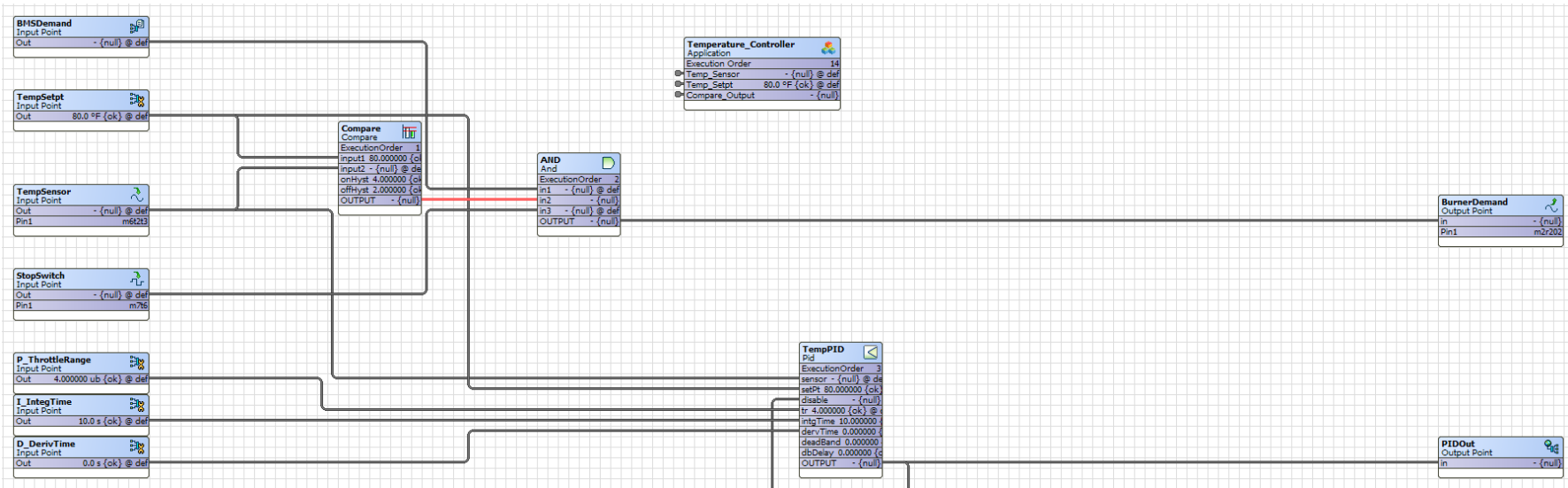
The bolts indicate these points are set up for access. Use the back arrow to return to the main wire sheet.

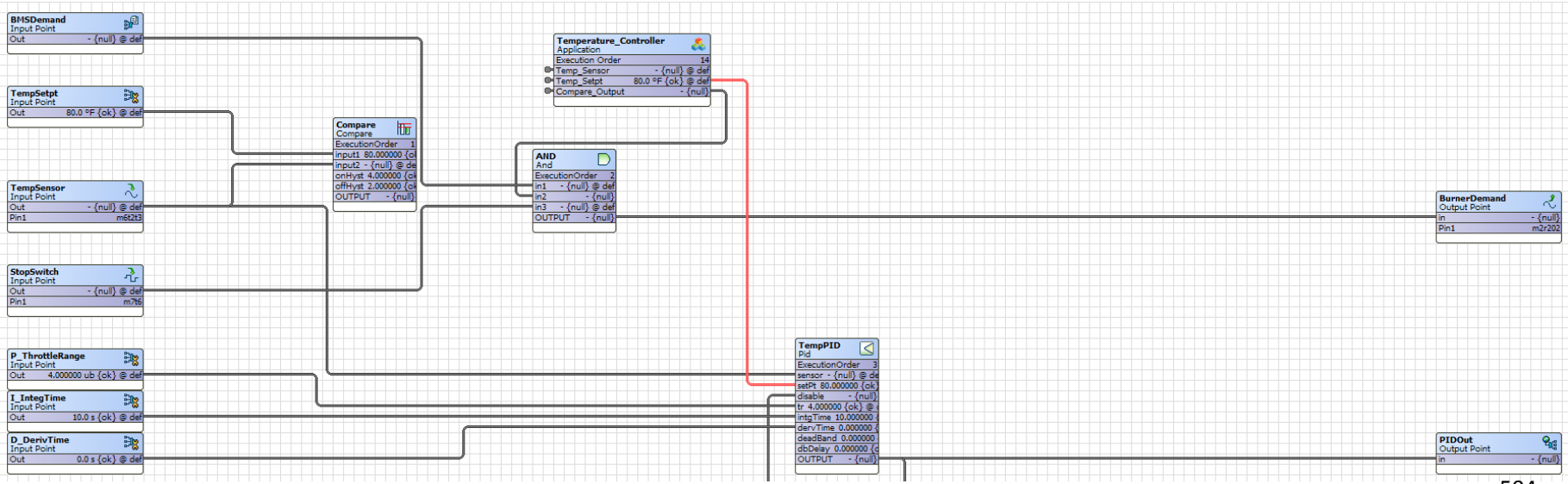
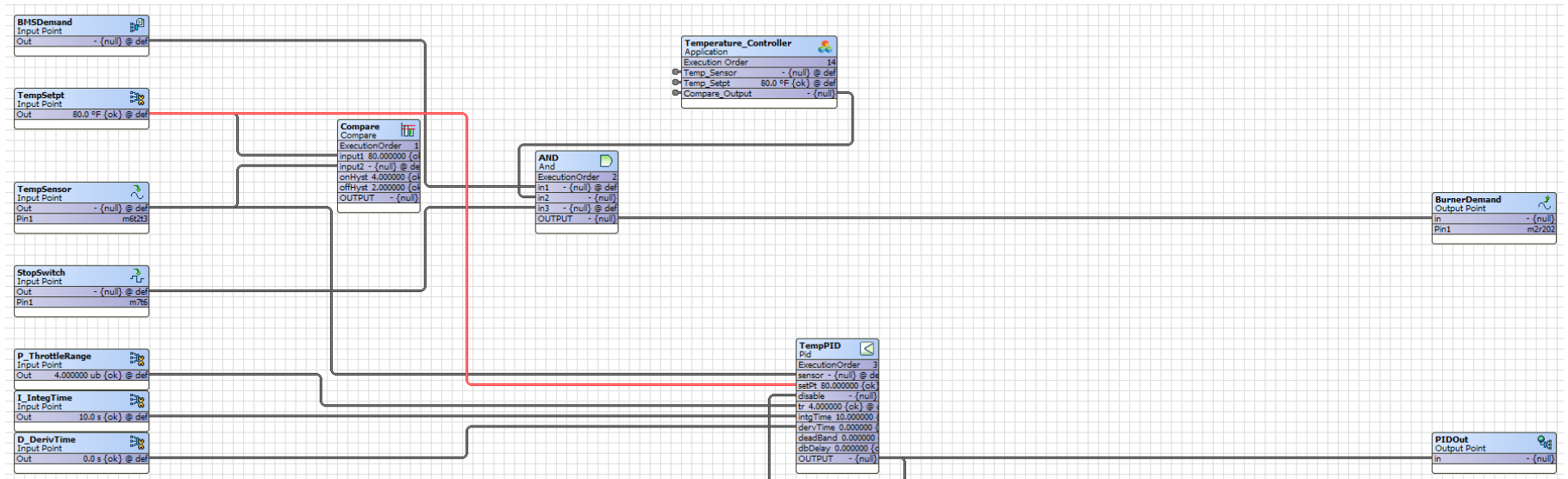
Macros and Applications

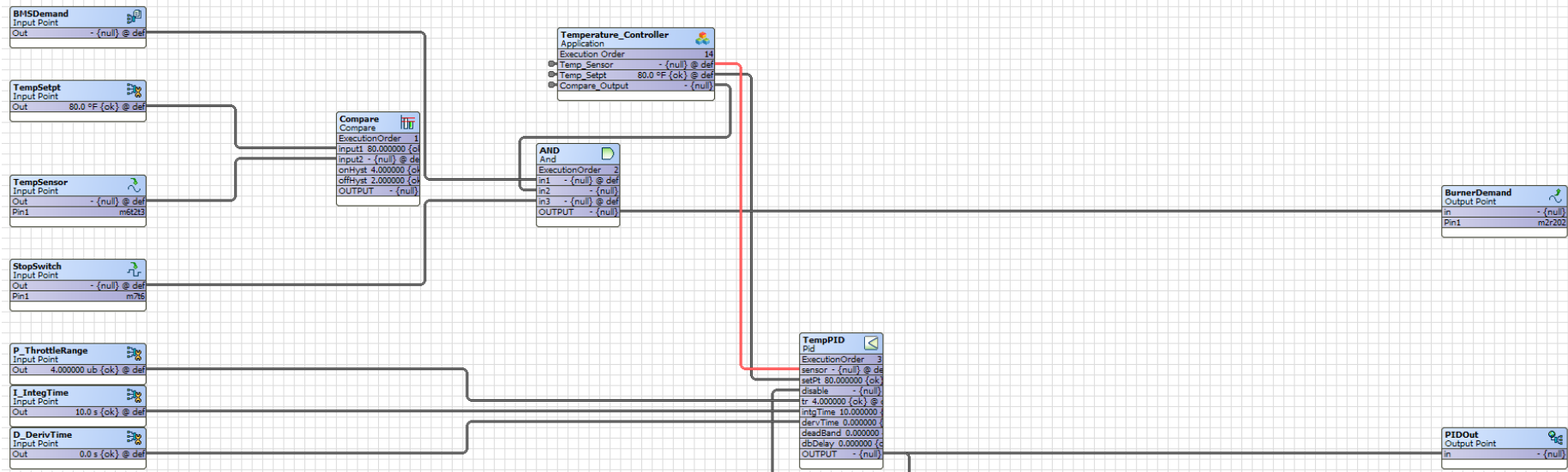
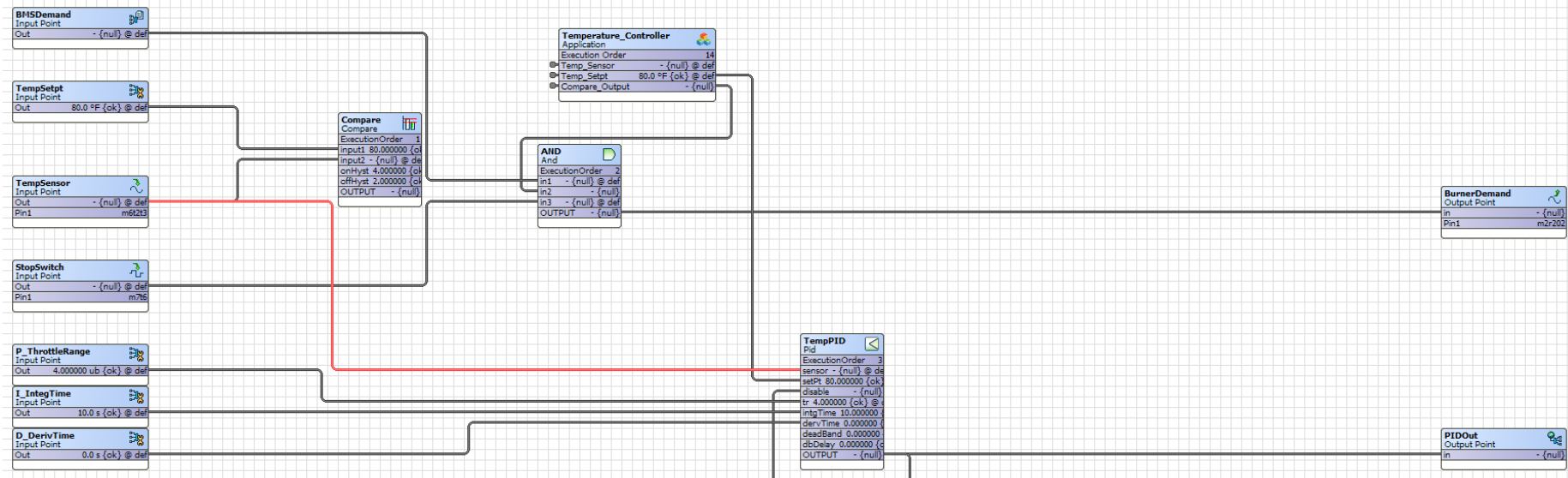
We now integrate the updated “Temperature_Controller” Application block into the main wire sheet.

In order to not lose track of the existing links within the wire sheet, place the Application near the location of the existing temperature controller blocks and remove one link at a time from the blocks while adding the same link to the Application block.



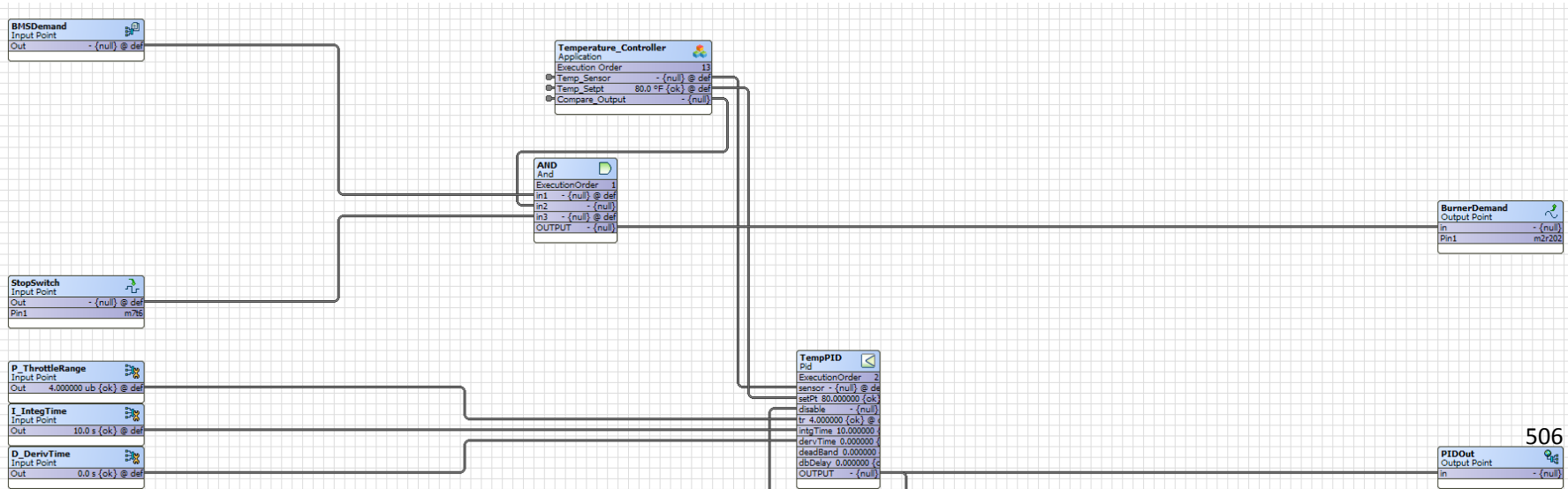
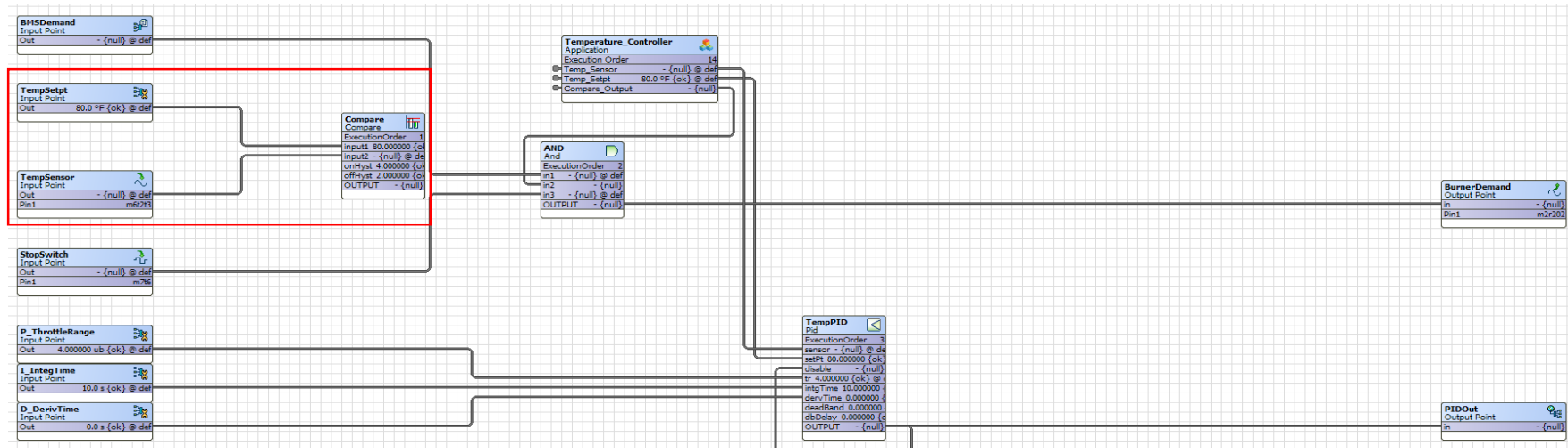






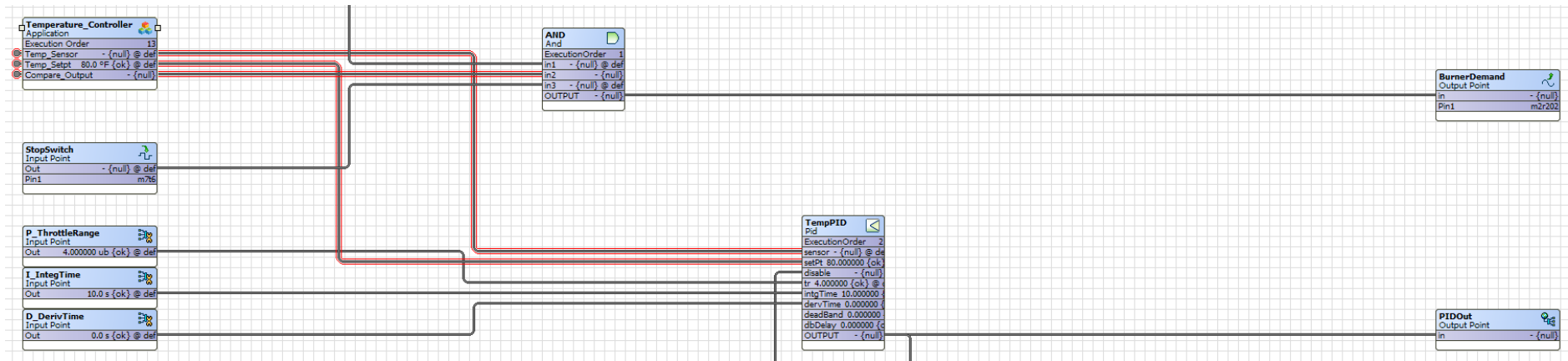
Macros and Applications

Drag a box around the “TempSetpt”, “TempSensor” and Compare blocks and delete them from the main wire sheet.



Macros and Applications

Reposition the “Temperature_Controller” Application block on the wire sheet

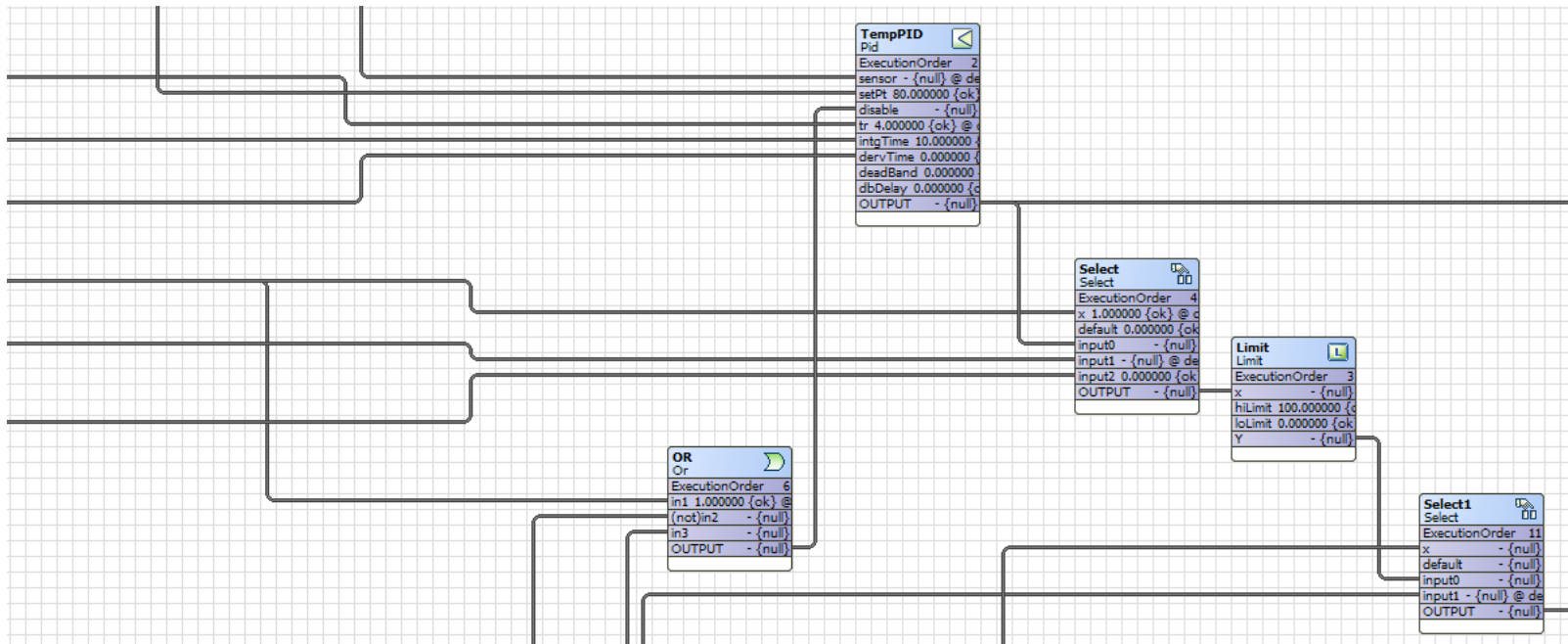


Make sure all the bindings of each block within the Application block are in tact!!

When finished, you can save the Application by right clicking on the Application header and selecting “Save to Library”.

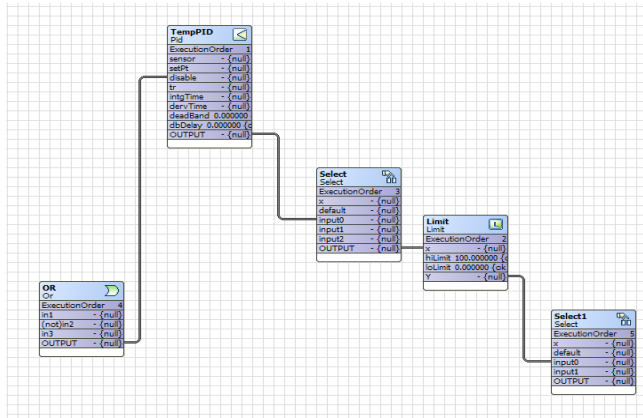
Macros and Applications

Next let's repackage the blocks below into a Macro. Notice, the blocks only contain logic and no inputs and outputs to the outside world!

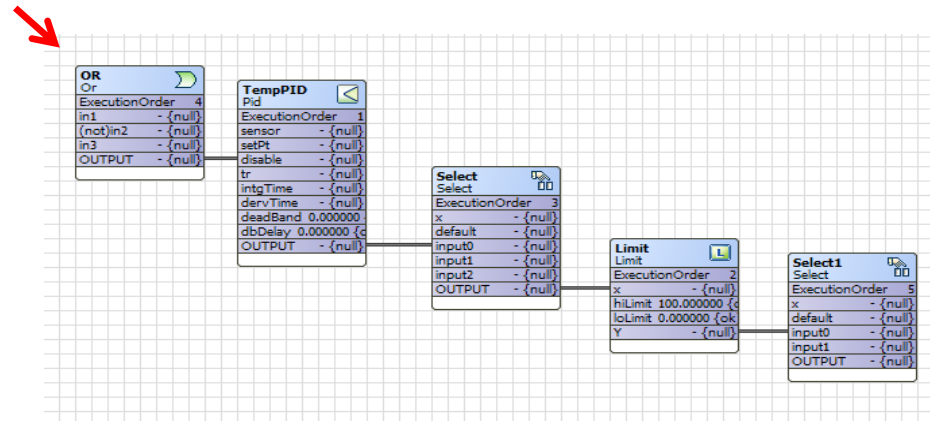


Macros and Applications

Begin by dragging and dropping a Macro block from the “Util” folder in the SLATE Palette onto the wire sheet. Name it “Control_Logic”. Open the block and add the blocks to the Macro (copy/paste from main wire sheet). Make sure the links are not omitted!

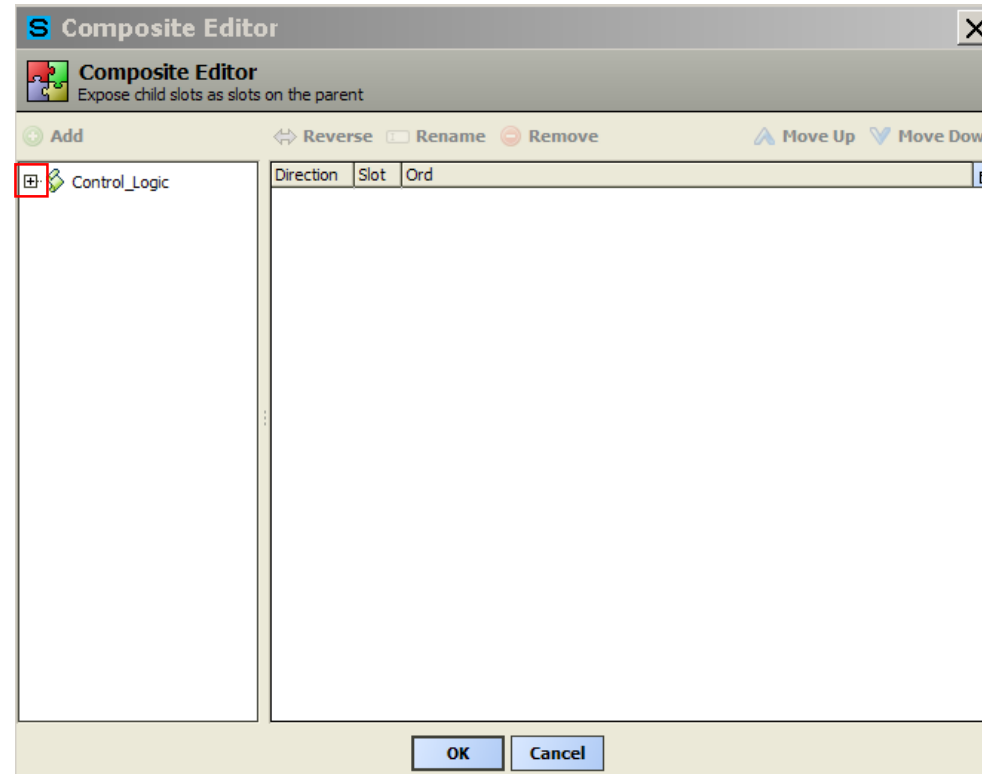


Reposition the blocks if desired.



Macros and Applications

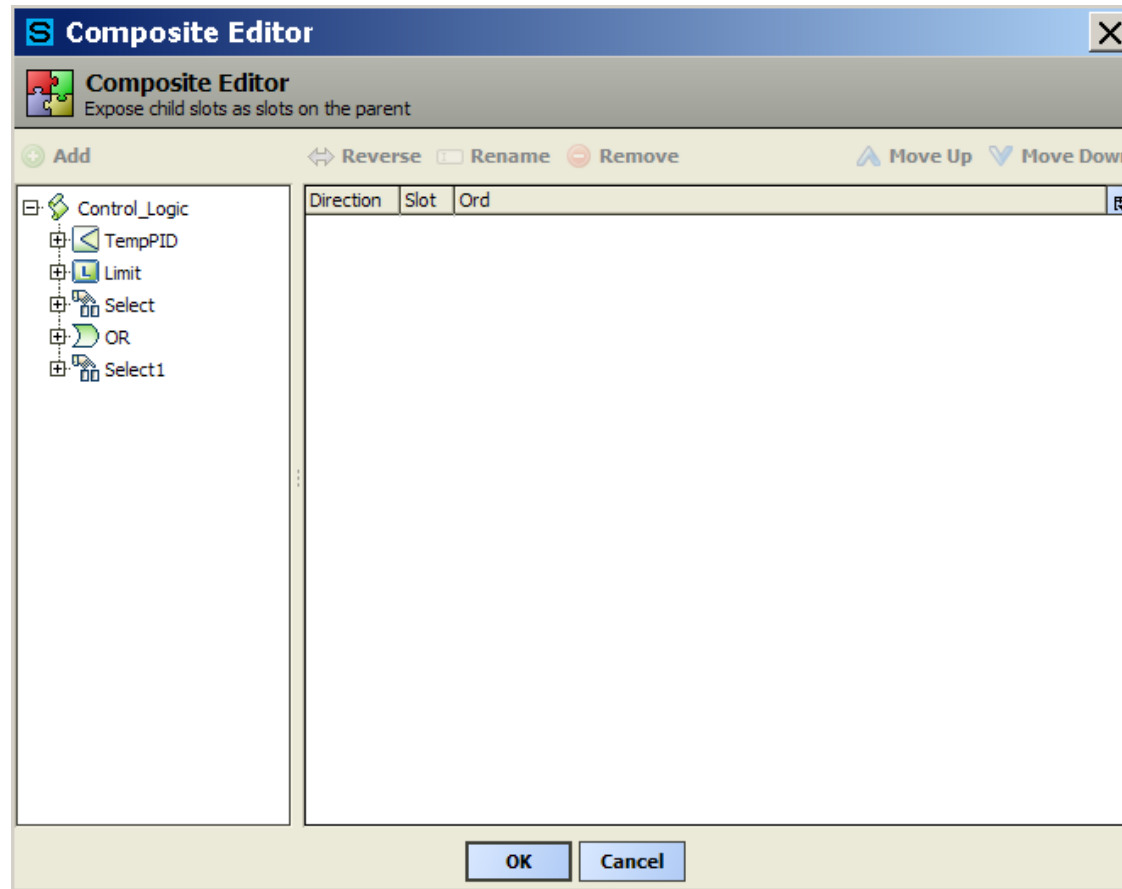
Click the back arrow to return to the main wire sheet. Right click on the “Control_Logic” Macro header and select “Composite”



Expand “Control_Logic” by clicking on the “+” box.

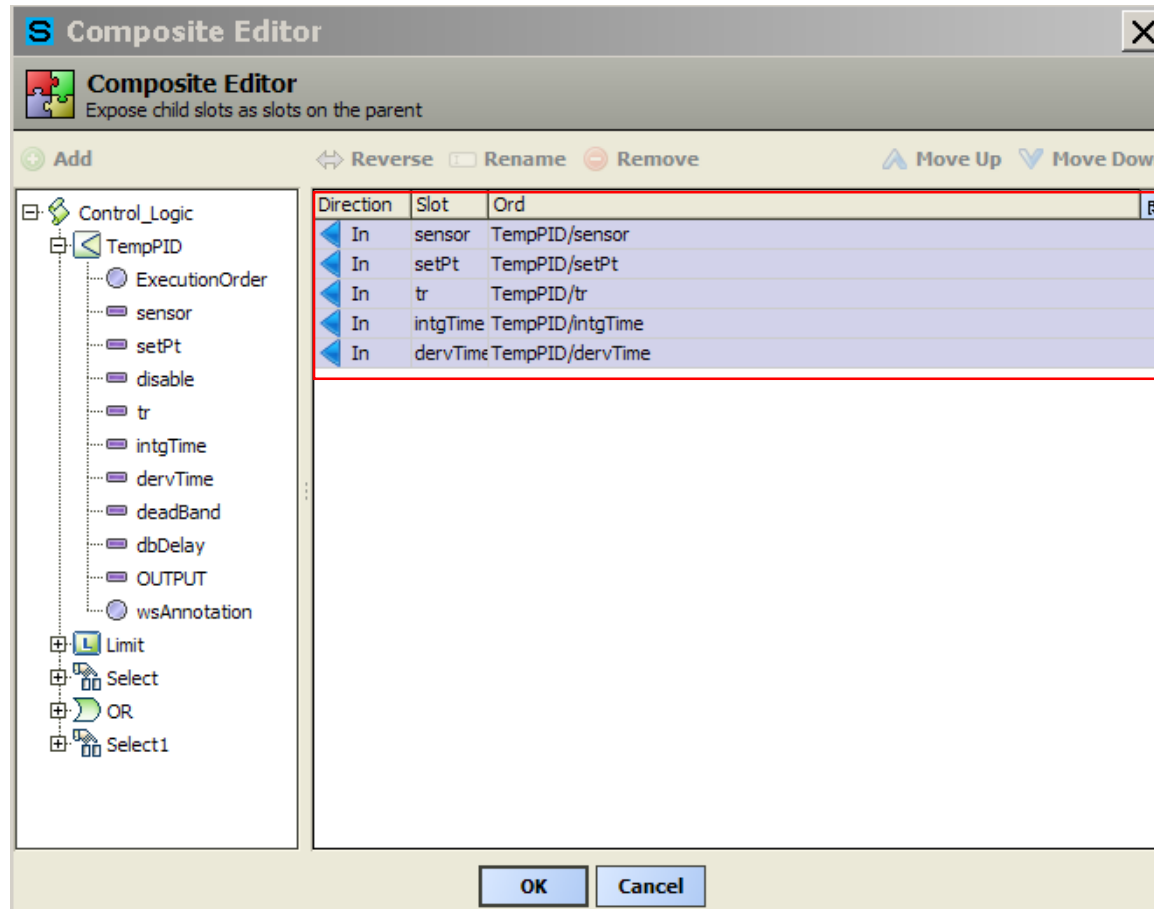
Macros and Applications

One by one, expand each block and locate either its input or output (as necessary).



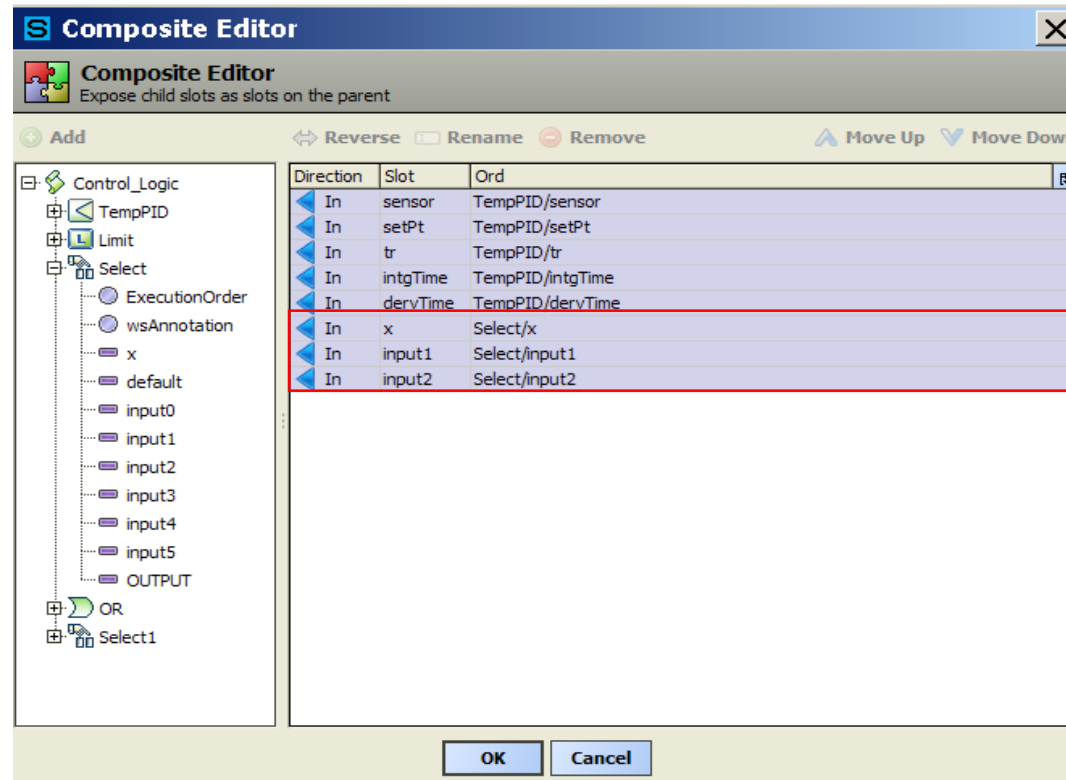
Macros and Applications

Select inputs and outputs of the “TempPID” block that reach outside the Macro block only. Notice the “disable” input comes from within the Macro so “disable” will not be composited.



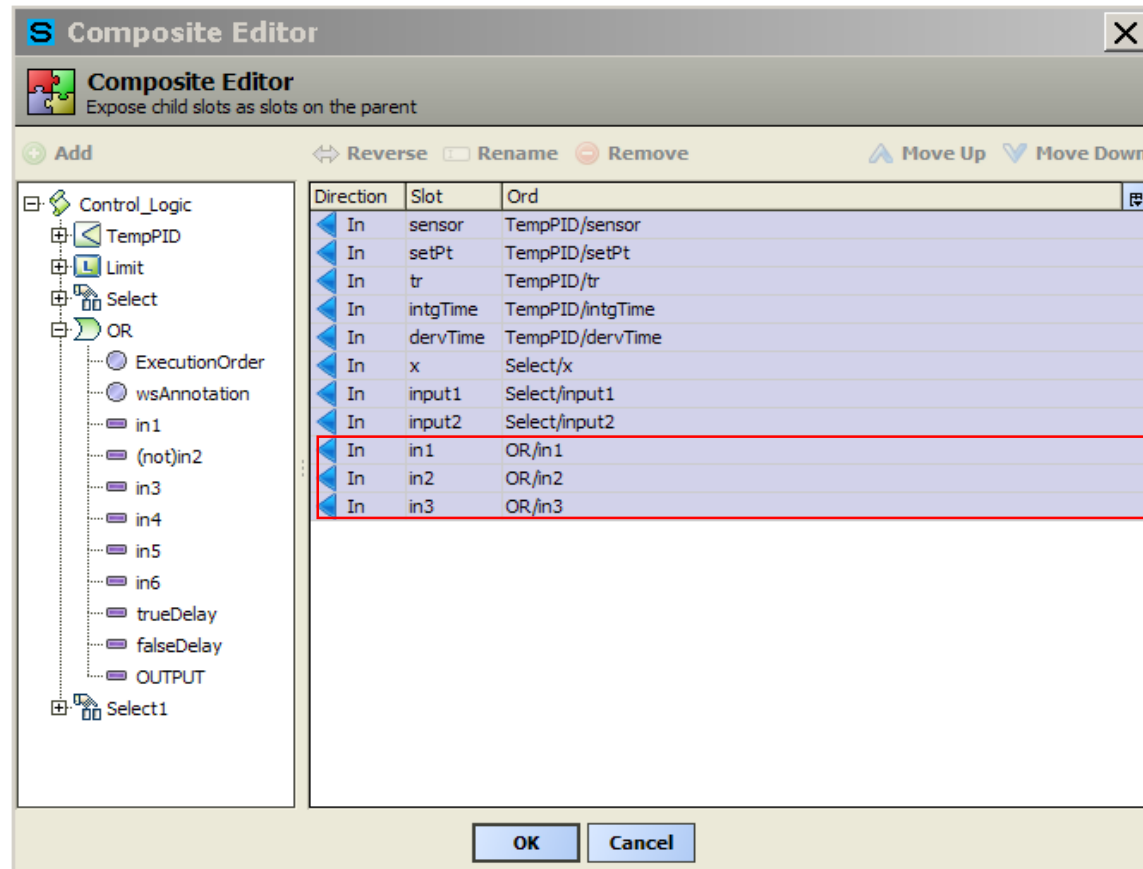
Macros and Applications

Next block to consider is the “Select” block. The external inputs are “x”, “Input1” and “Input2”. The rest of the I/Os are internal to the Macro block so they do not need to be composited. We skipped the Limit block as it was completely linked within the Macro.



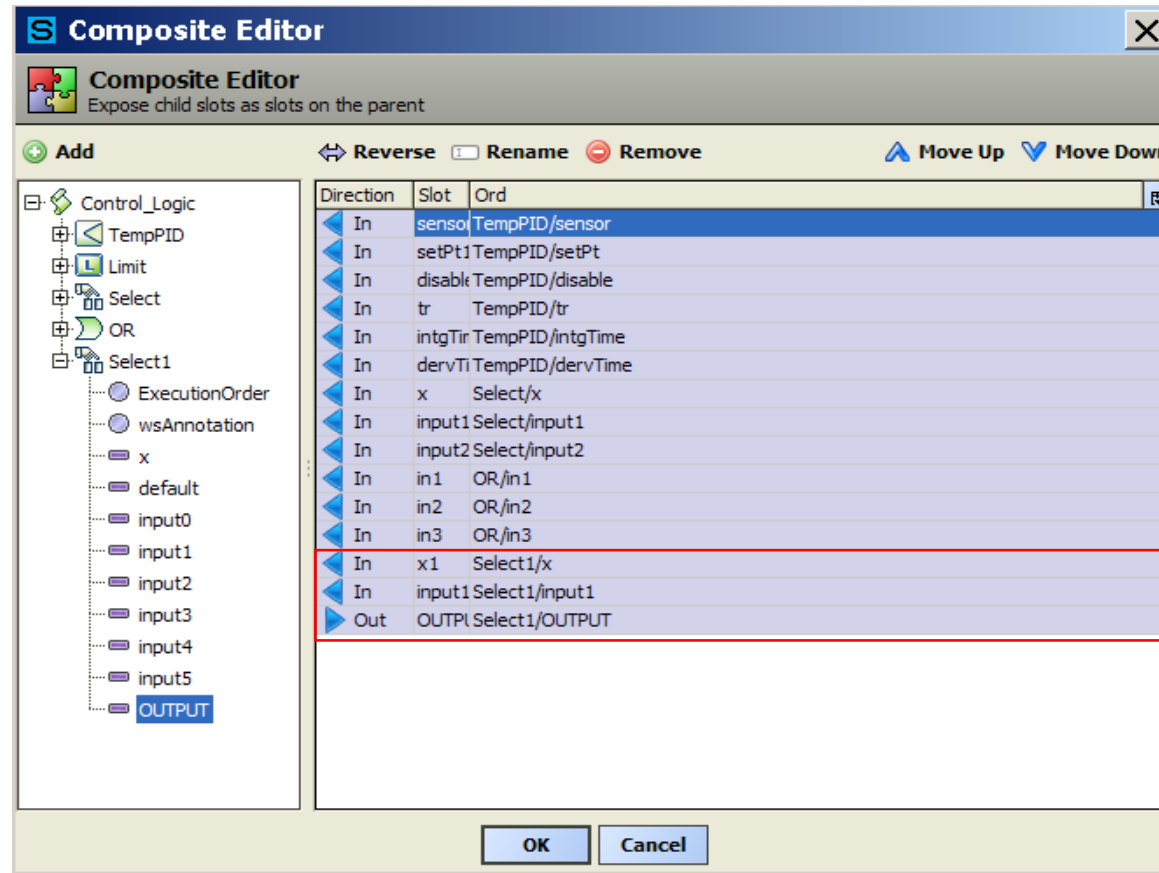
Macros and Applications

Next block to consider is the “OR” block. The external inputs are “In1”, “(not)In2” and “In3”. The output of the “OR” block is internal to the Macro.



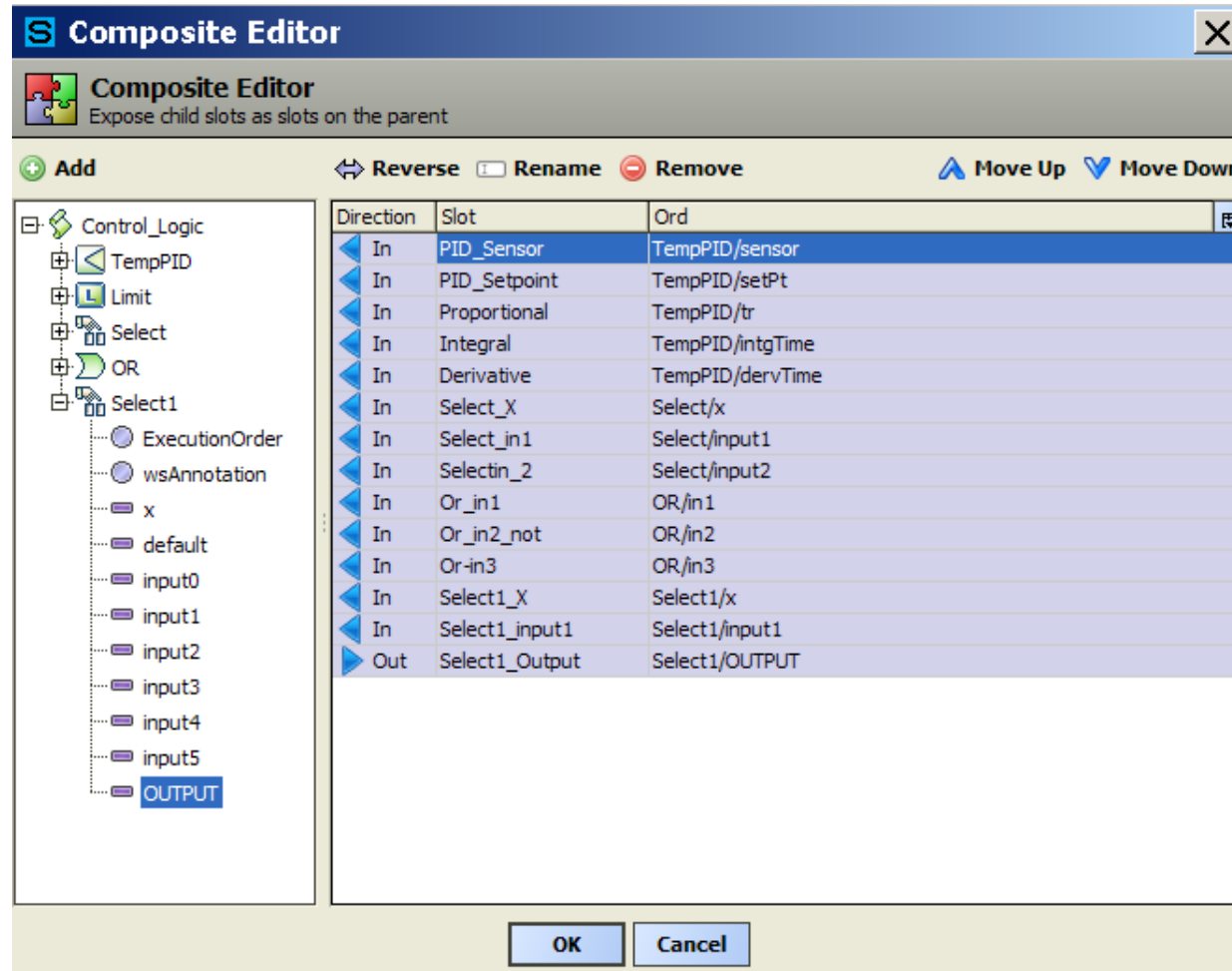
Macros and Applications

The last block to composite is the “Select1” block. The external inputs are “x” and “input1”. The “OUTPUT” of the “Select1” block is external to the Macro so it must be composited.



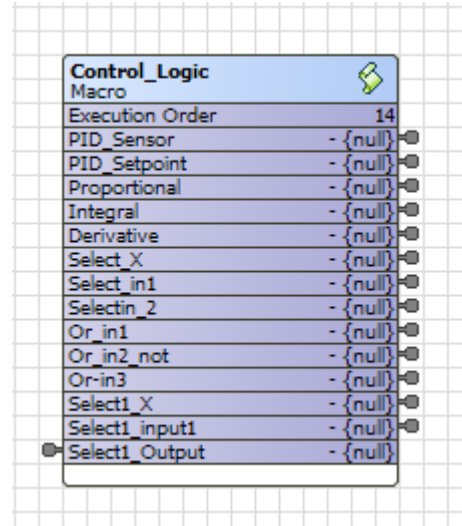
Macros and Applications

Check that the Macro slots directions are appropriate. Name the Macro I/Os as desired. Click the “OK” button when finished.



Macros and Applications

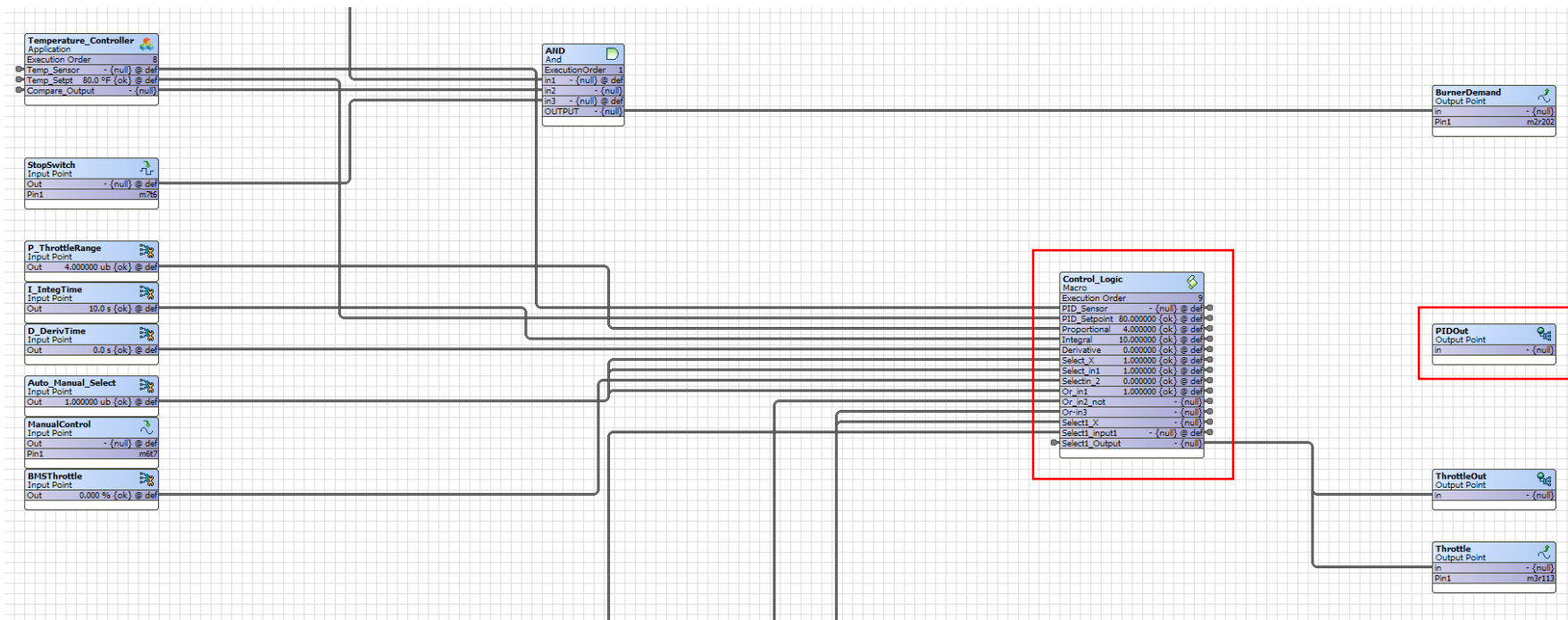
The result is the new Macro with its I/Os. This Macro is ready to replace the existing blocks of which it is created.



Macros and Applications

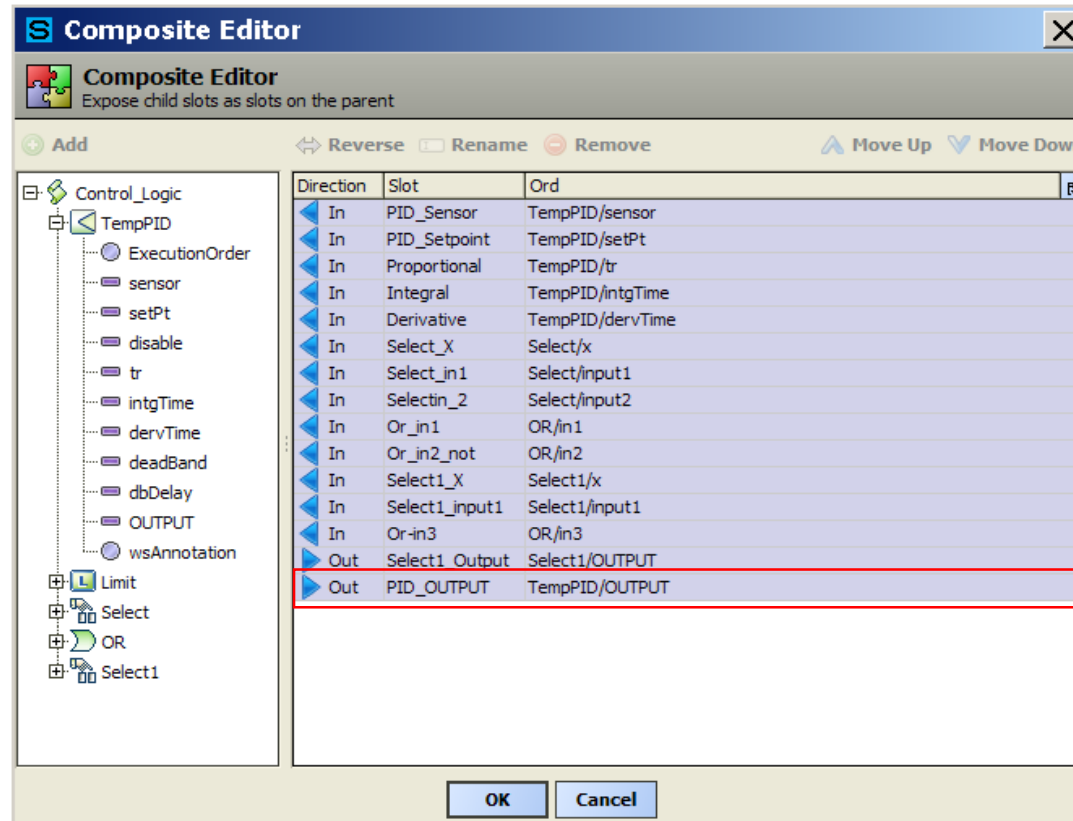
The section of the wire sheet which contained the 5 blocks making up the Macro now looks like this.

In this case you will notice that the “PIDOut” block no longer has a link. If an item is accidentally omitted in a Macro or Application, right click on the block (in this case the Macro) and select “Composite.”



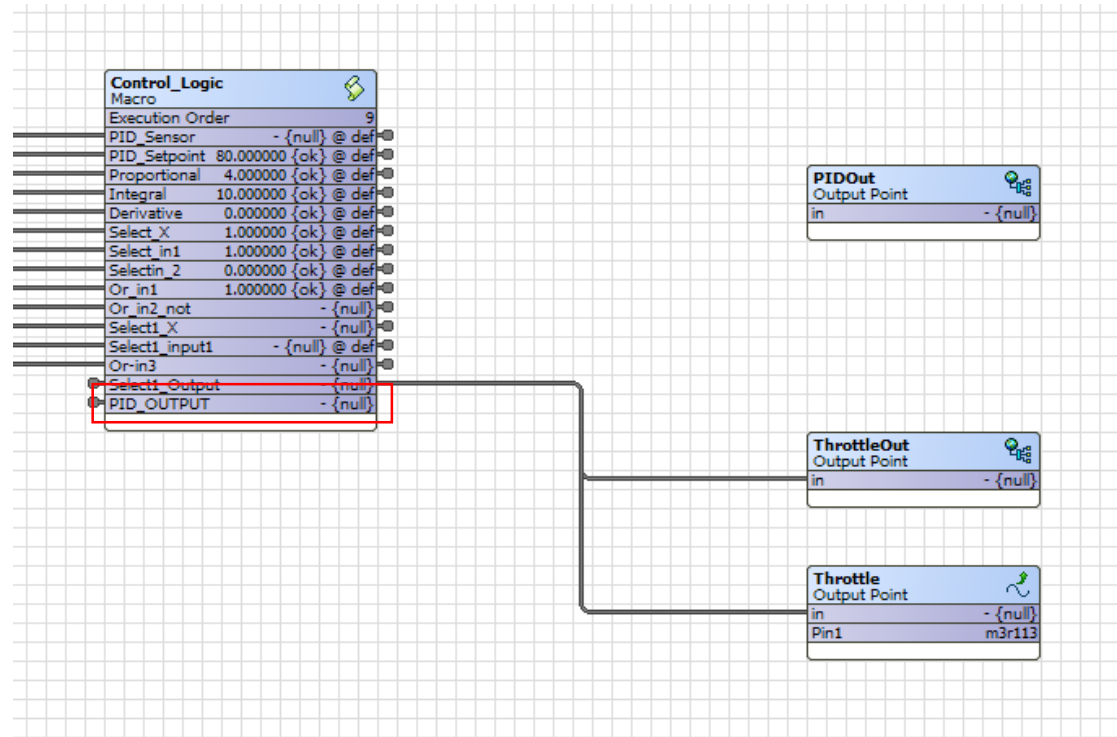
Macros and Applications

Expand “Control_Logic” and expand the “TempPID” block. Select the OUTPUT to composite. Click the “ADD” button. The PID block “OUTPUT” slot is now added to the composite list. Rename and arrange the order of the composite list as desired and click the “OK” button.



Macros and Applications

Notice a new output slot named “PID_OUTPUT” has been added to the Macro.



Macros and Applications

The last step is to link the “PIDOut” block to the “Control_Logic” Macro and rearrange the blocks to uncross links where possible.

