Heraeus

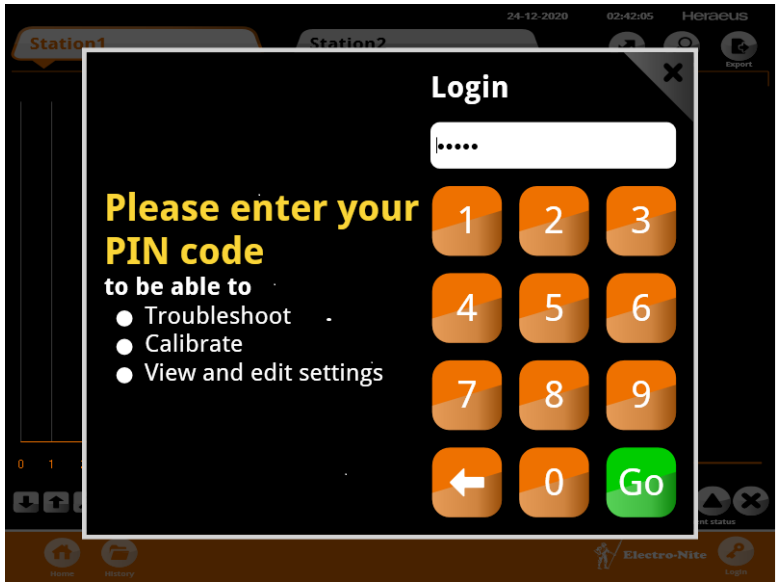
Profinet for iM2/SLS Connection to Siemens PLC – Step 7 Setup Guide

iM2/SLS Configuration

This setup has been tested on a Heraeus Electro-Nite iM2 with V2.3.38.0 software.

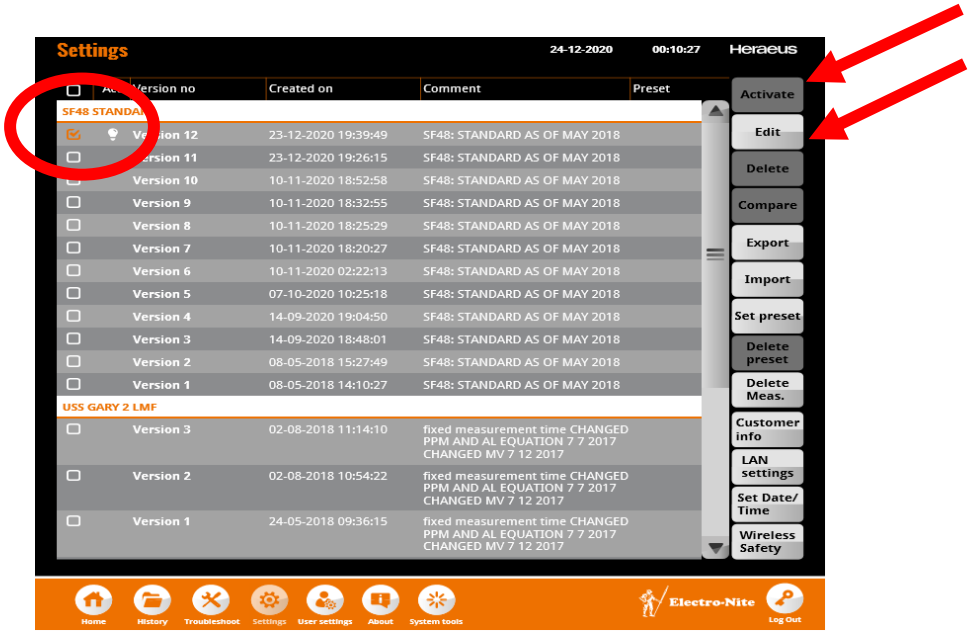
Login with Password

At the start up screen, select the Login button. The keypad screen for password entry will then appear. Enter “24816”, and then hit “Go”. The Home page will then appear. Then hit the “Settings” button in the bottom orange bar. BEWARE, there is an inactivity timer that logs you out after 5 minutes of keyboard inactivity which will cause you to lose all unsaved configuration changes. Save your work prior to any extended pause in keyboard activity.



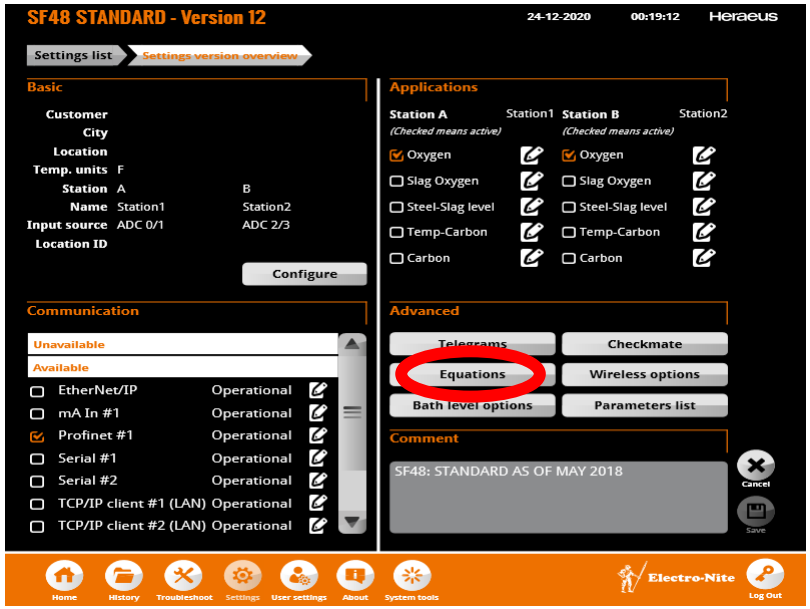
Select the Settings File

Select the settings file that will be modified with Profinet by clicking on the appropriate line and then hit the “Edit” button. After all configuration steps have been completed and you have saved the final configuration, you will be returned to this screen, and you will need to “Activate” the new settings file by again selecting it and then hitting the “Activate” button. The currently active settings file is indicated by the “light bulb” symbol.



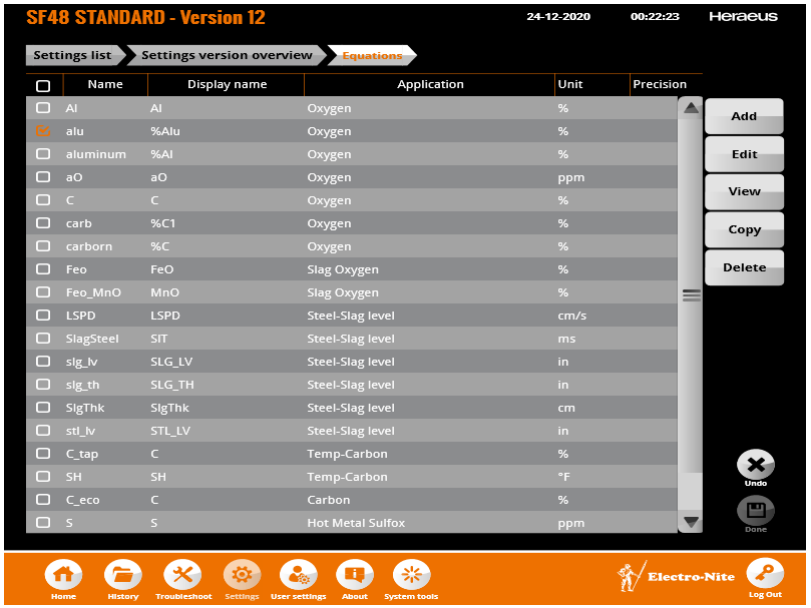
Consider Your Variables

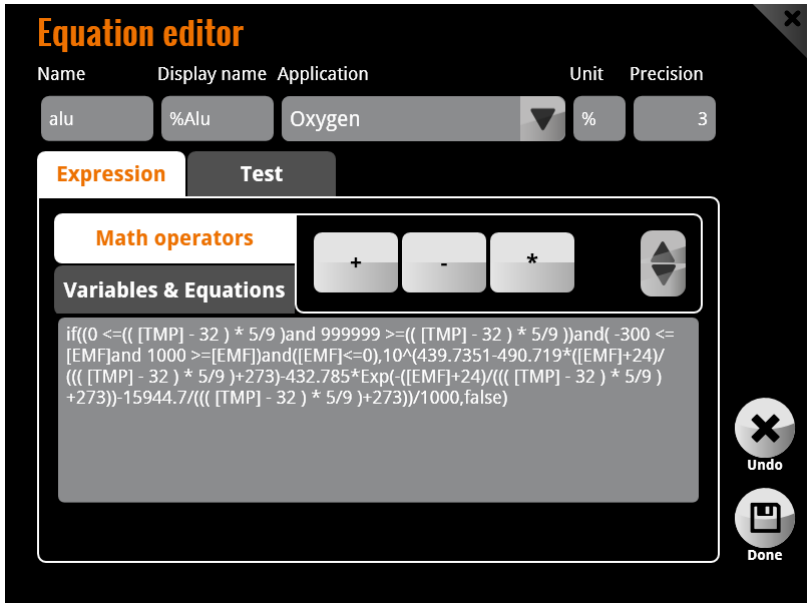
The picture below, shows the Settings Version Overview page. Its controls are organized in a quadrant format. Set up all necessary variables before creating the Telegram. Hit the “Equations” button located in the bottom, right quadrant of the screen to go to the equation editor to define and edit the equations for each named Variable.



Equation Selection and Editing

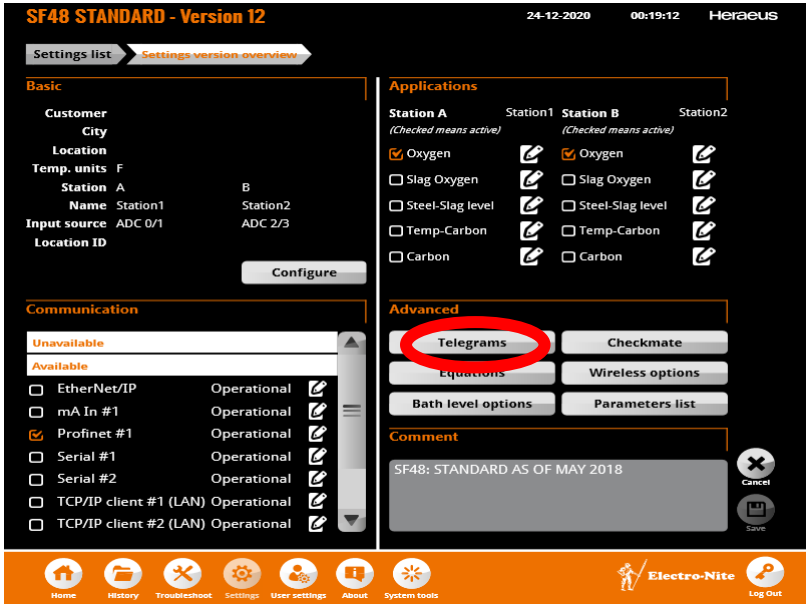
If you are using custom carbon and aluminum predictions, you cannot edit the default “C” or “Al”. You will need to create new ones, by first copying them and giving them new names. Typically, “Carb” and “Alu” are serviceable names. As you can see, in the bottom right picture, conditional logic and math are combined in a single expression. When finished editing, hit the “Done” button and you will return to the settings overview page.





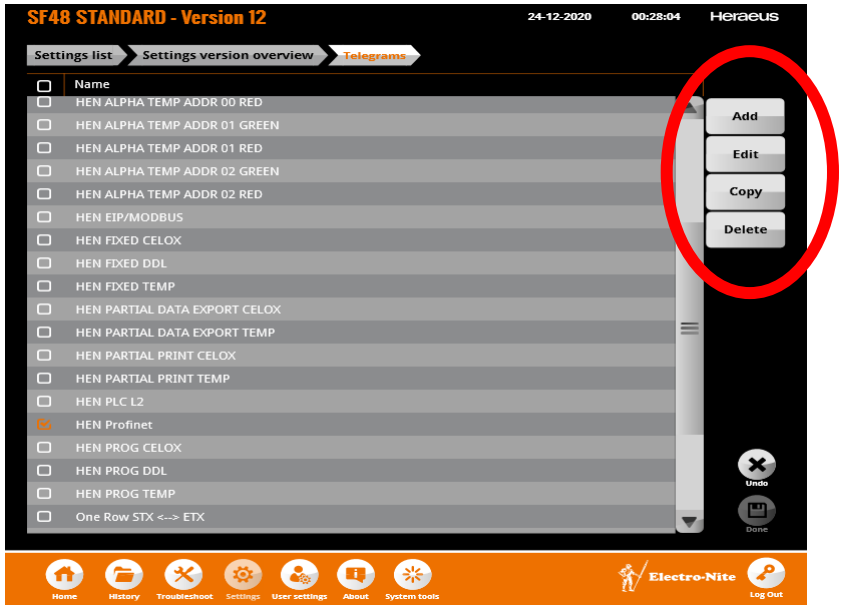
Consider the Profinet Telegram

Hit the “Telegram” button shown below, to go to the Telegram selection and creation page..



Telegram Management

This page allows the user to Add, Edit, Copy and Delete telegrams to and from this list. To prepare the Profinet telegram, either select an existing one that is close to what is needed and then “Copy” it and give it a new name or create a brand new one from scratch by using the “Add” button. Either way, once the telegram has been named (typically something with Profinet in it) and it appears in this list, select it and hit the “Edit” button.

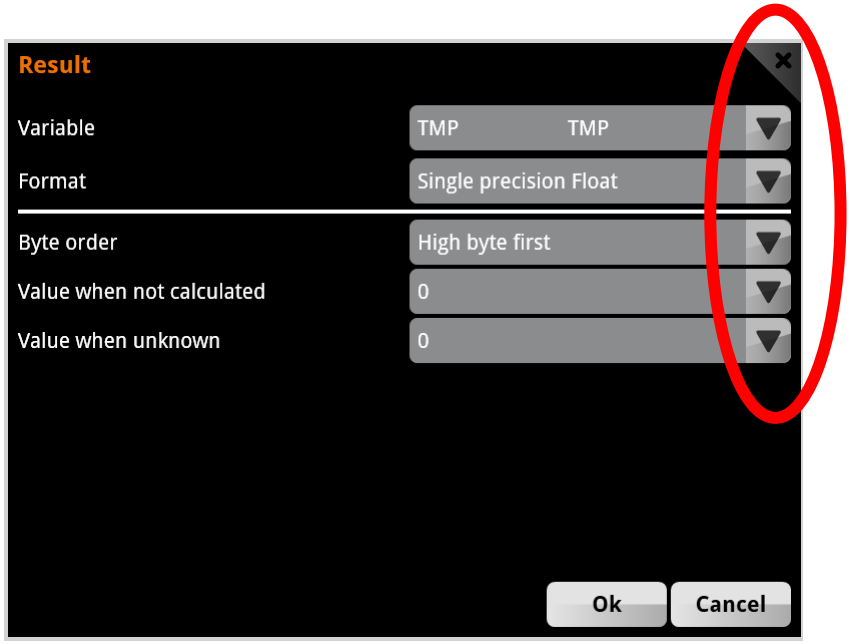


Telegram Editor

Each of the information blocks inside the red oval, taken together, make up the information content of the Profinet telegram. The left to right position order determines their placement in the data array that the PLC reads. The position of any block in the field can be adjusted by clicking and dragging a block to a new position. A wide variety of “Available Blocks” are listed in the scrollable column on the right side of the page. Two types of blocks are shown in this telegram. The first block is of type “Status” and the others are of type “Result”. “Text” blocks, while not shown, are also common. To populate a telegram, just click, drag, and drop a block from the scrollable column to where desired in the telegram field. Note the little gear symbol that is at the right end of the results blocks (Tmp, etc.), this indicates that the block can be further edited by double clicking on it. Now, let’s take a look inside the “Tmp” block.

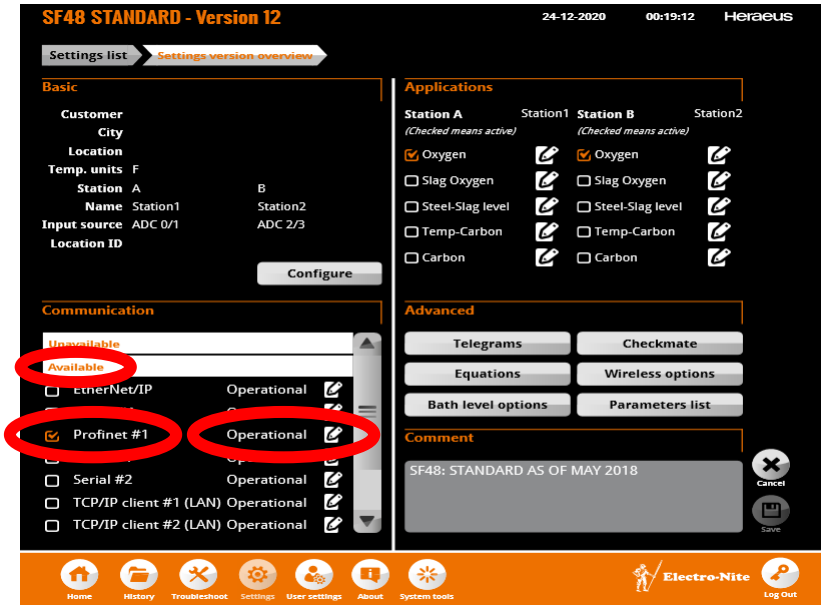
Block Editor

All blocks of type “Result” are initially instantiated into the telegram as a “Tmp” variable. Utilize the drop down at the right end of the Variable field to select the actual variable that is needed (EMF, aO, Carb, Alu, etc.). Likewise, initially the format is ASCII, but the drop down at the end of the Format field allows for different formats (integer, real, etc.). Typically, for Profinet, the results are formatted as real numbers (single precision float). Also, note that the “Byte order” can be specified. For Siemens PLCs it is usually set as “High Byte First”. Continue double clicking on all of the different “Result” blocks in the telegram until they are correct. The block of type “Status” is not editable, and its fixed construction will be detailed later. When you are done editing blocks, hit “OK” and “Done” until you are back at Settings Version Overview page.



Configuring the Profinet Interface

Verify that the Profinet interface is operational in the list of “Available” interfaces. Then activate the Profinet interface by clicking on the box at the left end of the Profinet line. Now click on the pencil and paper icon at the right end of the Profinet line to complete the configuration of the interface.



Configuring the Profinet Output

Select the “At each status change” button and the “1 Telegram” button. Next hit the “Add” button, and the fields inside the red box will appear. The Application Type field is populated with “All applications”. Next, use the drop-down box in the Station field to select “All stations”. Finally, use the drop-down box in the Telegram field to select your named Profinet telegram that was previously created. Now click OK, Done, and save all changes. After saving the changes, you will be returned to the screen with the list of settings files. The newly saved one will be at the top. Select it and hit the activate button.

PLC Data Array

The data in the array is based on the telegram construction detailed above. If you change the order of the data telegram or data type results, then data element locations will also change. Both Station A and Station B data are in the same location. Byte 4 of "Status Bytes" is an integer: 1 = Station A/1, 2 = Station B/2.

Element (Word)	Data (Station A and B)	Type
0	Status – 1st word (bit structure)	Boolean
1	Status – 2nd word (byte structure)	ASCII / INT
2-3	Temp	Real
4-5	Emf	Real
6-7	aO (O2 ppm)	Real
8-9	Carbon	Real
10-11	Aluminum	Real

Status Block Definition

Status First Word – bits 0 - 15

.0 = Red light	.8 = N/A
.1 = Yellow light	.9 = Open
.2 = Green light	.10 = N/A
.3 = Error	.11 = DDL connected
.4 = Carbon measurement	.12 = Celox Slag connected
.5 = Bath level	.13 = Insulation warning
.6 = Celox measurement	.14 = Blinking active
.7 = Txd complete	.15 = Horn

Status Second Word

High Byte = Probe Type (ASCII Character)

Low Byte = Measurement Place (Integer: 1=Station A/1, 2=Station B/2)

PLC Configuration

This setup has been tested on a Siemens S7-315 PN/DP CPU using Step 7 V5.6.

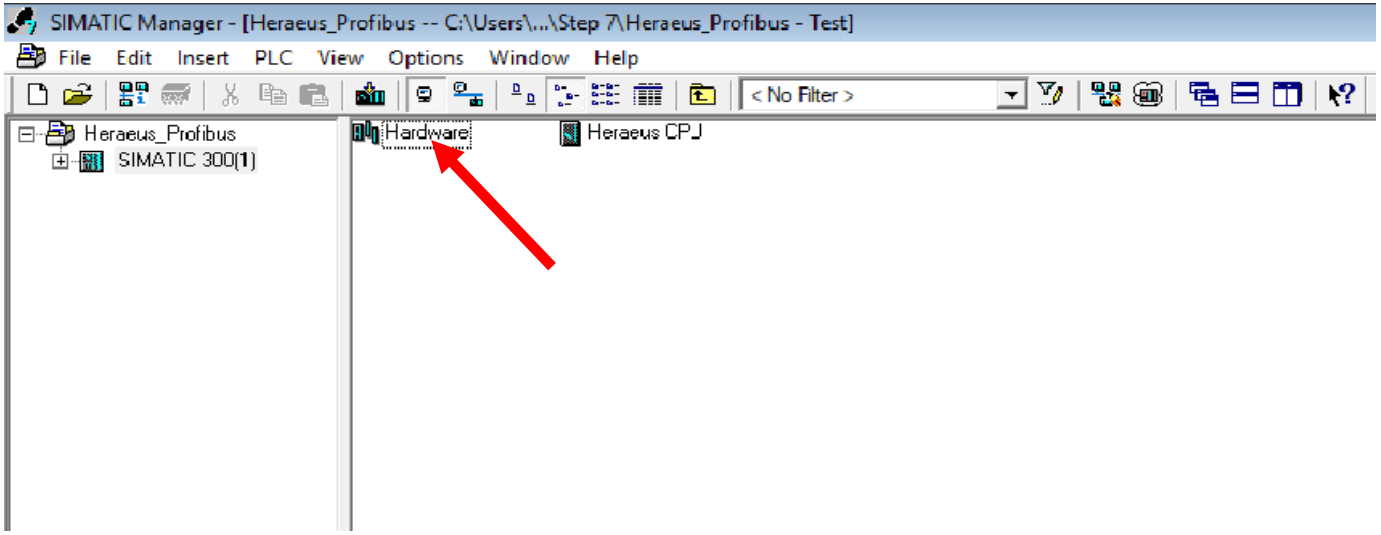
Launch SIMATIC Manager and open project.

Adding GSD file

The GSD file will create the hardware image for the Beckhoff EL6631 controller.

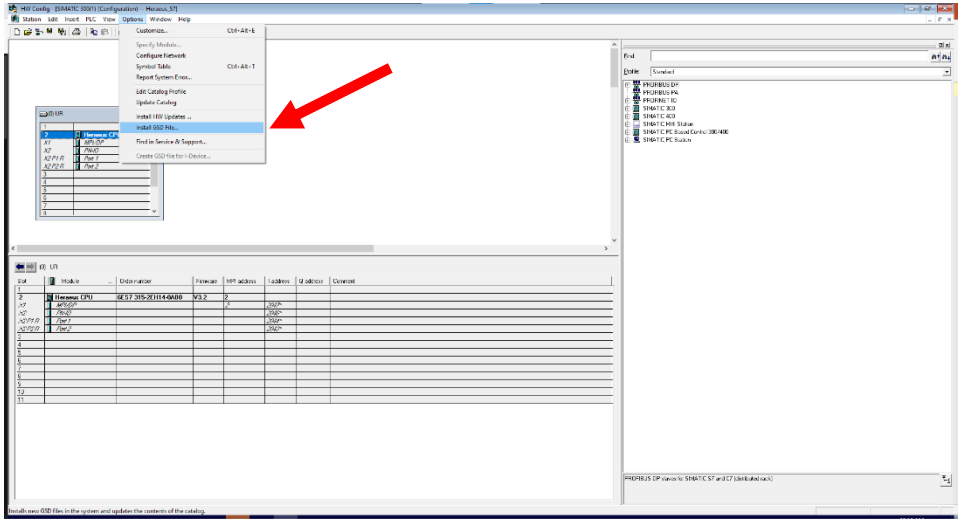
GSD file used: gsdml-v2.33-beckhoff-el6631-20200116.xml

First, open the project and select the PLC Station. In this example it is SIMATIC 300(1). Next, double click on Hardware to access the hardware modification screen.



Adding GSD file

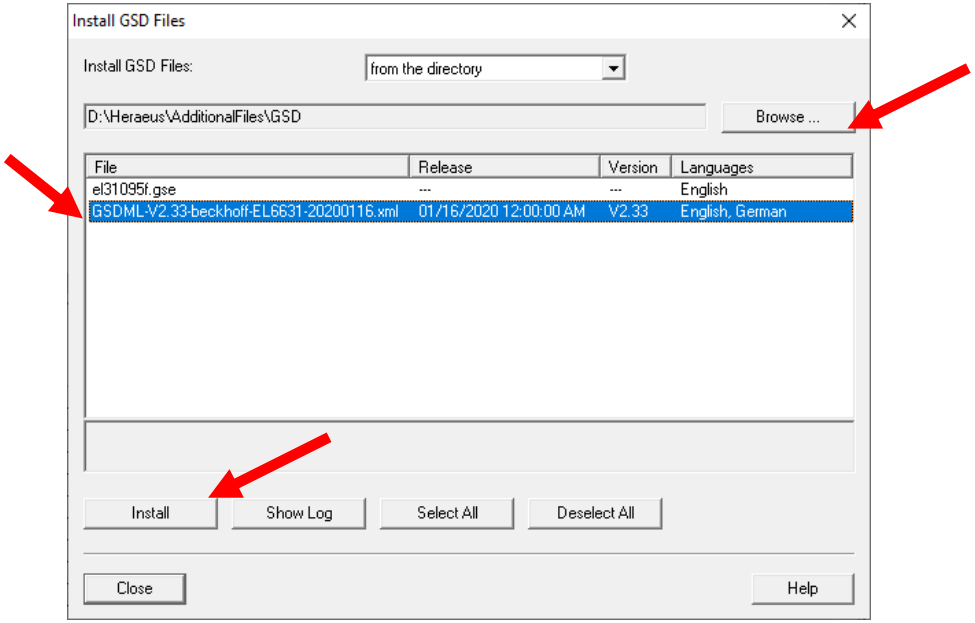
The HW Config screen should pop up after selection. Go to Options and select Install GSD File.



Adding GSD file Cont.

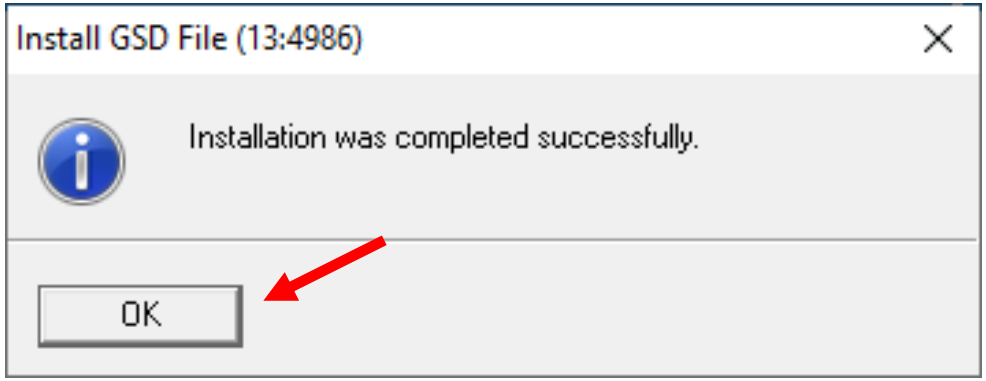
After selecting “Install GSD Files” a popup will appear. Select the browse button and navigate to the file location where the GSD file is saved.

Click and highlight the GSD you wish to install, and then hit install.



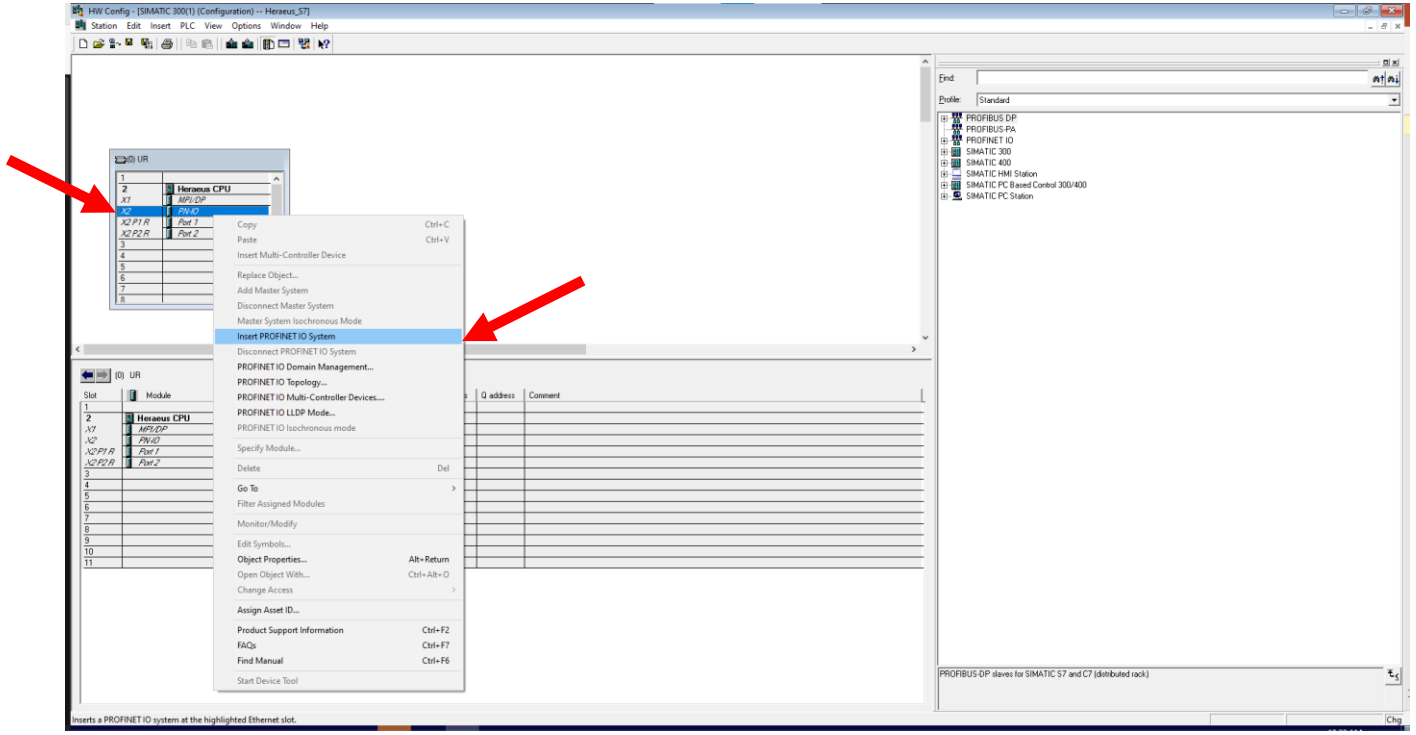
Adding GSD file Cont.

After successful installation you will receive the below message. Click OK when done.



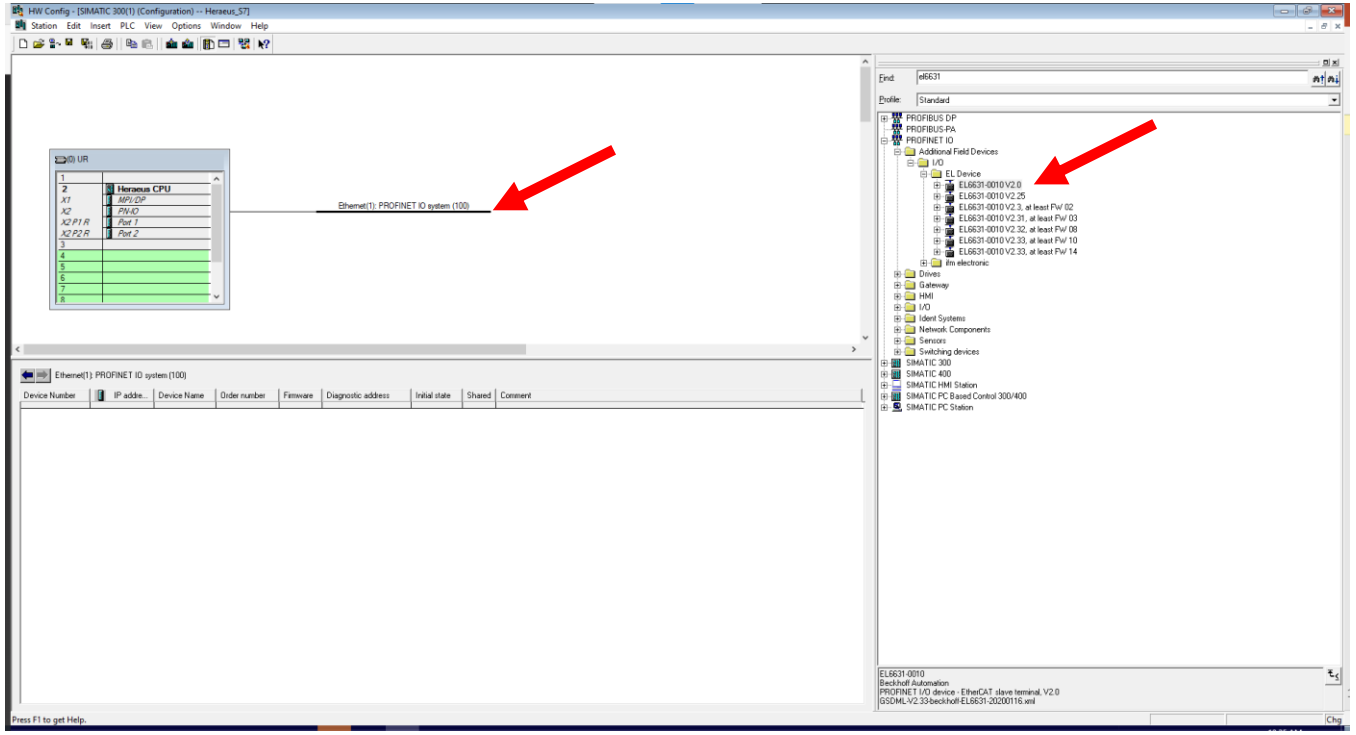
PLC configuration

With the GSD installed, a Profinet IO system will need to be added to the system. Start by right clicking on PN-IO on the CPU and select “Insert PROFINET IO System”.



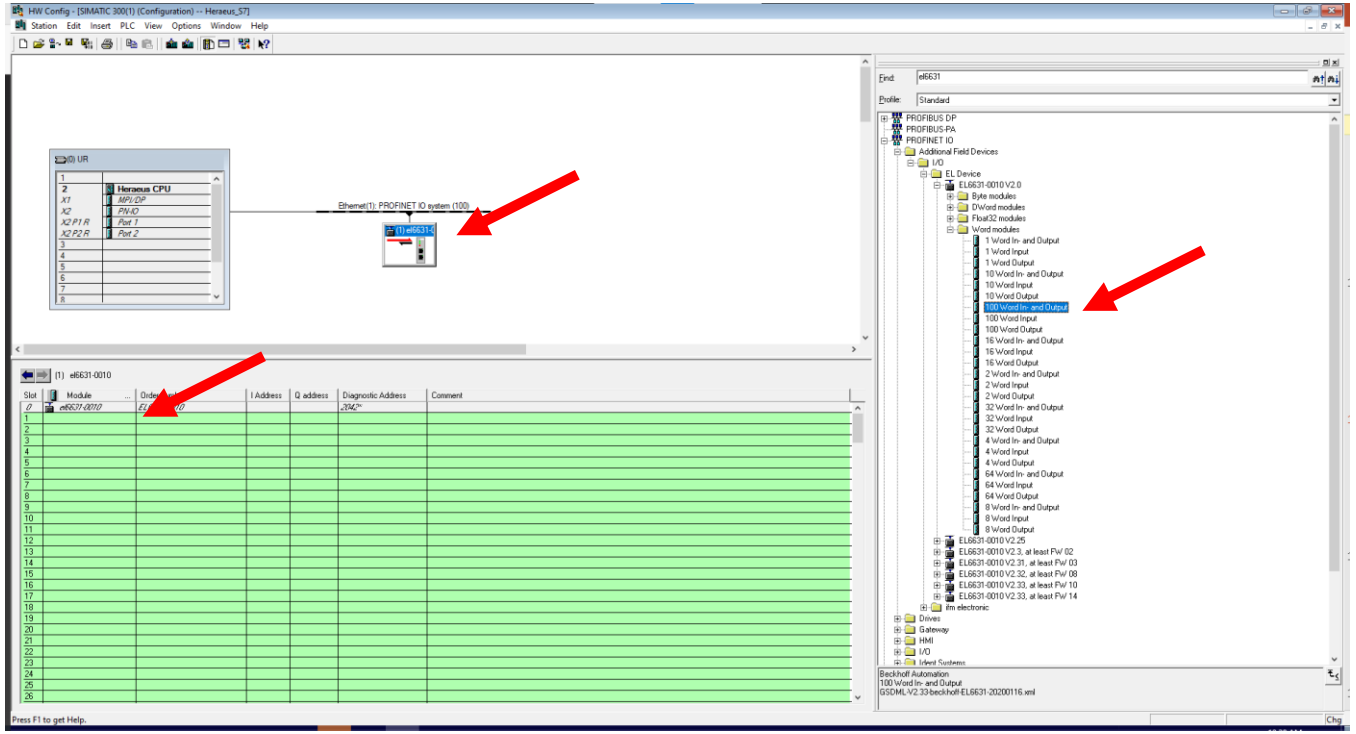
PLC configuration

Search for EL6631-0010 in the Search Bar. Select EL6631-0010 V2.0 and drag over to PROFINET IO system. You will see a + mark when hovering over the PROFINET IO System.



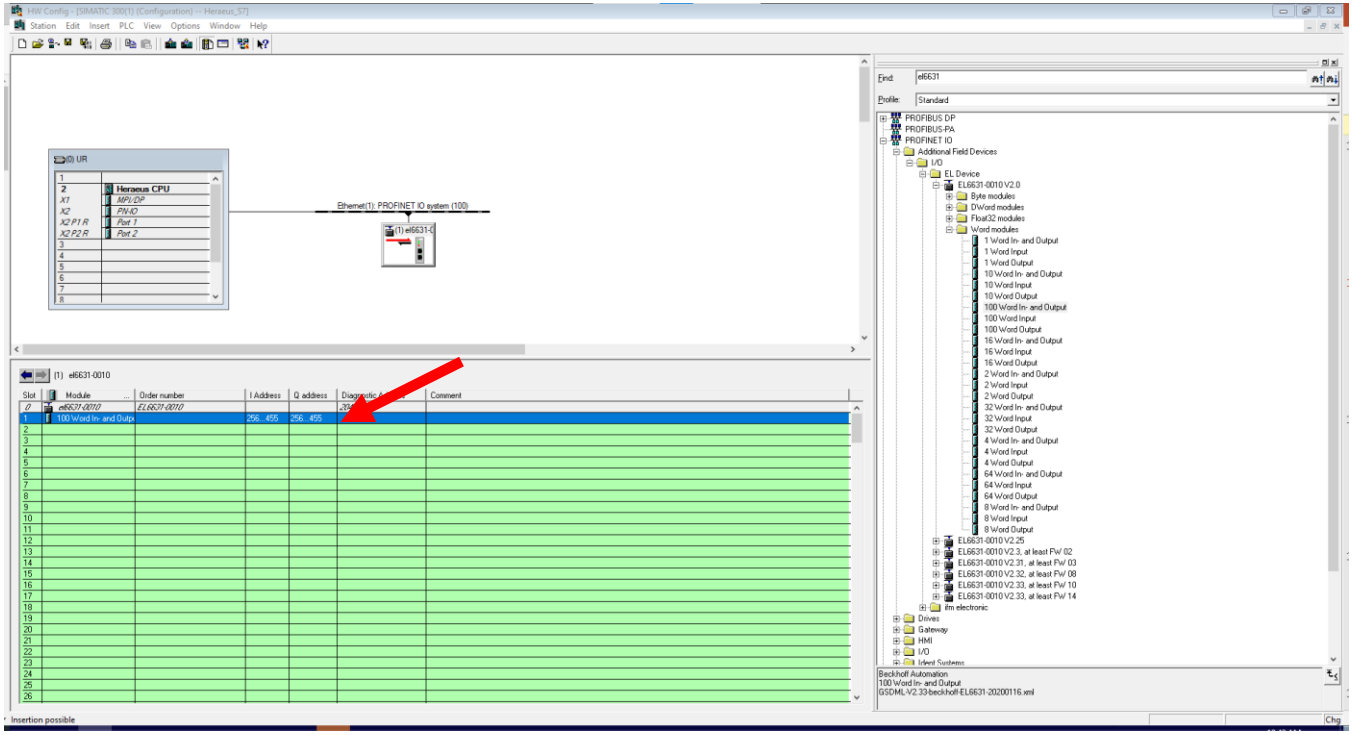
PLC configuration

Once the module has been added to the PROFINET IO System, select the drop down under EL6631-0010 for WORD Module. Select 100 WORD In- and Output and drag to the first location under EL6631-0010. Again, you will see a + sign when hovering over the correct location.



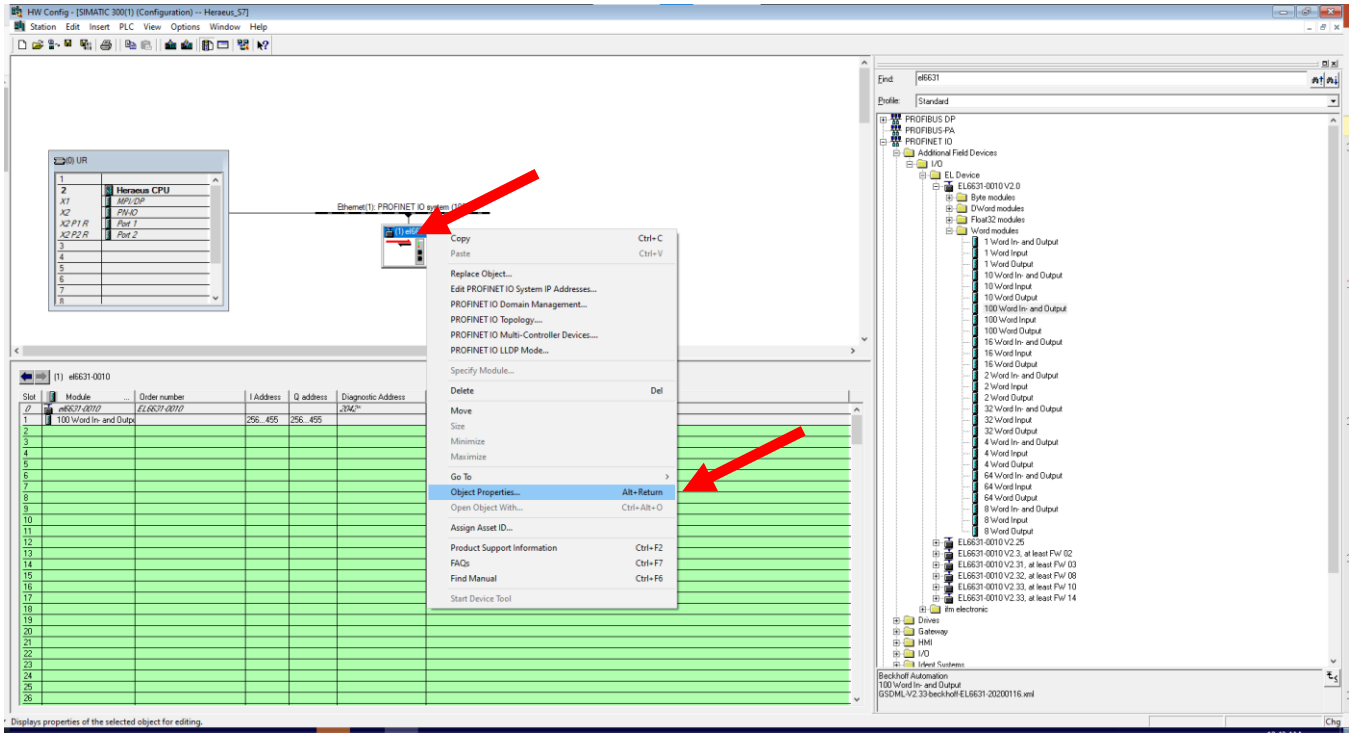
PLC configuration

When the Word Module has been added the I and Q Address will be auto populated. These may be changed to whatever Input and Output address you desire.



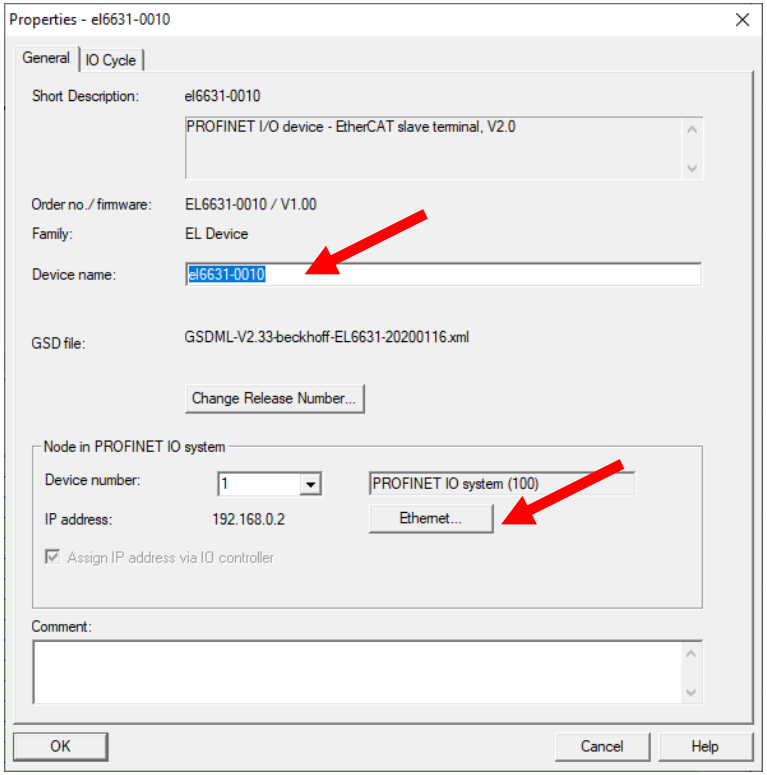
PLC configuration

Next, we will need to modify the IP address of the new module. Right click the EL6631-0010 module and select Object Properties.



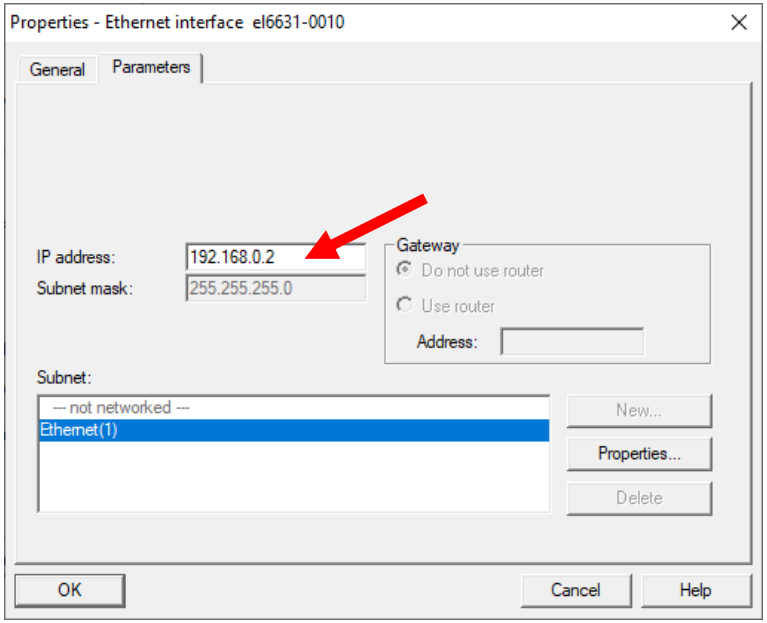
PLC configuration

You will see a popup as shown below. First, we will need to modify the Device name. In the example we will change this to “heraeus”. Then you will select “Ethernet...” button



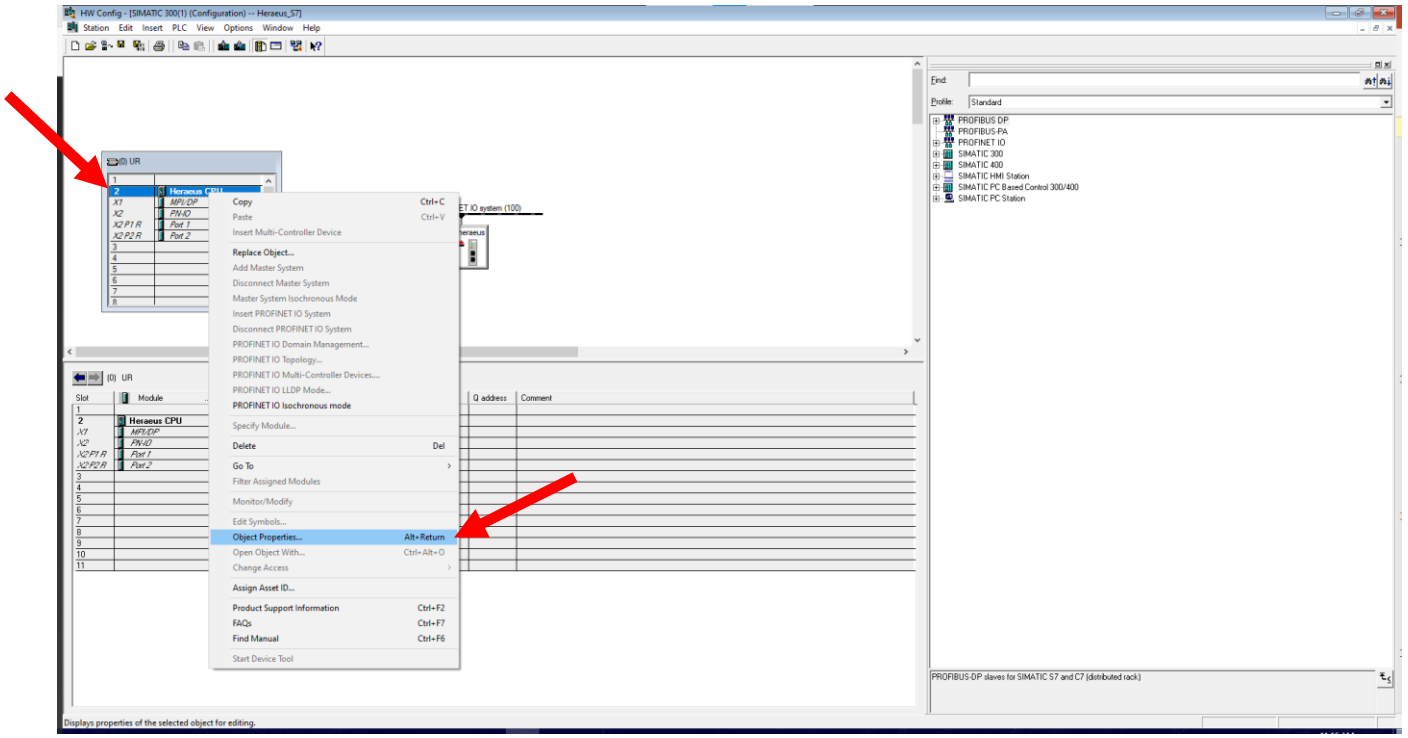
PLC configuration

You will receive the popup below. In the example we use address 192.168.0.2.
Select OK when complete.



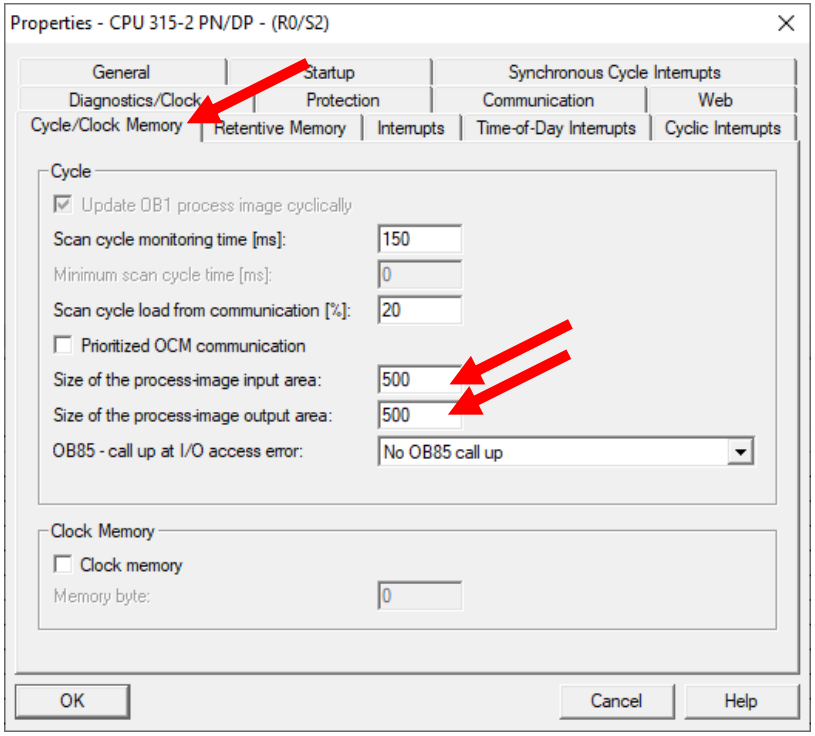
PLC configuration

Next, we will expand the CPU Process Image so the Heraeus module can be viewed. First right click on the CPU and select object properties.



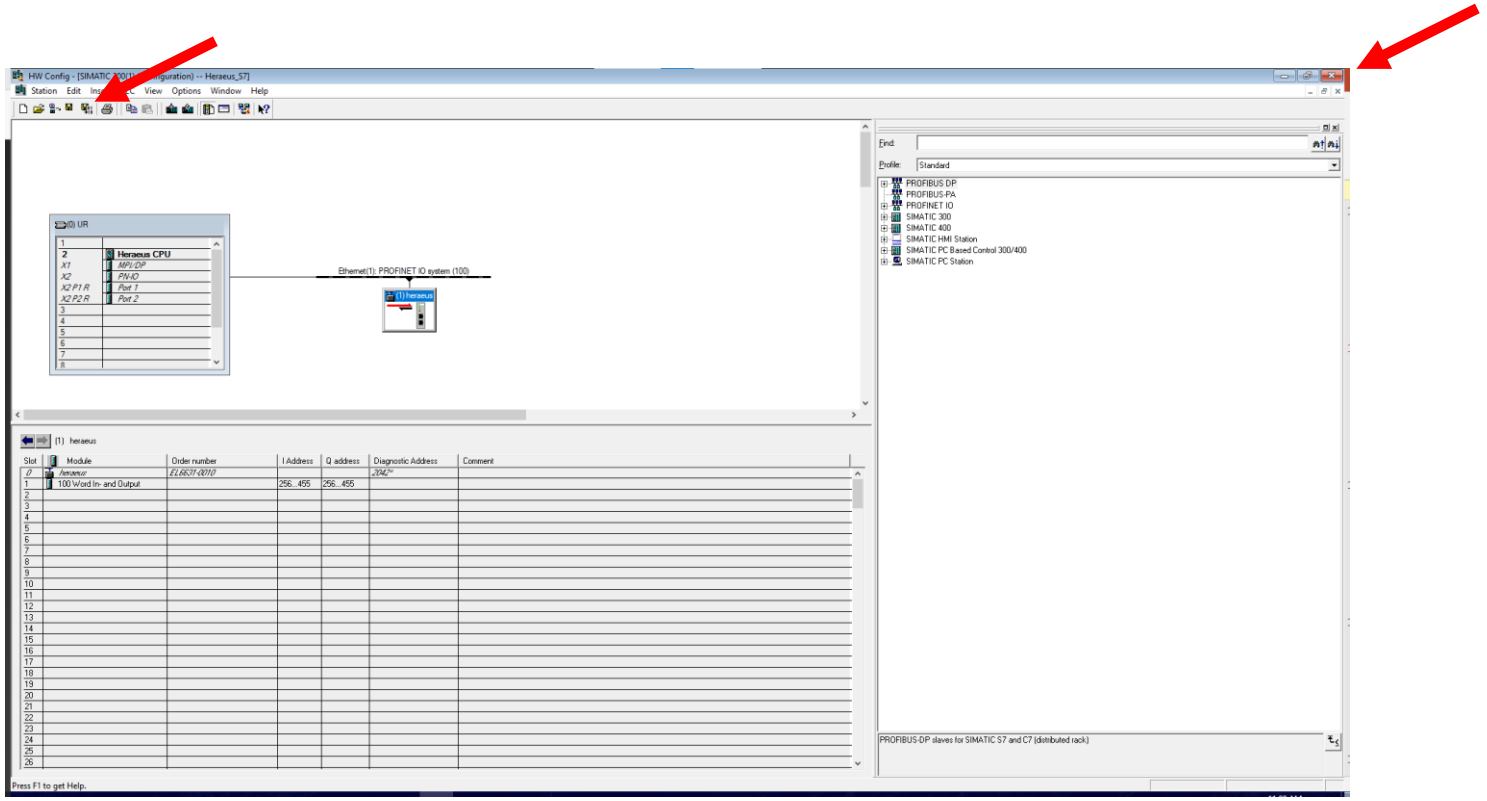
PLC configuration

Select on the Cycle/Clock Memory tab and change both process image tabs to encompass the el6631-0010 module. Select OK when done.



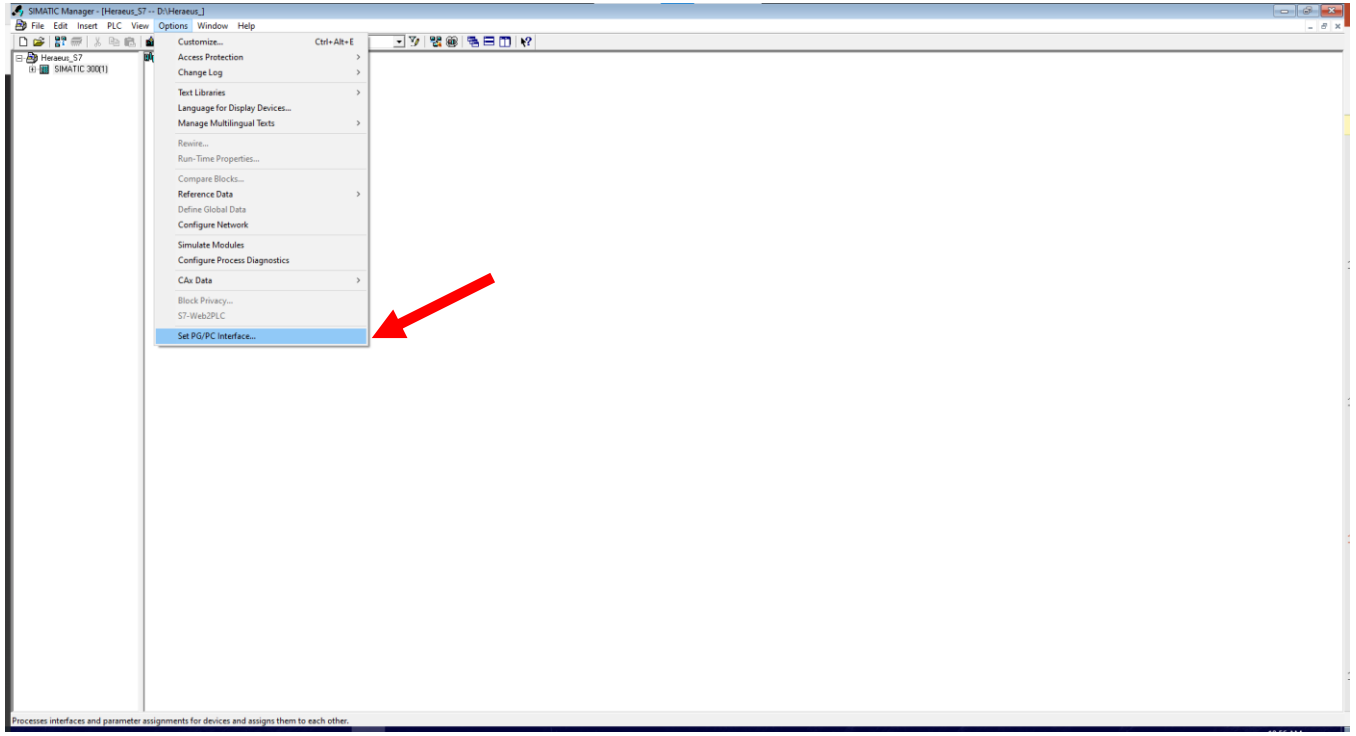
PLC configuration

Select the Save and Compile tab. Then close this window.



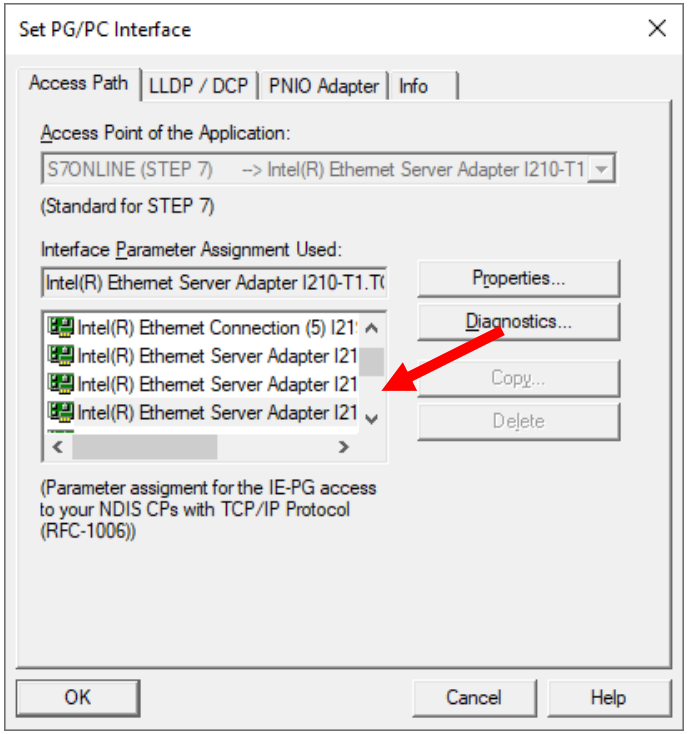
PLC configuration

With configuration complete we will need to download to the PLC. Return to the SIMATIC Manager screen. Select Option and Set PG/PC Interface.



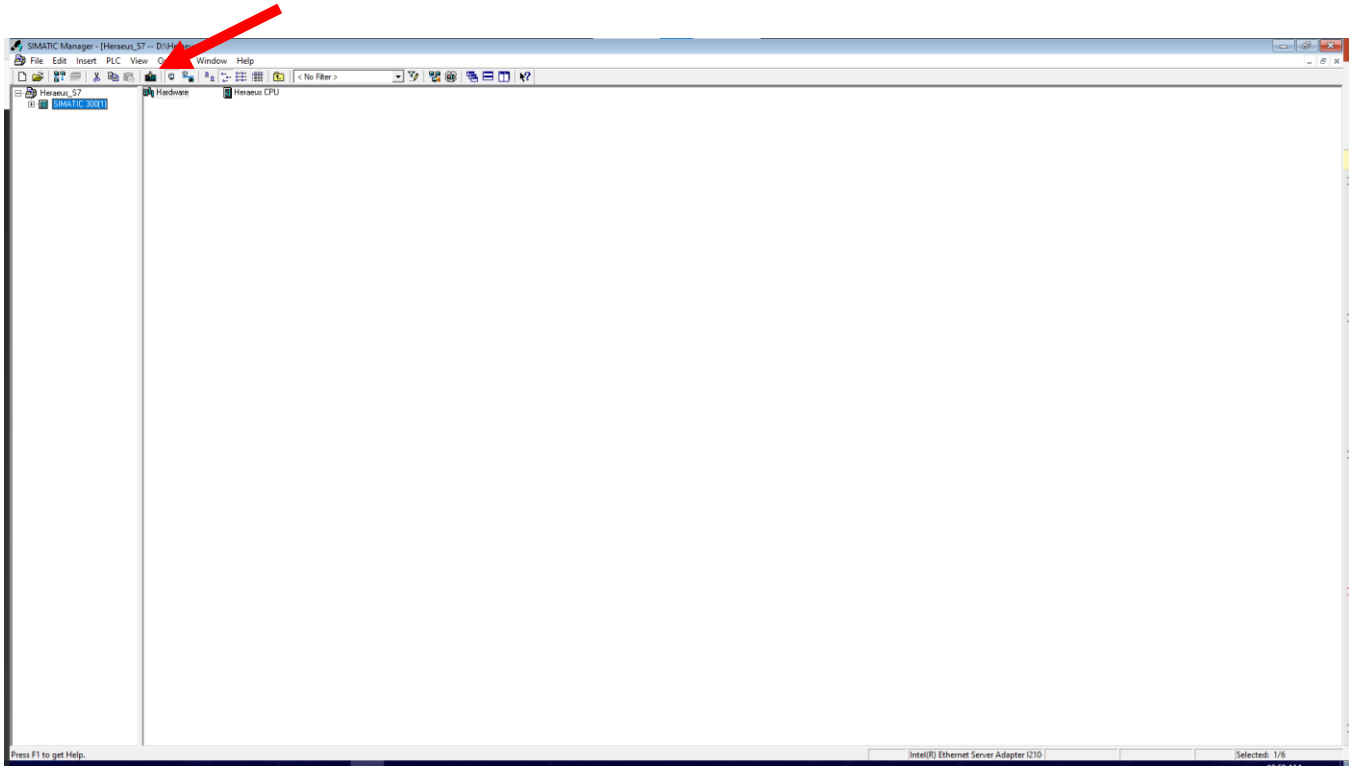
PLC configuration

Once the Set PG/PC Interface pops up you will need to select your ethernet adapter. This will depend on your pc but select the .TCPIP.Auto.1 on your adapter. Select OK when complete. Note: make sure your adapter is set to the same IP network as the CPU interface you are working on.



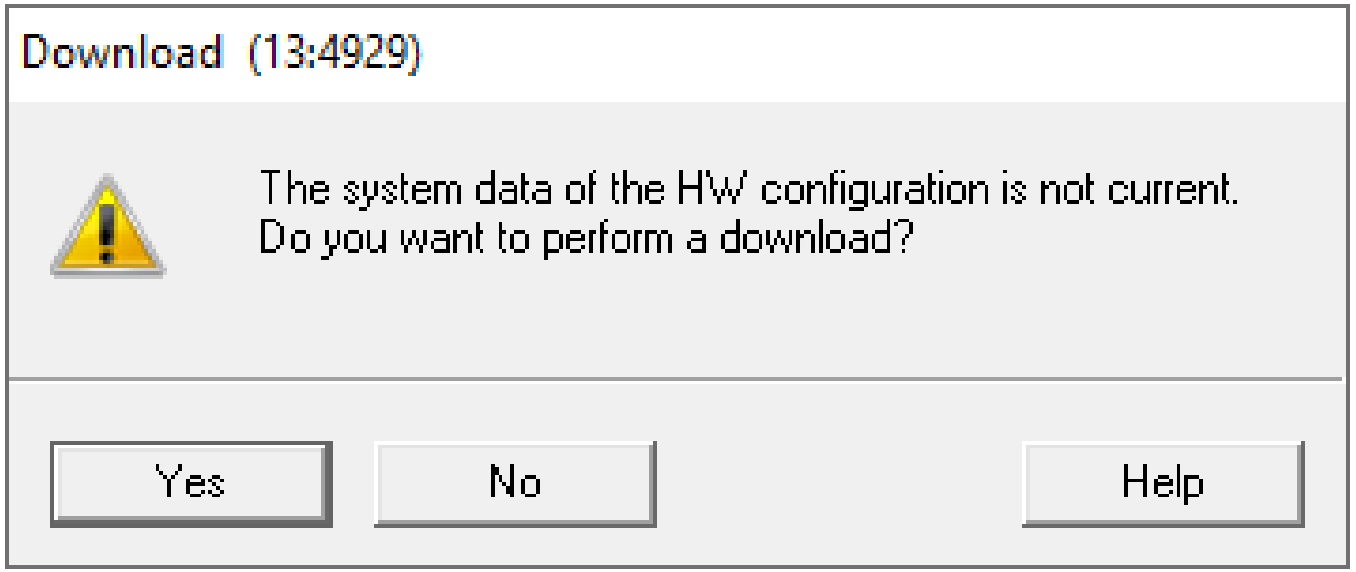
PLC configuration

With the SIMATIC 300 Module selected, select the download button.



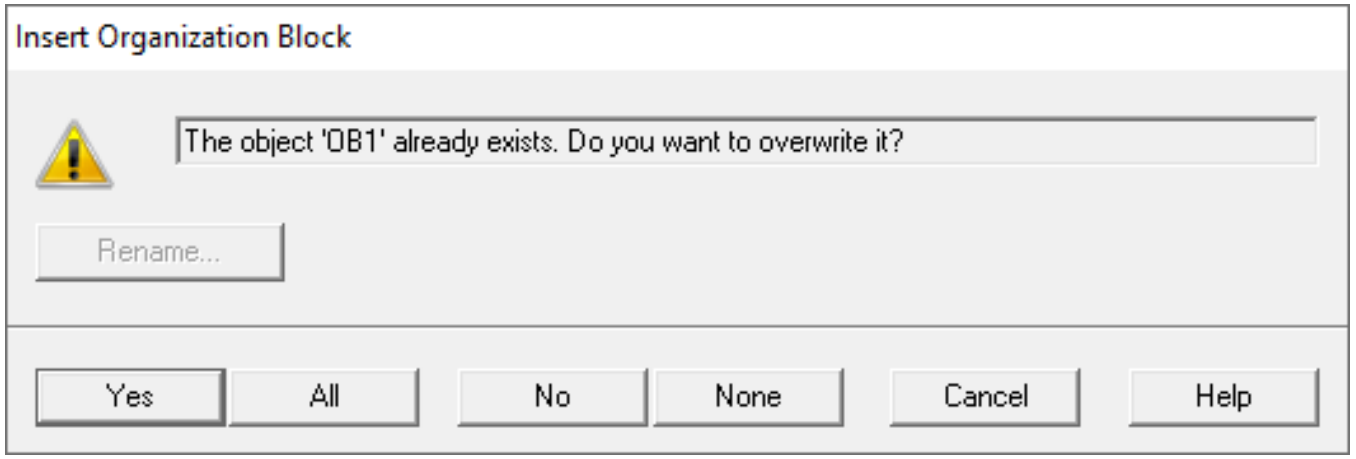
PLC configuration

You will receive the popup below. Select Yes.



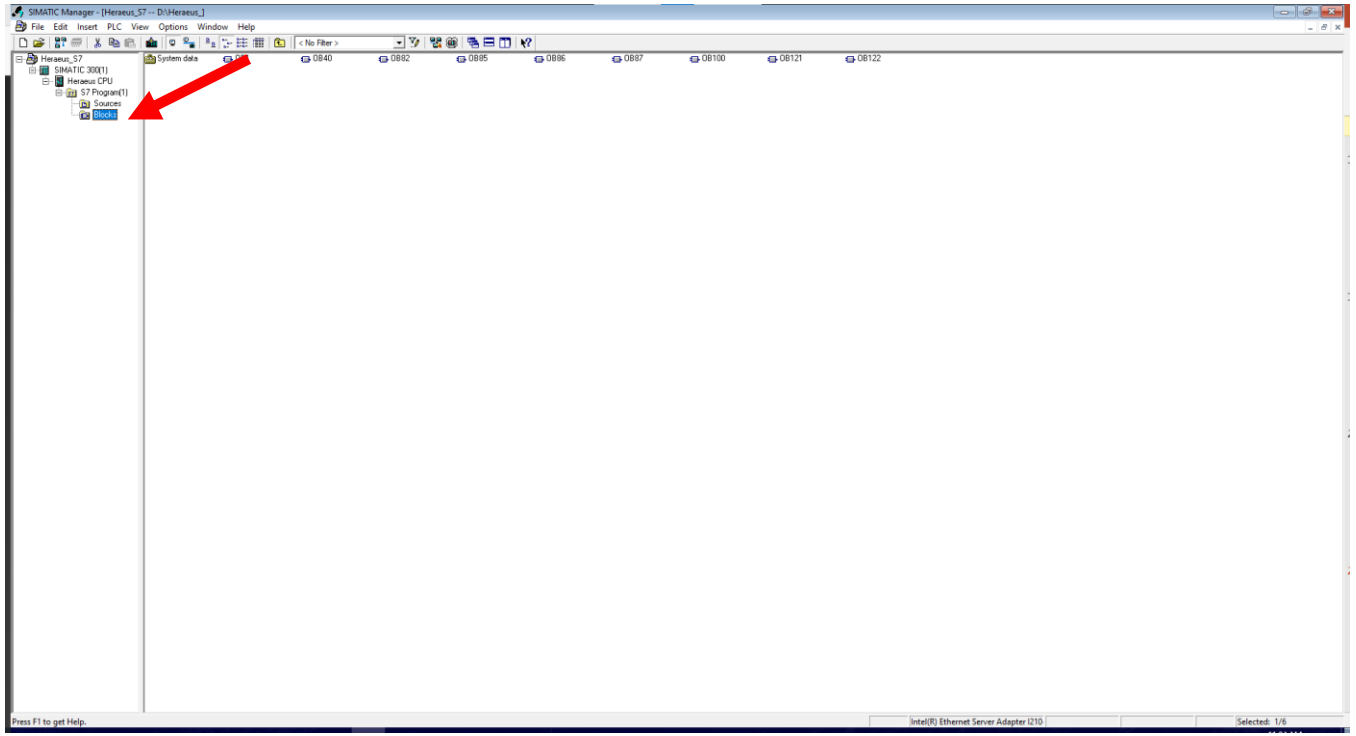
PLC configuration

When the next popup appears select All. Note: be sure that you are using the most up to date version of the program available as this will override all the program blocks.



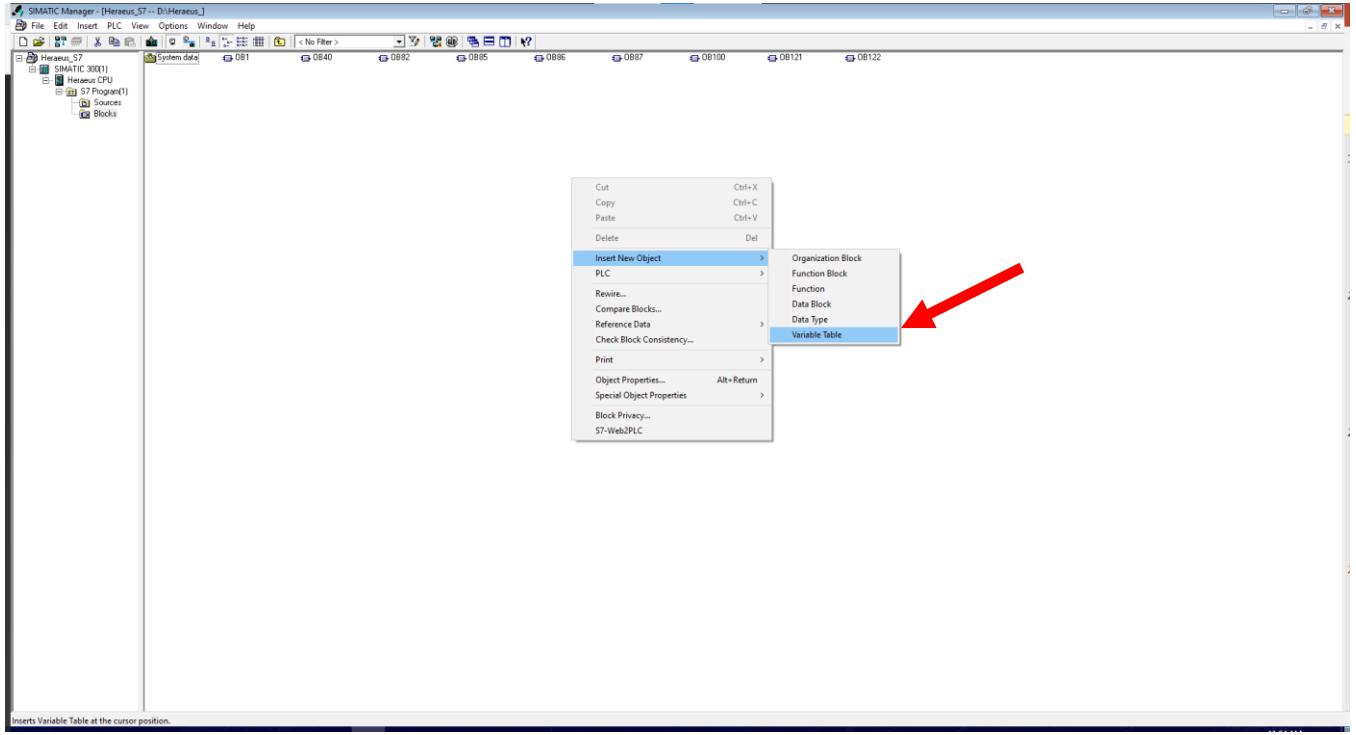
PLC configuration

Next, we will create a variable table to view the data. Return to the SIMATIC Manager and select the drop downs until you get to blocks.



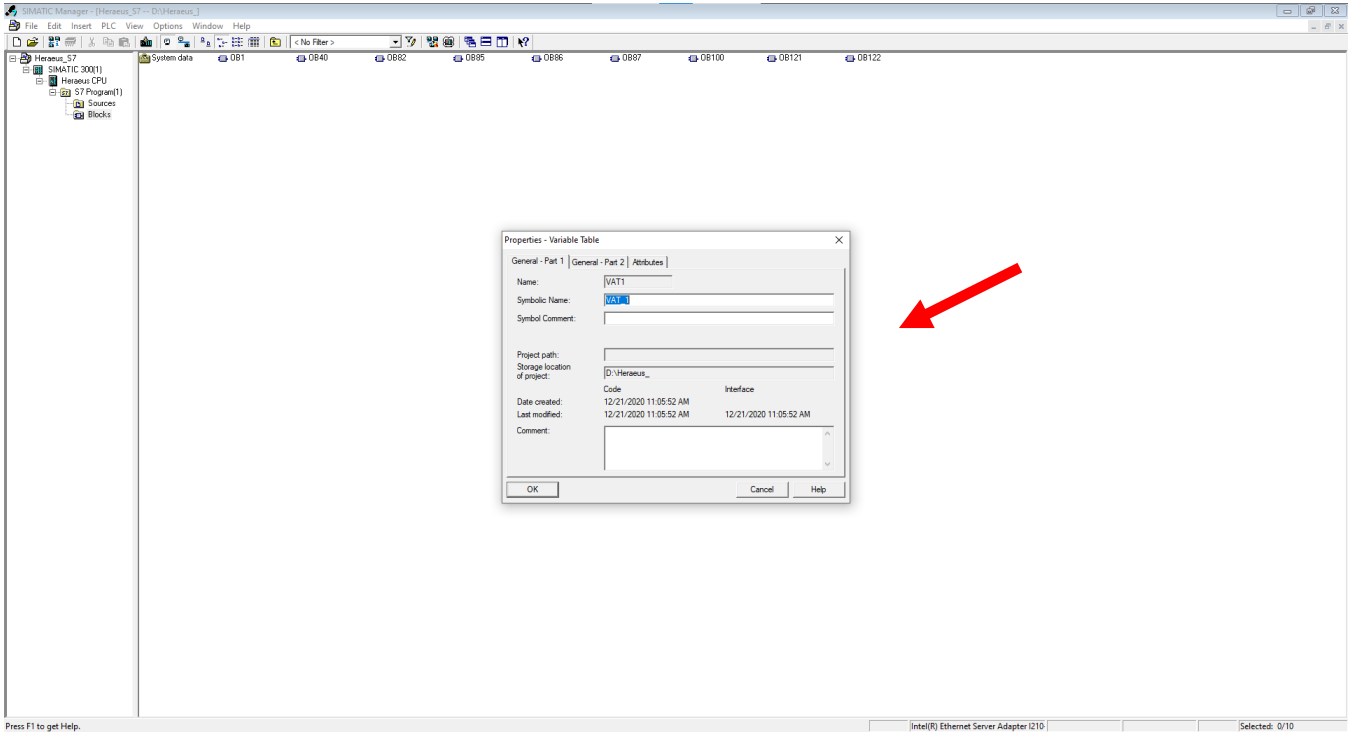
PLC configuration

Right click anywhere on the blocks screen and select “Insert New Object” and “Variable Table”.



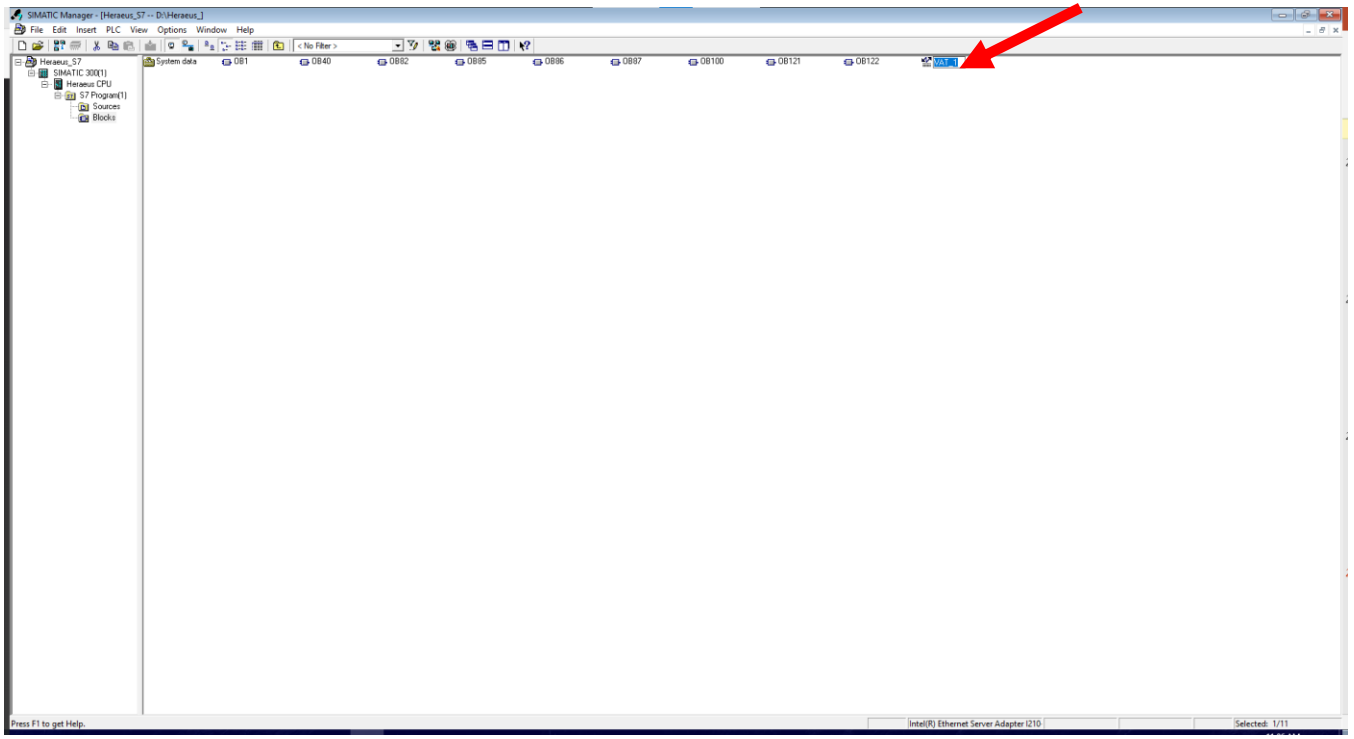
PLC configuration

You may name this table anything you want.



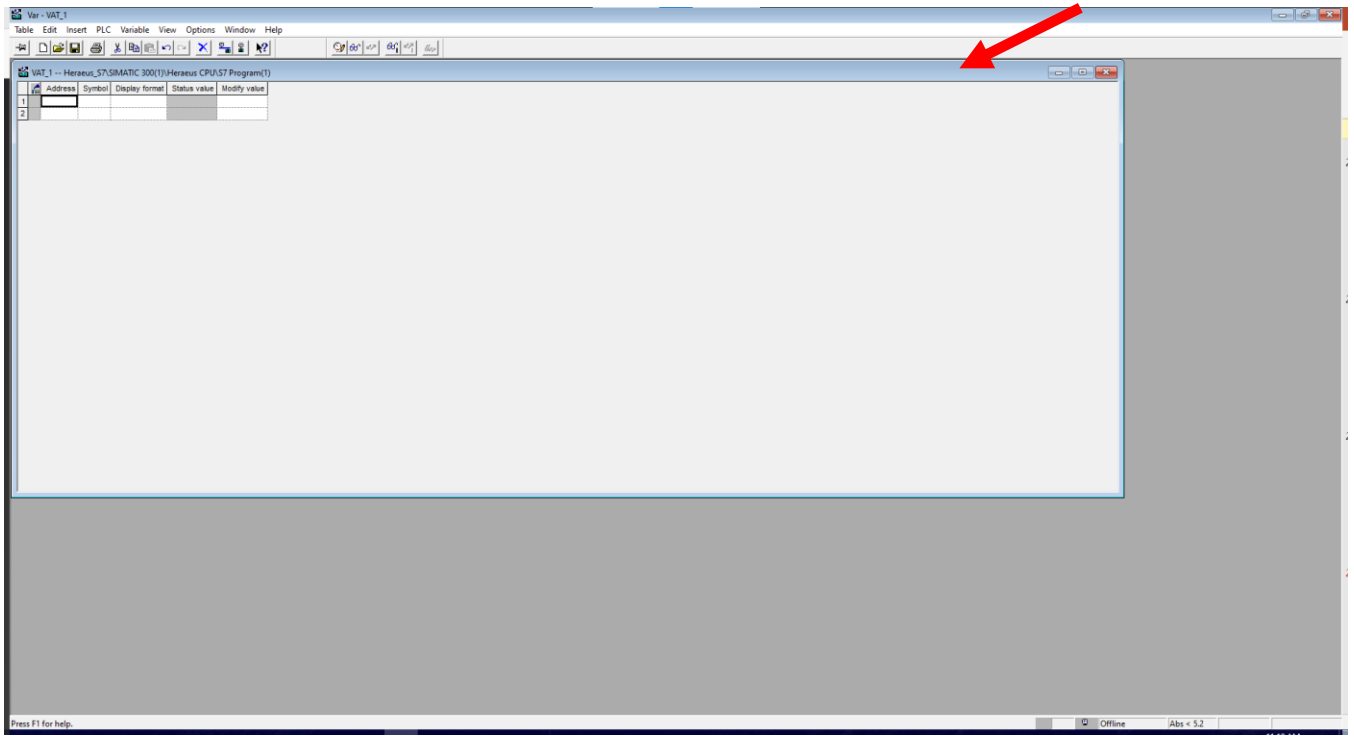
PLC configuration

Double click on the variable table you created.



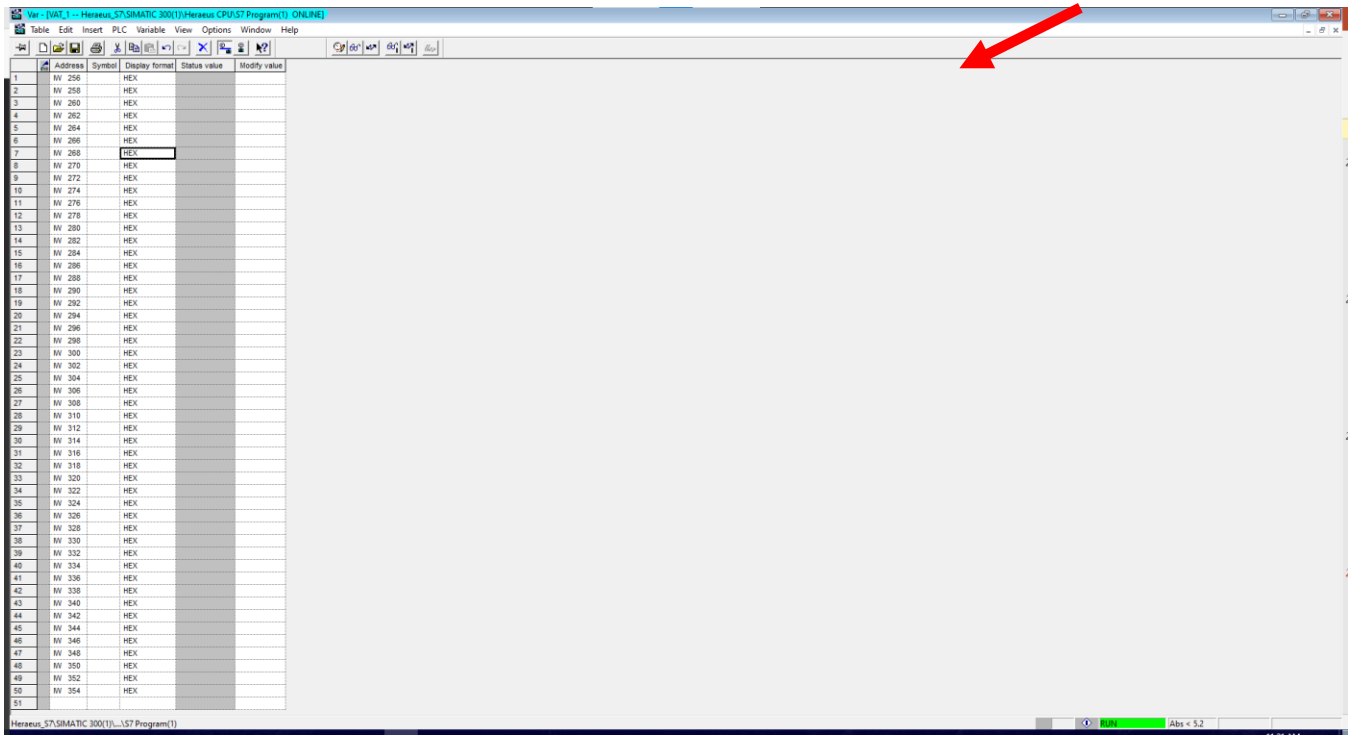
PLC configuration

The new window will open. Under Address type to the address of the EL6631-0010. In this example our Inputs start a 256 and Outputs start at 256. We will add the first 50 word starting at 256.



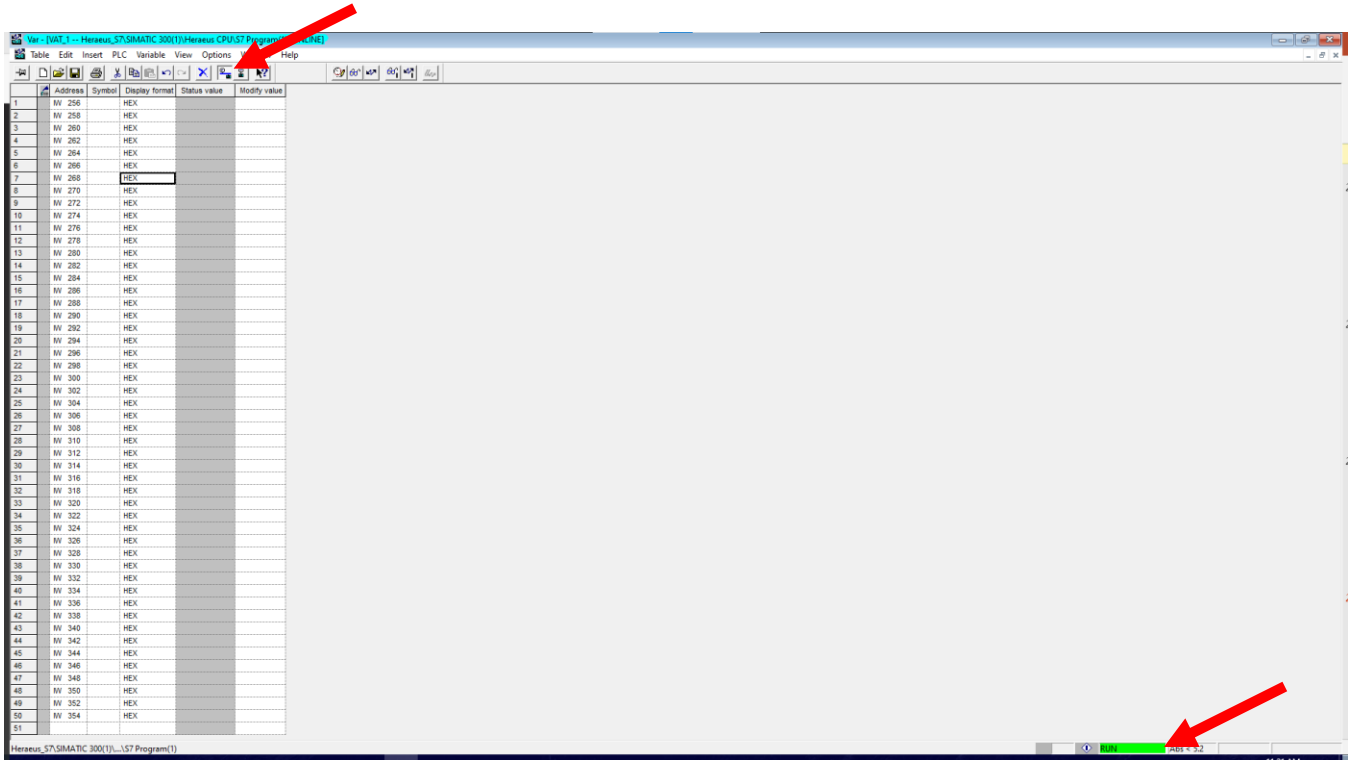
PLC configuration

The new window will open. Under Address type to the address of the EL6631-0010. In this example our Inputs start at 256 and Outputs start at 256. We will add the first 50 word starting at IW256.



PLC configuration

Next select go live with the CPU. Select the online button. You will see RUN in the bottom right corner when online.



PLC configuration

Select the Monitor Variable button. This will cause the status variables to populate. Now you will see the data being sent from the el6631-0010. From here this is where you can monitor test data from the Heraeus SLS.