Rockwell Studio5000 SCADA

Software Instructions

V1.0

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1) **Rockwell Studio5000 SCADA Software Instructions**

2) **Contents:**

1) Overview

Studio 5000 Logix Emulate is a software application that can simulate the behavior of Logix5000™ controllers. Studio 5000 Logix Emulate allows user to experiment with and debug the application code in a controlled environment without the need to invest in Logix5000 controllers and I/O modules. Studio 5000 Logix Emulate also allows the testing of HMI applications.

The emulated controller can be programmed and accessed directly from the computer on which Studio 5000 Logix Emulate is installed or remotely through FactoryTalk Linx Gateway.

The simulated controller behaves similar to an actual Logix5000 controllers in most cases.

Instruction consists of 2 parts:

Simple project for PLC and HMI with basic blocks (Analog inputs, Digital inputs, pumps etc.) and instruction bases on DWG. NO SPM-720-001 (Advanced Distillation-Feed system);

Control system for advanced process with Process library by Rockwell Automation bases on DWG. NO. SPM-720-001(Advanced Distillation-Distillation Column and Feed system).

Links:

Studio 5000 Logix Emulate Guide:

https://literature.rockwellautomation.com/idc/groups/literature/documents/gr/lgem5k-gr016_-en-p.pdf

FactoryTalk View Site Edition User's Guide:

https://literature.rockwellautomation.com/idc/groups/literature/documents/um/viewse-um006_-en-e.pdf

FactoryTalk View Machine Edition User's Guide

https://literature.rockwellautomation.com/idc/groups/literature/documents/um/viewme-um004_-en-e.pdf

Logix 5000 Controllers General Instructions Reference Manual:

https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/1756-rm003_-en-p.pdf

Rockwell Automation Library of Process Objects

https://literature.rockwellautomation.com/idc/groups/literature/documents/pp/proces-pp008_-en-e.pdf

PlantPax Application Configuration

https://literature.rockwellautomation.com/idc/groups/literature/documents/um/proces-um003_-en-p.pdf

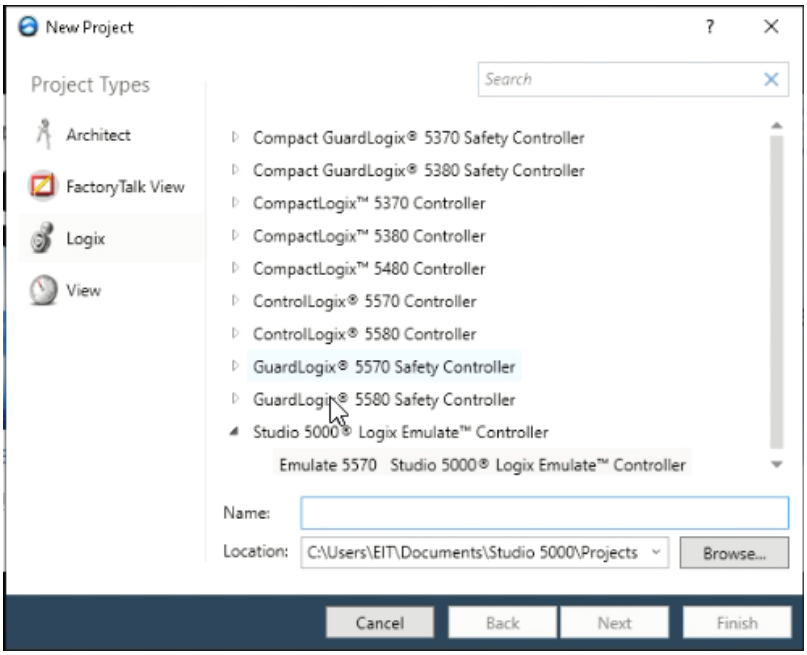
Process library (PlantPax):

https://compatibility.rockwellautomation.com/pages/search.aspx?crumb=117&q=PlantPAx%20Library

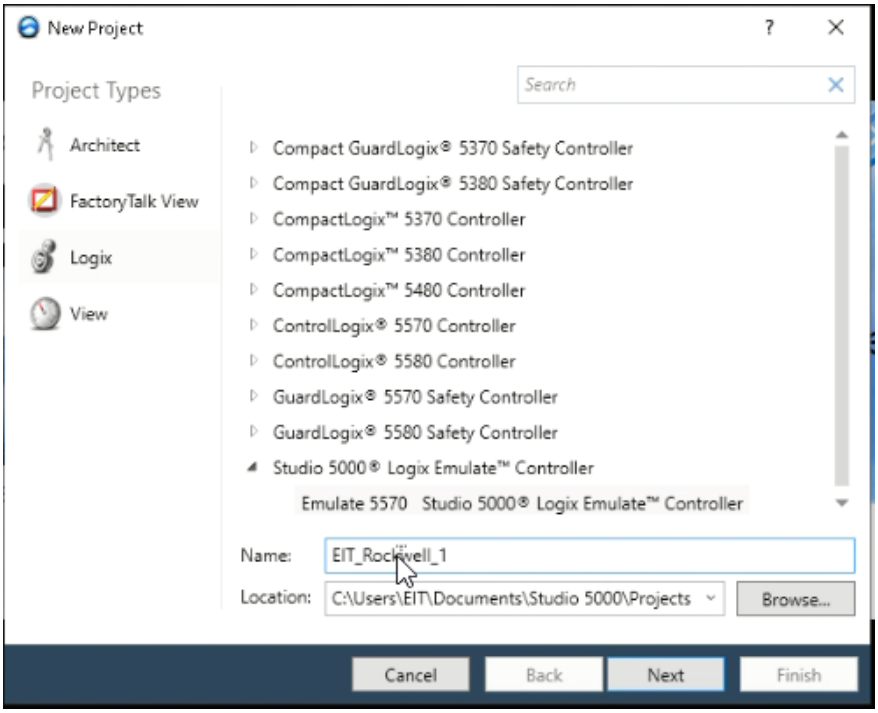
2) Emulate

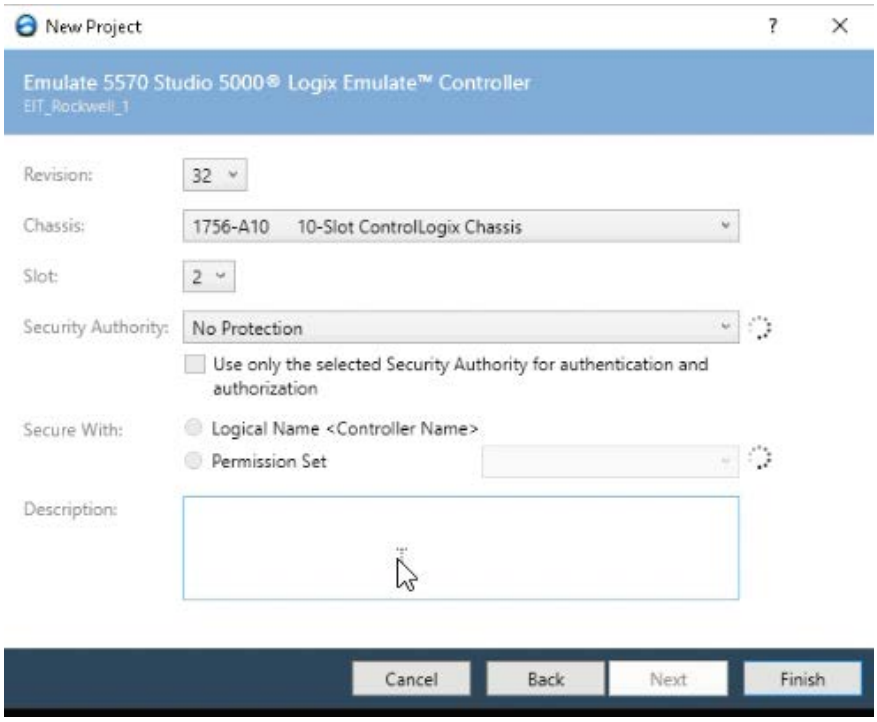
2.1 Create a new project in Studio5000

Step 1. Start Studio5000 and create a new project using the Studio 5000 Logix Emulate controller type.

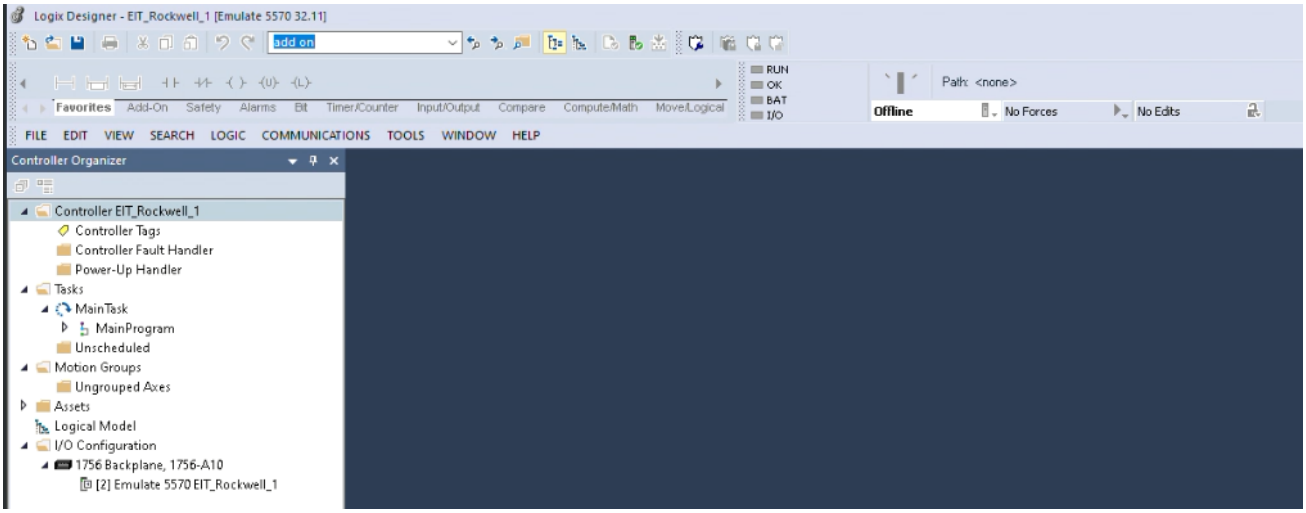


Step 2. Name your new project “EIT_Rockwell_1”.





Step 3. Controller Organization in LogixDesigner

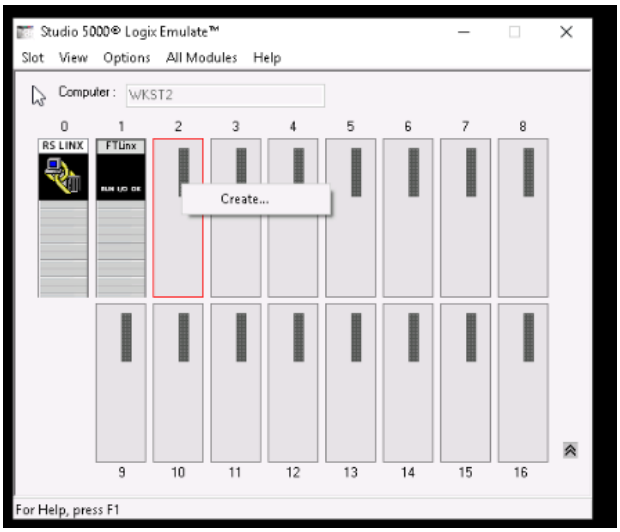


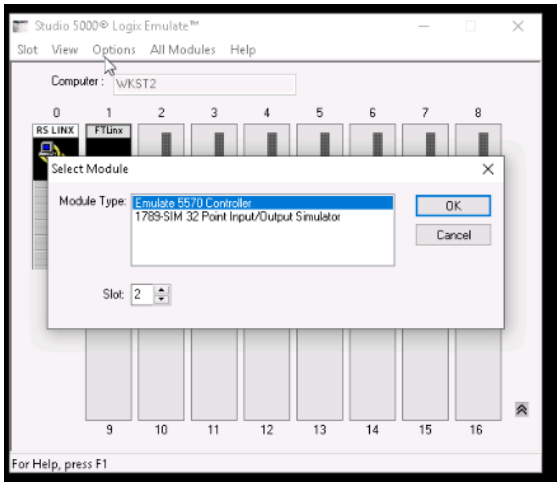
We have project with configuration for simulation in LogixDesigner. Before we start simulation, we need to start emulator and create HW configuration for our simulation.

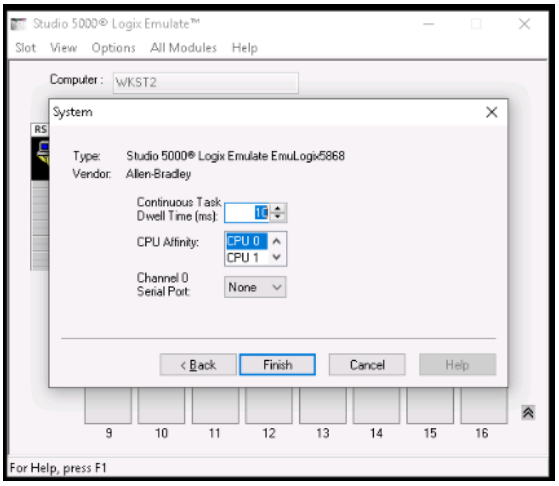
2.2 Create a new HW configuration in Studio5000 Logix Emulate

Step 1. Click Start > All Programs > Rockwell Software > Studio 5000 Logix Emulate. The Studio 5000 Logix Emulate window opens.

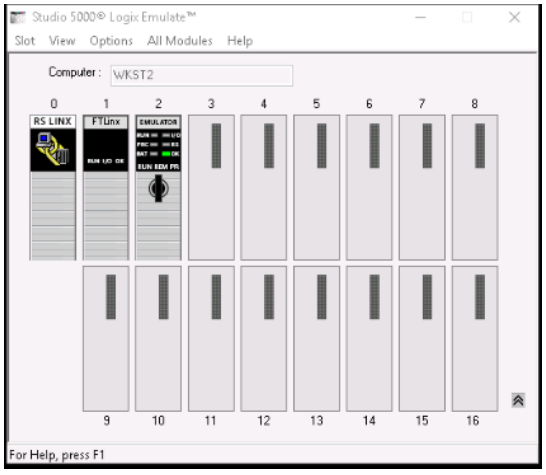
Step 2. Create a new plc in a Rack. Select Emulate 5570 Controller in Module type list.

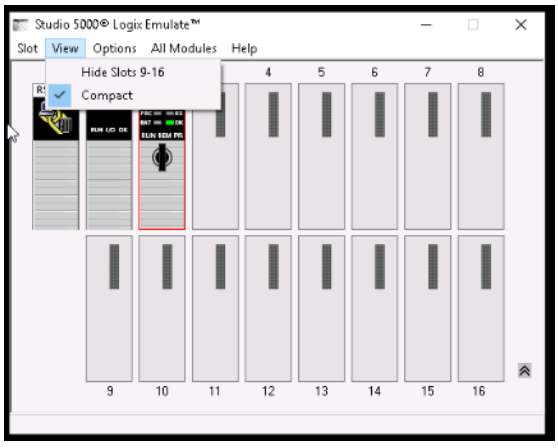






Leave all setting as it is and press “Finish”





Slots 9-16 can be hidden as they are not in use, to make the virtual chassis take up less screen space.

2.3 Downloading project from Logix Designer to Logix Emulate

Downloading a new project will overwrite the existing program in the CPU (real CPU or simulator). One should be careful during this step and make sure that the correct program is being downloaded to the correct CPU.

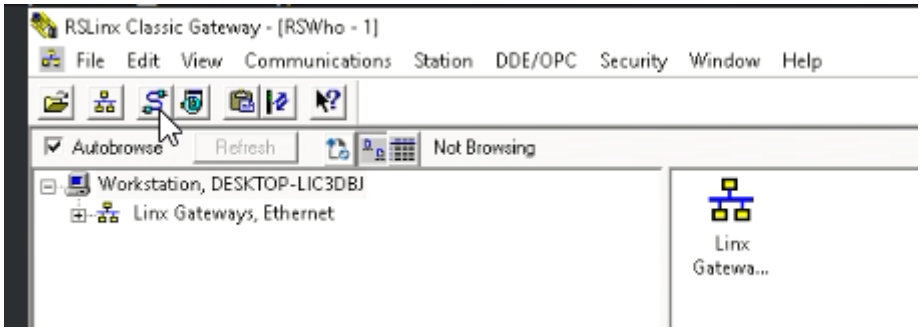
There are some important rules which you have to follow:

- RSLinks drivers should be configured correctly with the correct path to the CPU
- Configure the Studio 5000 Logix Designer project to match the configuration of the virtual chassis

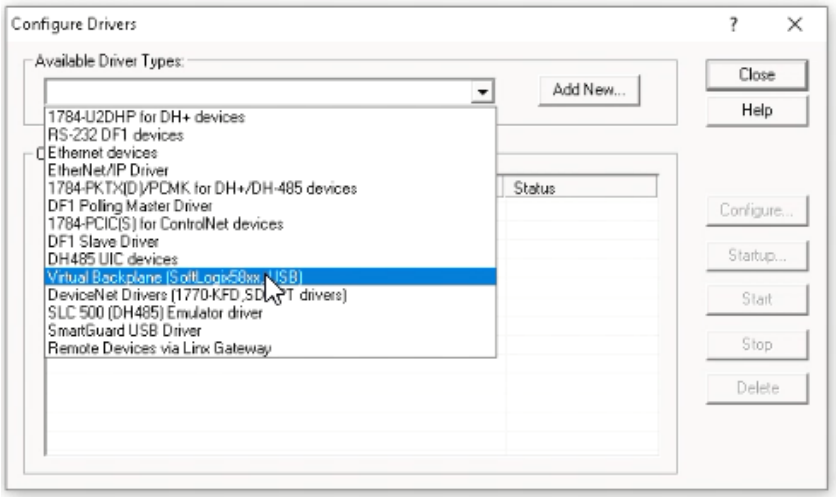
Before the program is downloaded to PLC the software will compile the program and check for errors, if program compiles successfully without errors then downloading to the PLC is possible.

Before downloading we need to configure our driver for Studio 5000 Logix Emulate and then check the path to CPU.

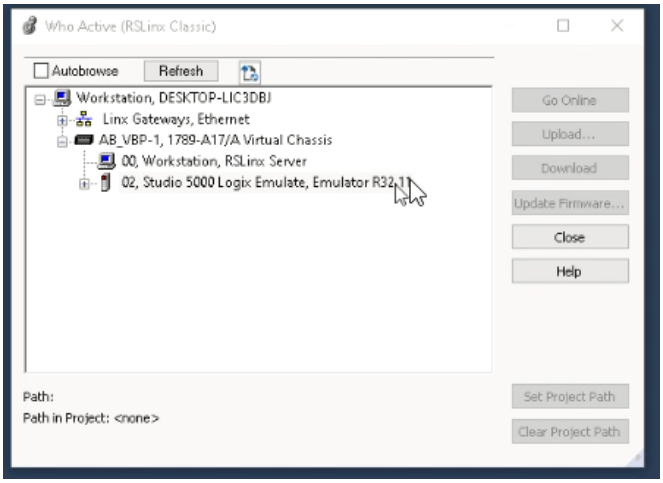
Step 1. Open RSLinx. Start > All Programs > Rockwell Software > RSLinx Classic. The Studio 5000 Logix Emulate window opens. Create new driver for our simulator. Select “Configure driver”



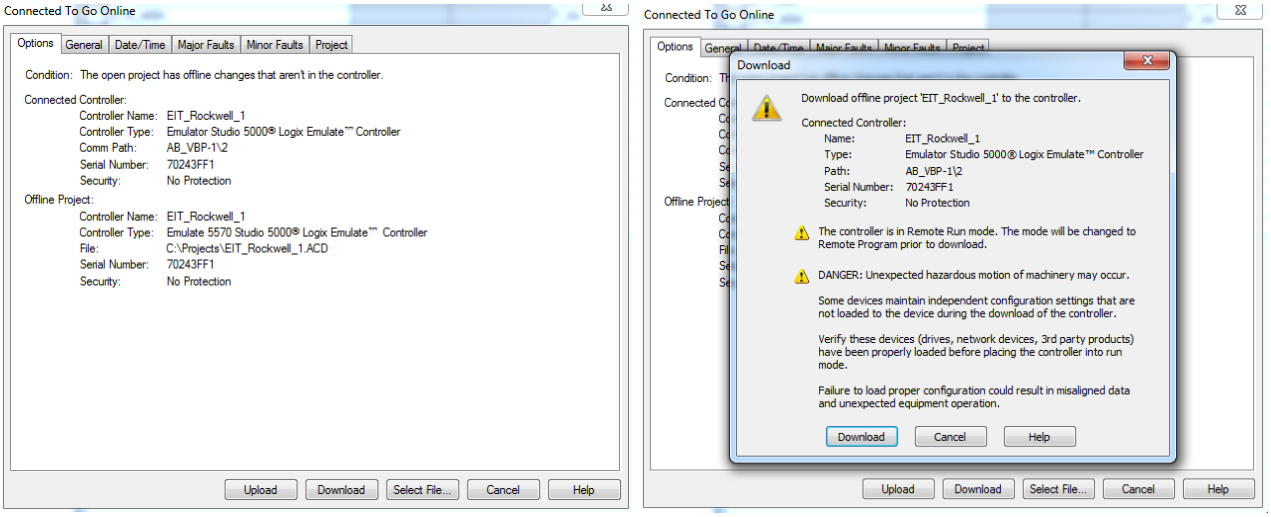
Choose “Virtual Backplane” from Available driver types and add it. Leave all settings as they are.



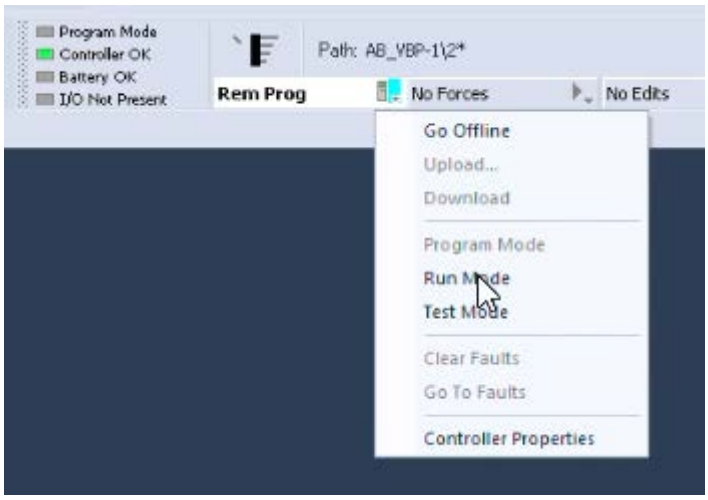
Step 2. Choose correct CPU and click “Go online”

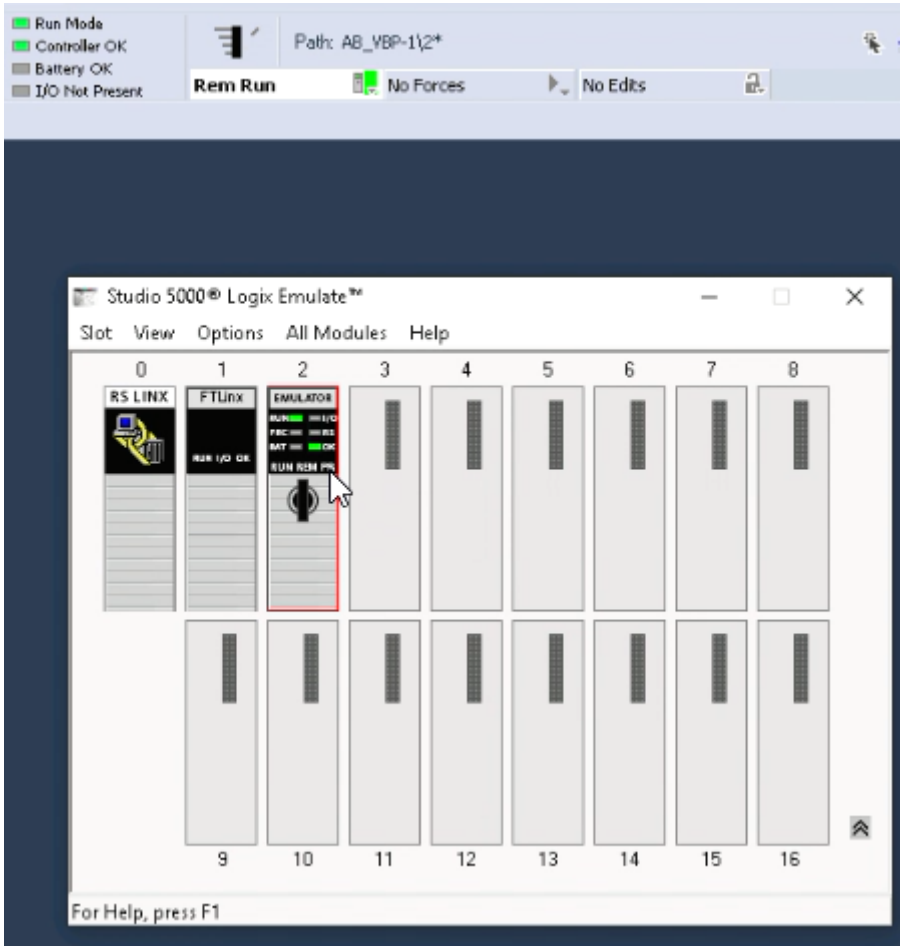


Step 3. Go ahead and download your program



Step 4. Change the mode of CPU. Switch CPU to run mode.



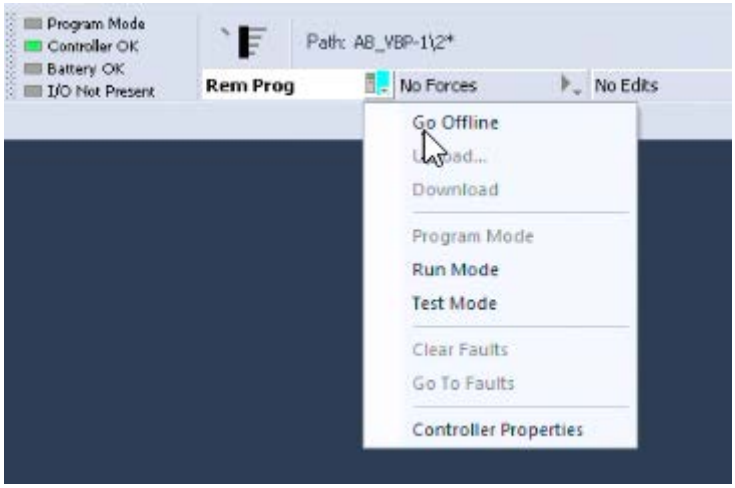


Now we are online and can see how our program works.

3) LogicDesigner

4.1 Create project in LogixDesigner

Step 1. Go offline. Add customs library to the project.



Go to “Controller organizer”, select “Add-On Instructions”, right-click -> “Import Add-On Instructions”. We need to add P_Ain, P_Din, P_Motor, P_PIDE and P_ValceC instructions. You can read more about these instructions here:

P_Ain -https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/syslib-rm001_-en-e.pdf

P_Din https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/syslib-rm003_-en-e.pdf

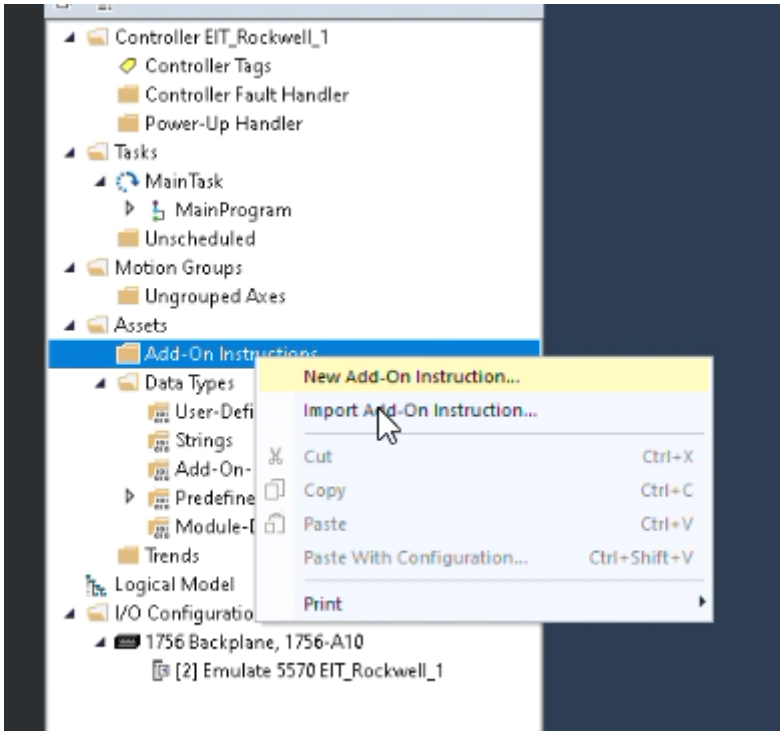
P_Motor https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/syslib-rm006_-en-e.pdf

P_PIDE

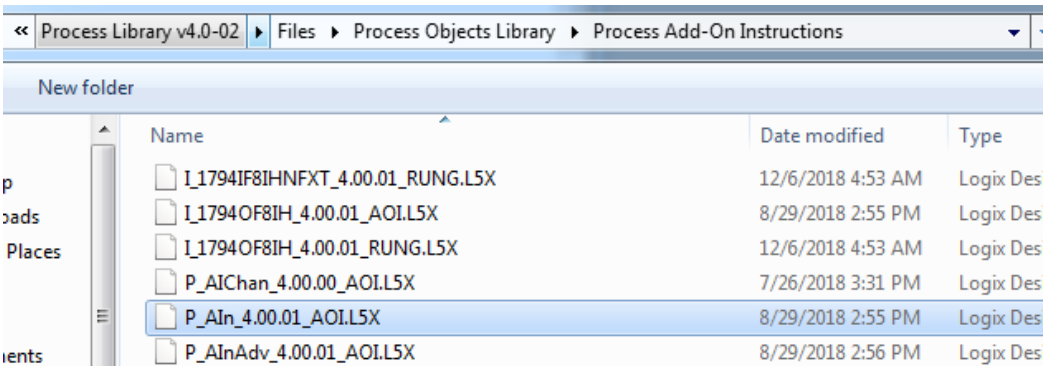
https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/syslib-rm045_-en-p.pdf

P_ValveC

https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/syslib-rm034_-en-p.pdf

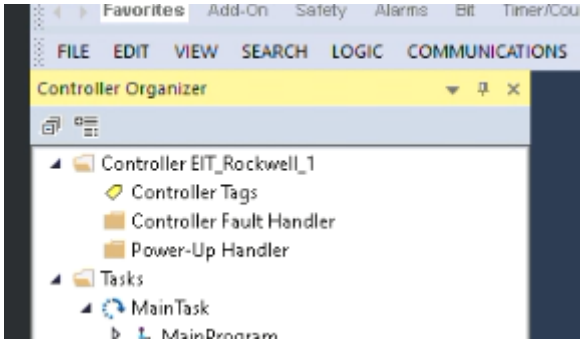


Select the folder containing the Process library. Select elements which you want to add. Go to folder /Files/Process Objects Library/ProcessAdd-on Instruction and click “Open”.

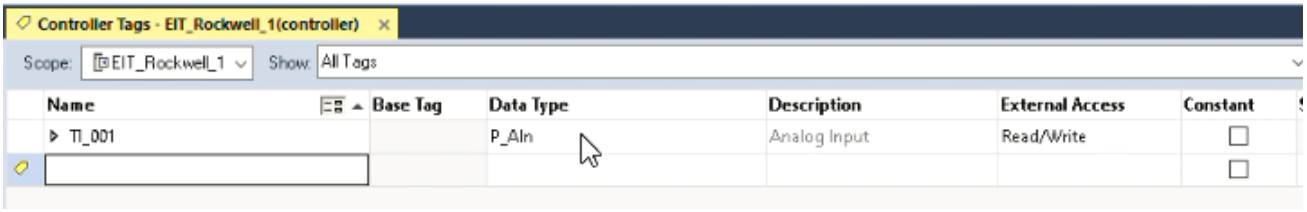


Now we have some elementary blocks in our program.

Step 2. Add variables. Controller Tags -> Edit Tags

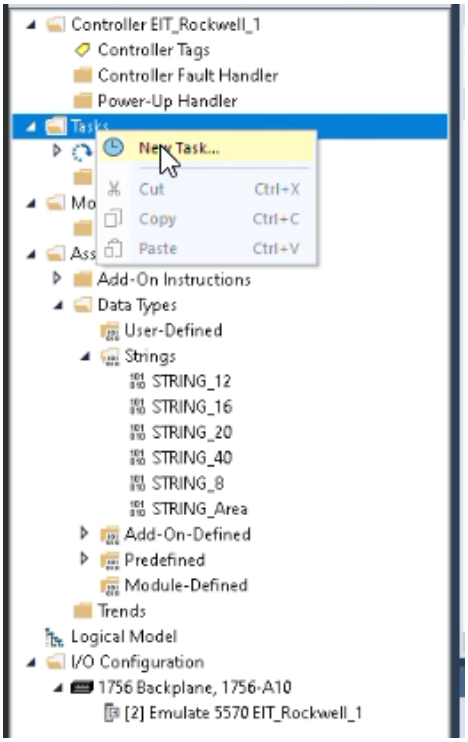


Create tag “TI_001” and choose P_Ain as Data Type for this tag.



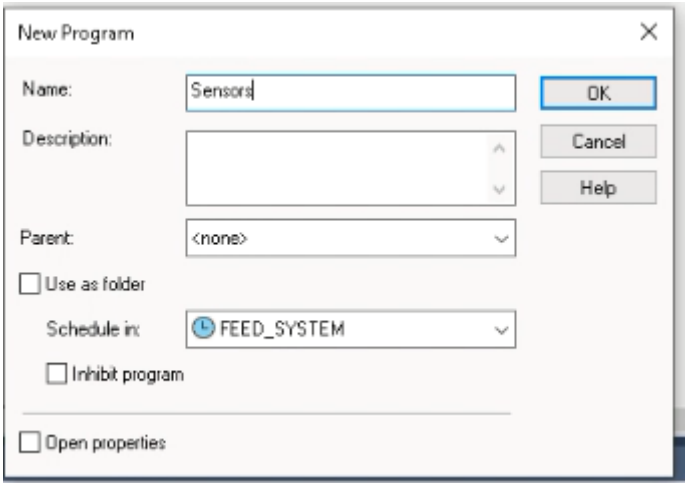
Step 3. Create task and program.

Create the task for TI_001. Go to “Controller organizer”, select “Tasks”, right-click -> New Task. Call it “FEED SYSTEM”. Leave all setting as it is.

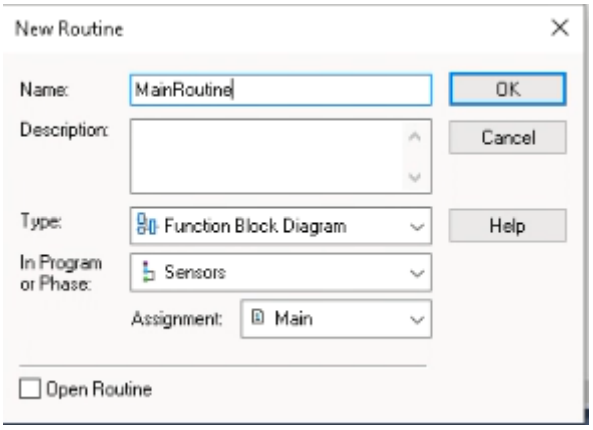


Go to “Controller organizer”, select “Tasks”, right-click -> New Task. Call it “FEED SYSTEM”. Leave all setting as it is.

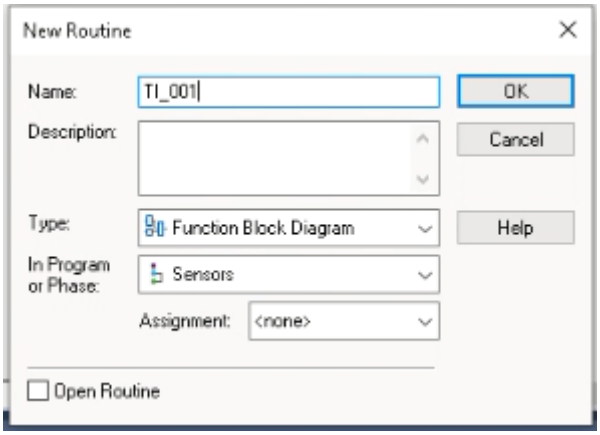
Create program for “TI_001”. Go to “Controller organizer -> Tasks->FEED SYSTEM”, select “FEED SYSTEM”, right-click -> New program. Call it “Sensors”.



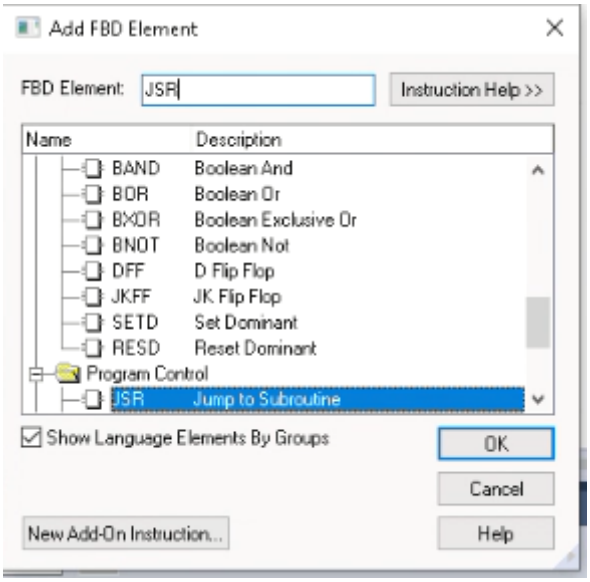
Now we need to create main routine for all routines of our tasks and routine for TI_001.



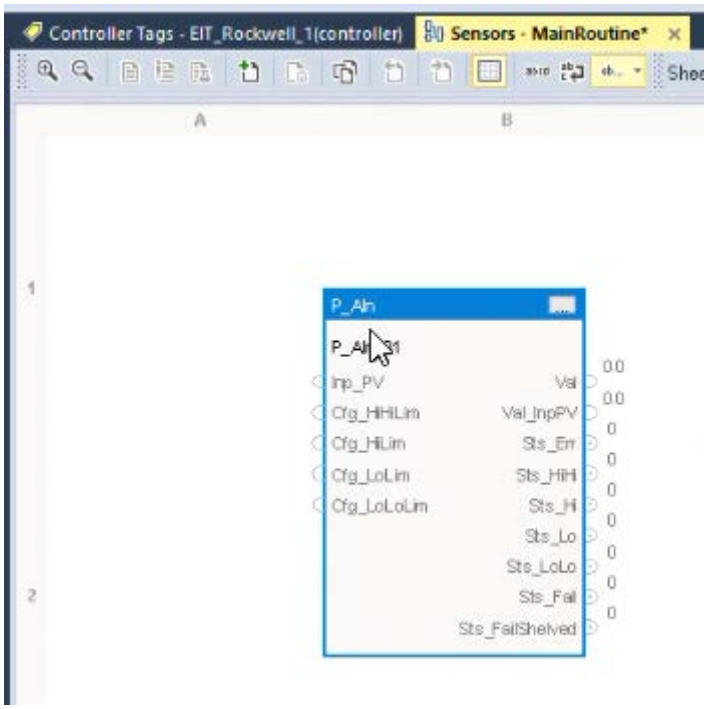
For TI_001 we need to select FBD Type.

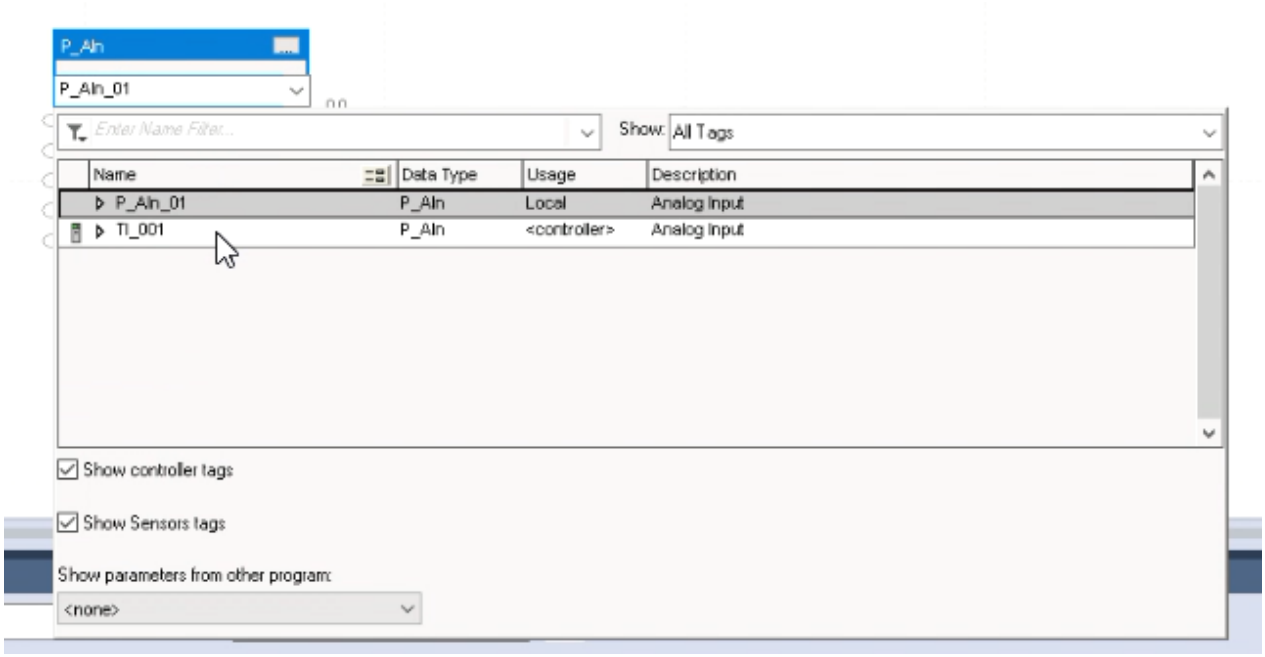


Add JSR control element and select “TI_001” routine there.



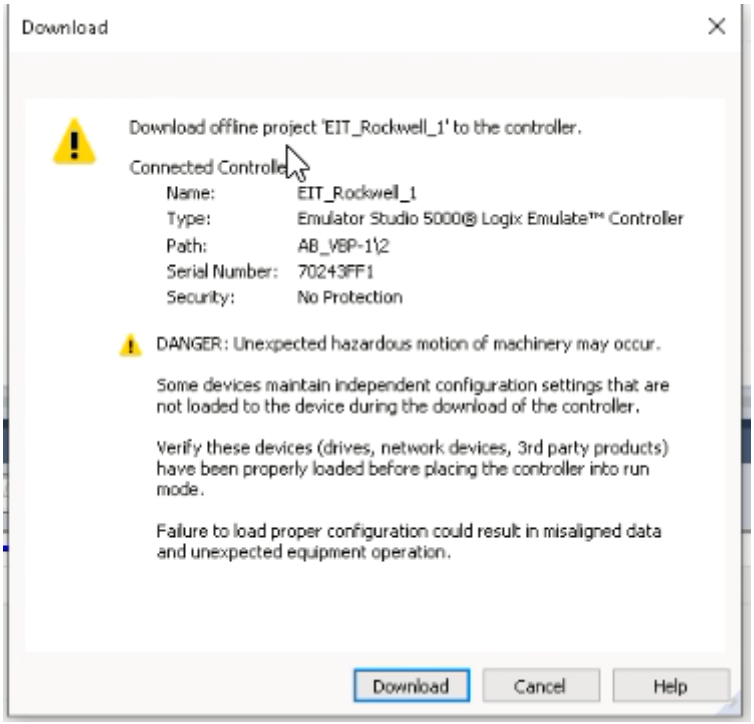
In TI_001 program add block P_Ain from “Add_on”. Select P_Ain TI_001.

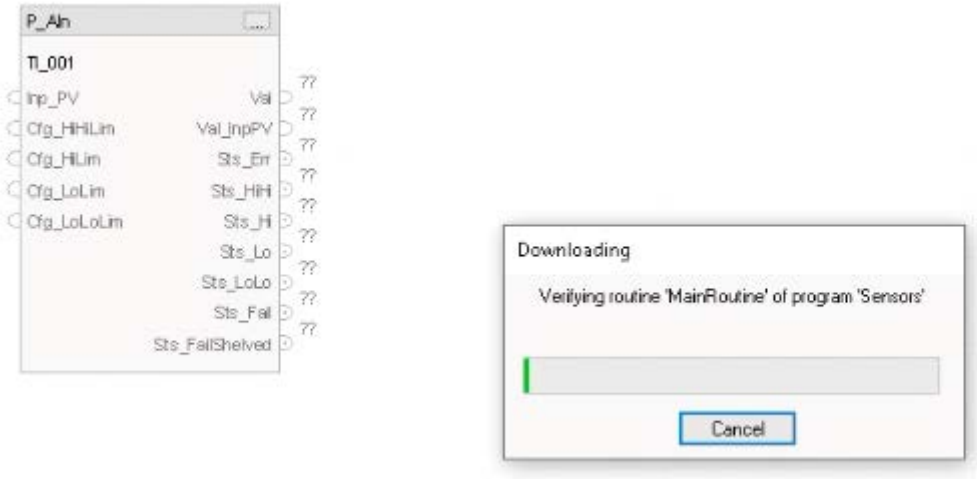




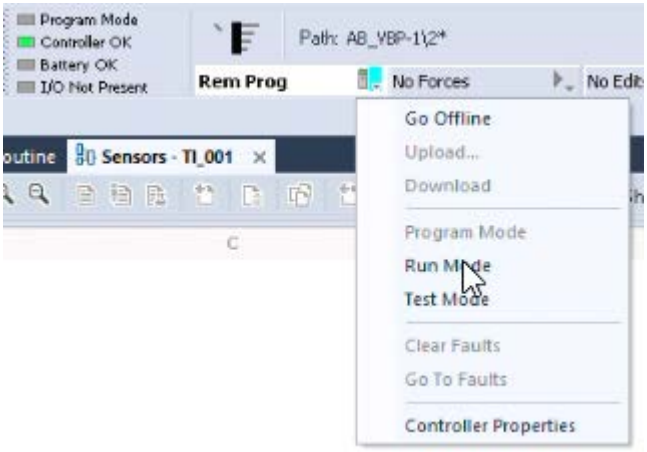
4.2 Downloading project from Logix Designer to Logix Emulate

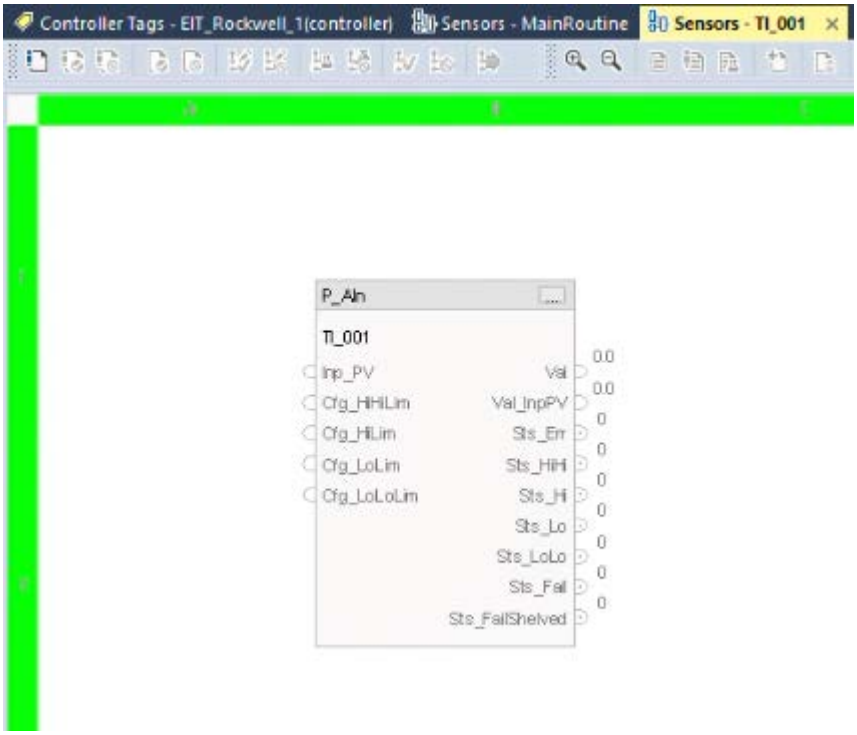
Step 1. Verify and download the program.





Step 2. Change controller mode to Remote Run.



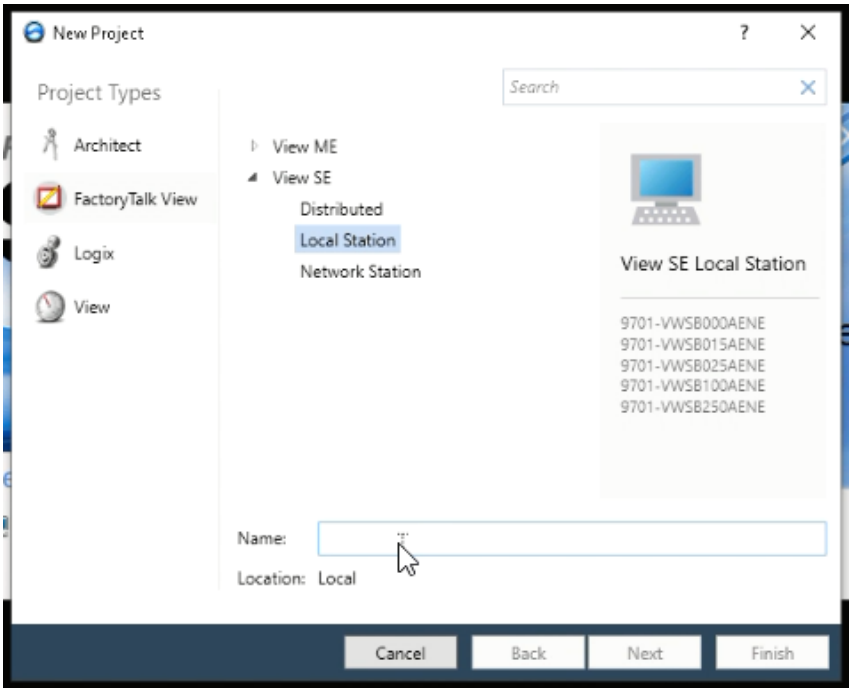


Now we can debug and correct our program in online mode.

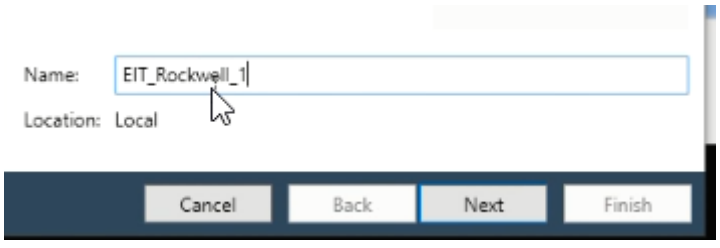
4) FactoryTalk

5.1 Create a new project in FactoryTalk

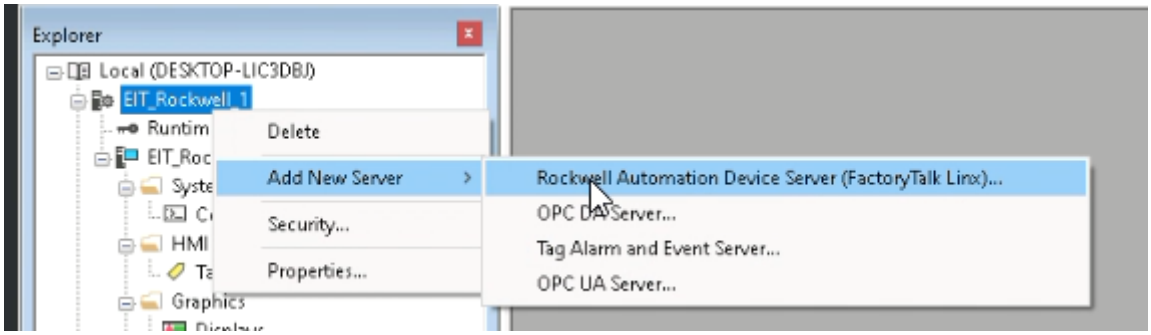
Step 1. Start FactoryTalk and create a new project (Site Edition).



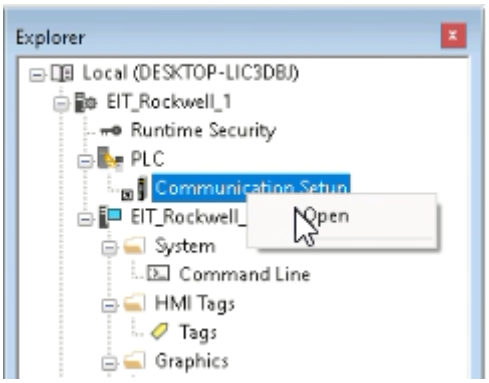
Step 2. Name your new project "EIT_Rockwell_1".

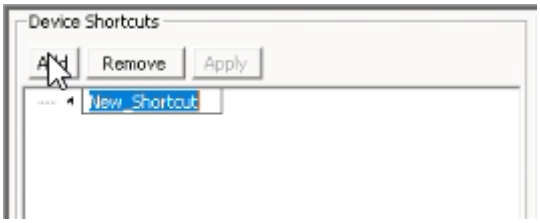


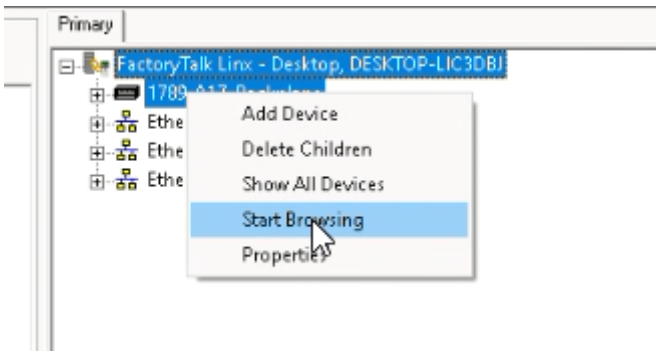
Step 3. Add new server. Go to "EIT_Rockwell_1", right-click -> Add New Server. Select Rockwell Automation Device Server (FactoryTalk Linx)

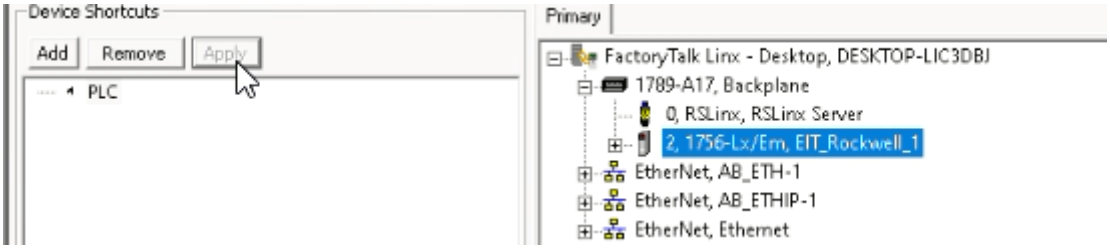


Step 4. Add connection to the plc. Open communication server and add new plc. Find and select online plc for this project (it can be emulator or real plc). Both real and simulated PLC will show up in the list and the user can select any PLC which he wants to connect with.

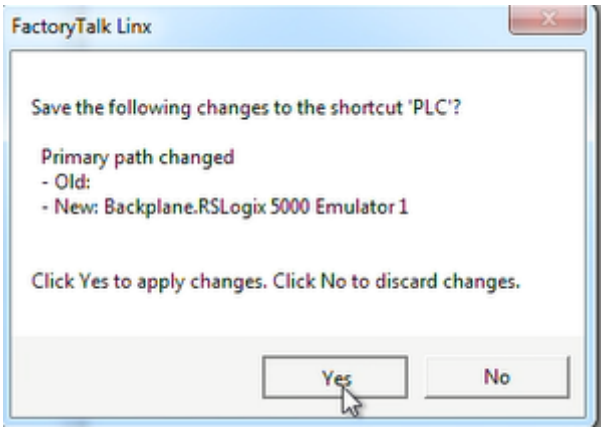




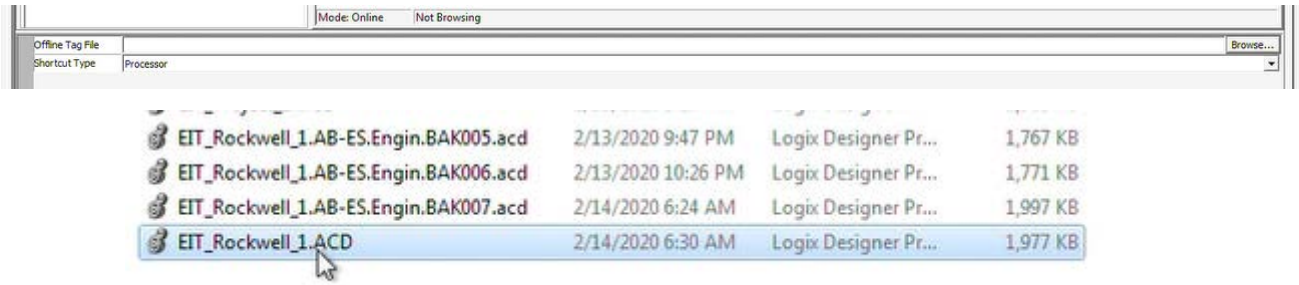


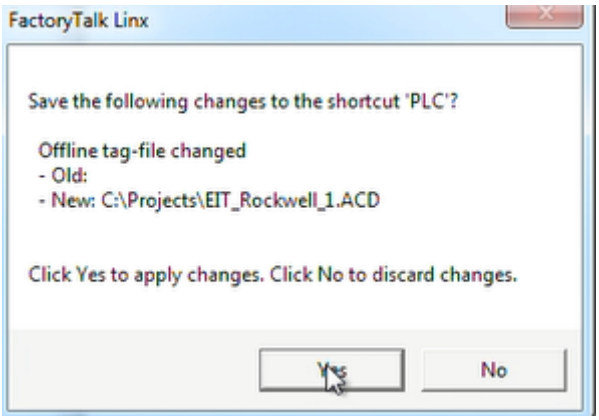


As shown above we have selected the emulated PLC here. Apply changes

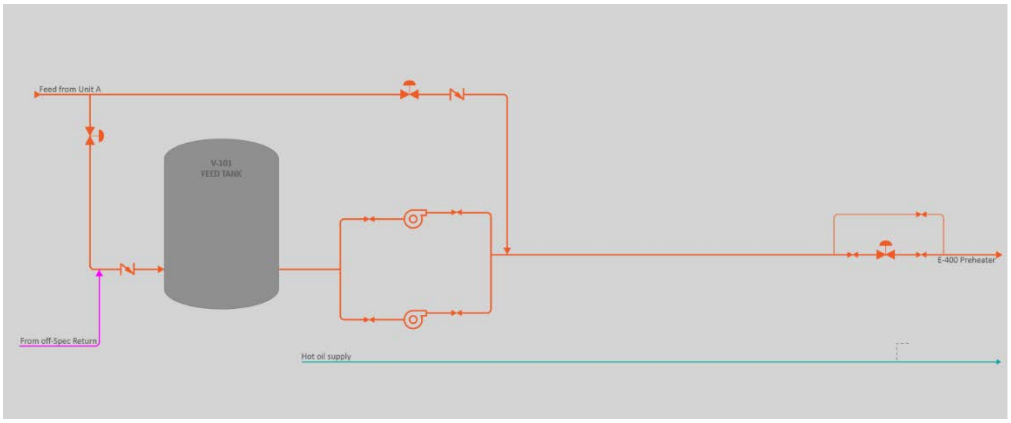


Select your plc project, verify and apply.

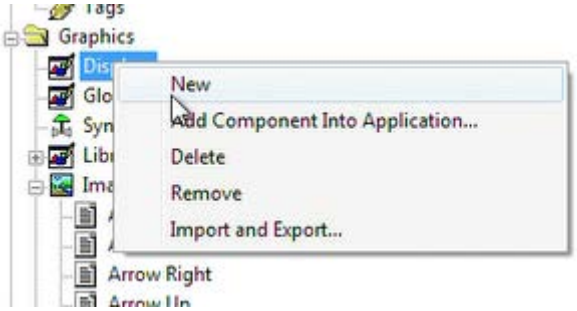


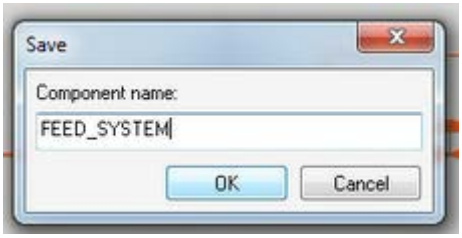


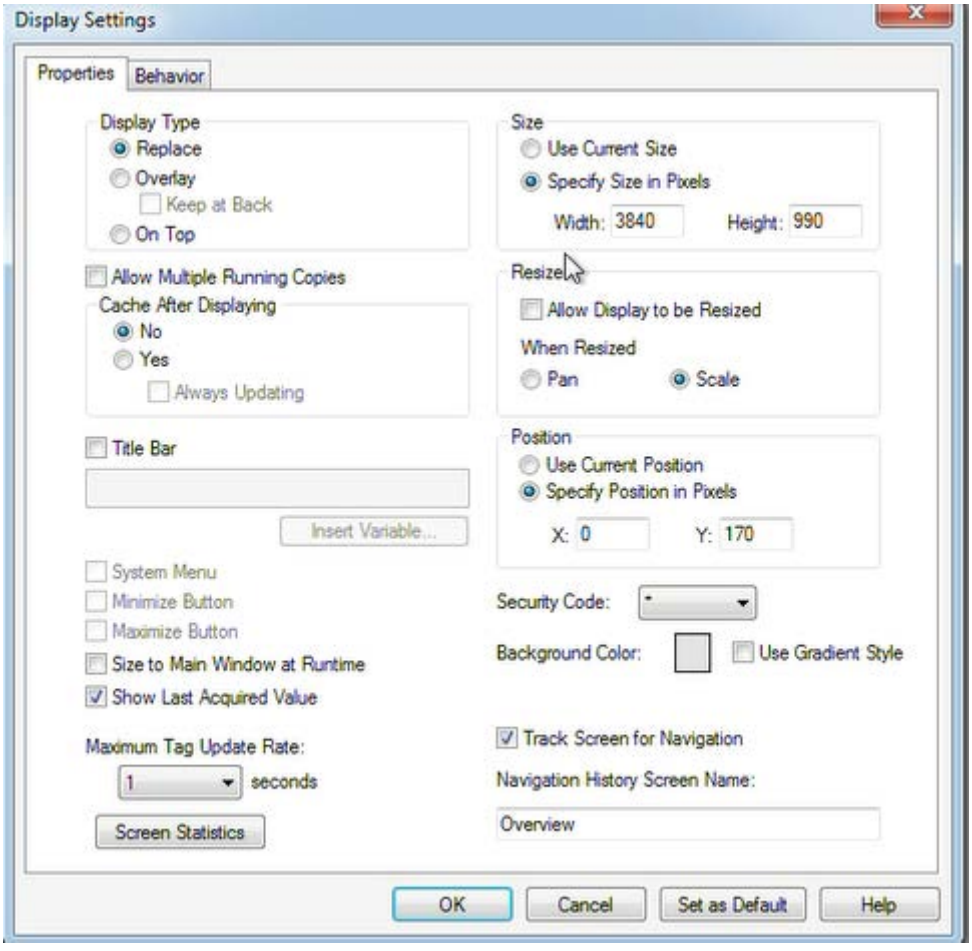
Step 5. Create display for your application. Make simple background for display acc. P&ID. (Advanced Distillation. FEED SYSTEM SPM-720-001. Appendix A)



Create new display with the name “FEED_SYSTEM”

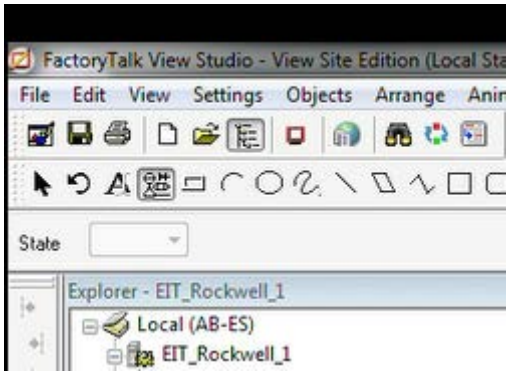

Graphics
New
Add Component Into Application...
Delete
Remove
Import and Export...
Arrow Right

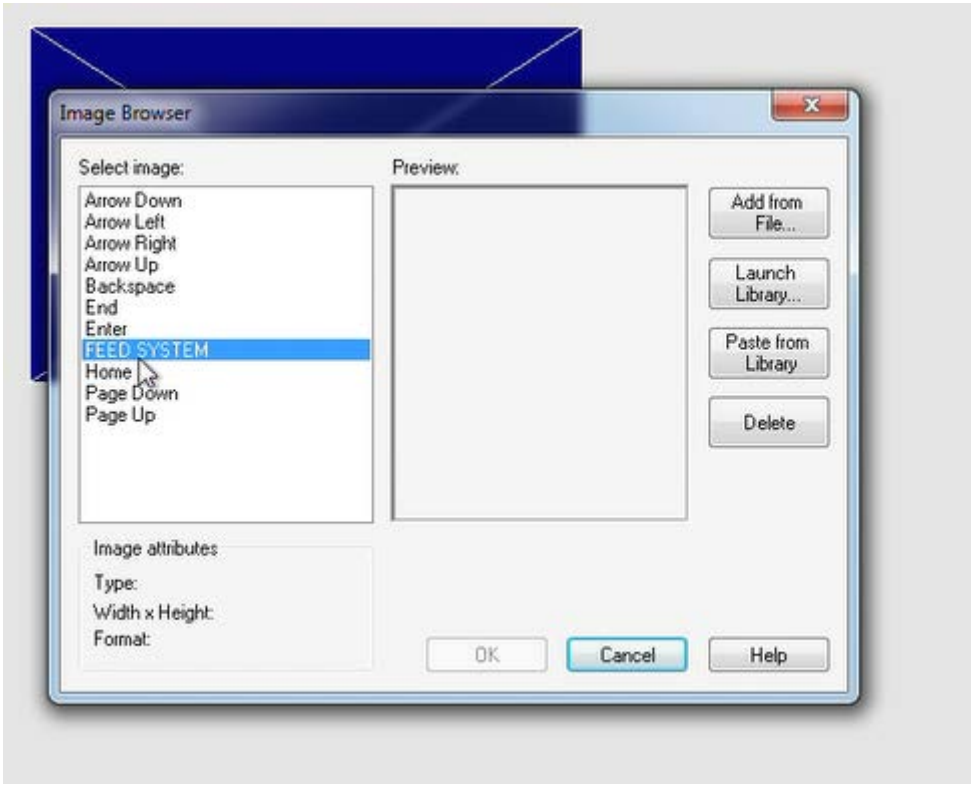

Save
Component name:
FEED_SYSTEM
OK
Cancel


Display Settings
Properties
Behavior
Display Type
Replace
Overlay
Keep at Back
On Top
Allow Multiple Running Copies
Cache After Displaying
No
Yes
Always Updating
Title Bar
Insert Variable...
System Menu
Minimize Button
Maximize Button
Size to Main Window at Runtime
Show Last Acquired Value
Maximum Tag Update Rate:
1
seconds
Screen Statistics
Size
Use Current Size
Specify Size in Pixels
Width: 3840
Height: 990
Resize
Allow Display to be Resized
When Resized
Pan
Scale
Position
Use Current Position
Specify Position in Pixels
X: 0
Y: 170
Security Code:
Background Color:
Use Gradient Style
Track Screen for Navigation
Navigation History Screen Name:
Overview
OK
Cancel
Set as Default
Help


Size
Use Current Size
Specify Size in Pixels
Width: 1500
Height: 618

Step 6. Add background wallpapers in “SYSTEM_FEED” screen.





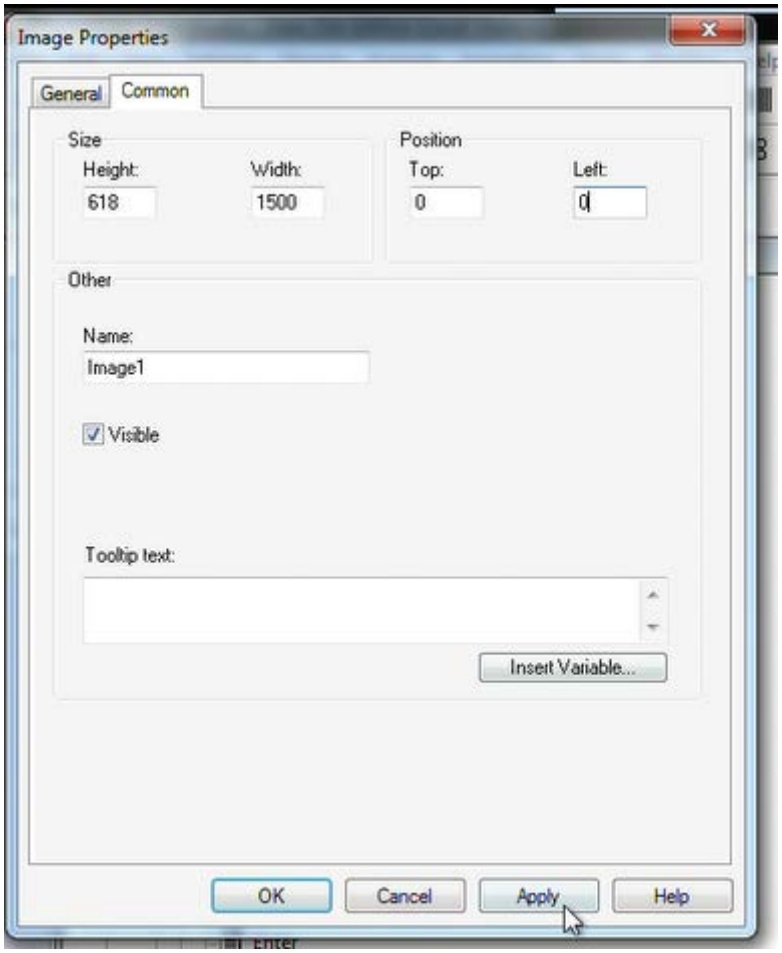
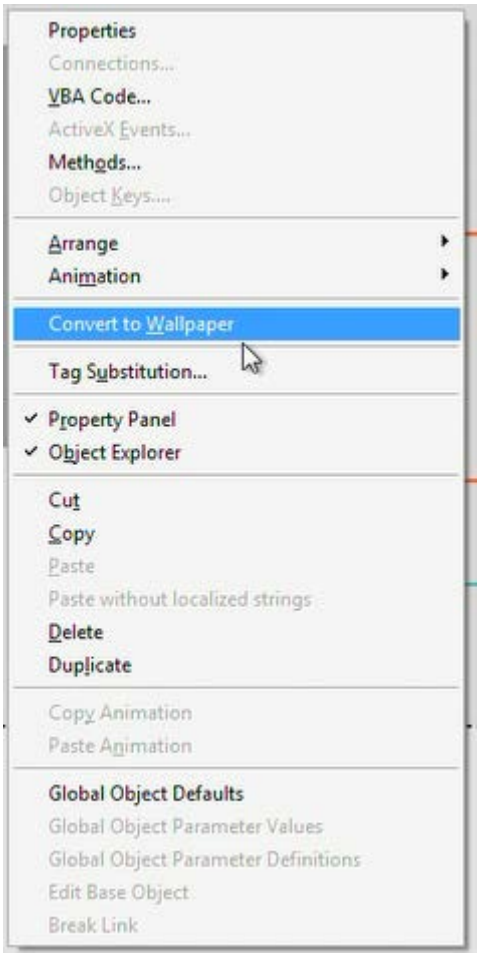
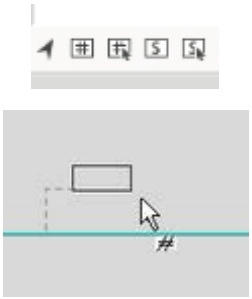


Image Properties
General
Common
Size
Height:
618
Width:
1500
Position
Top:
0
Left:
0
Other
Name:
Image1
Visible
Tooltip text:
Insert Variable...
OK
Cancel
Apply
Help

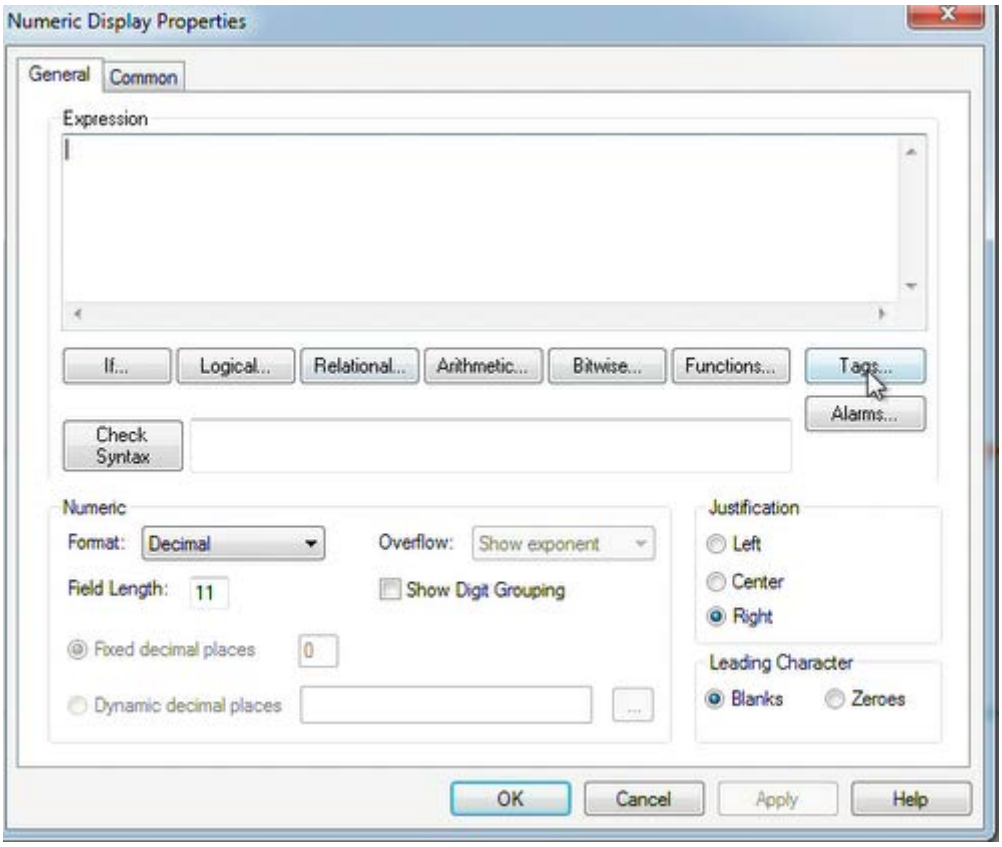


Step 7. Numeric object

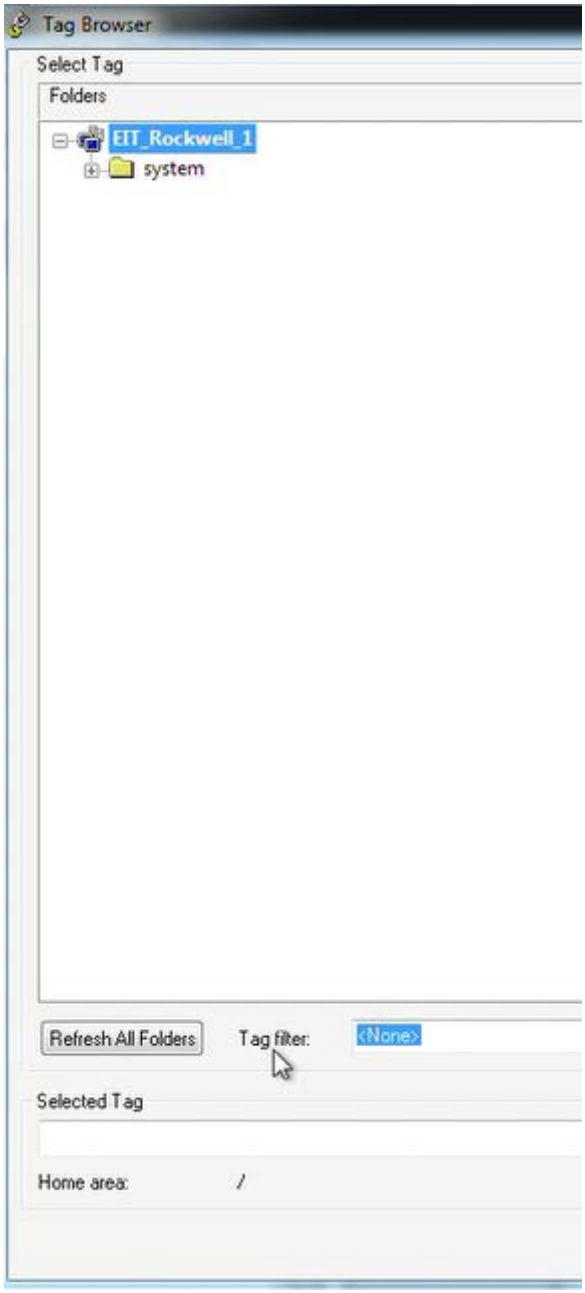
Use the Numeric Display tools  to create objects an operator can use to view tag or expression data at run time. In the Numeric Display or String Display Properties dialog box, specify the tag or expression to display, and the appearance of the display object

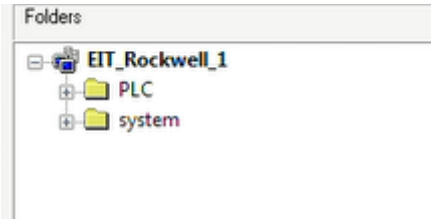


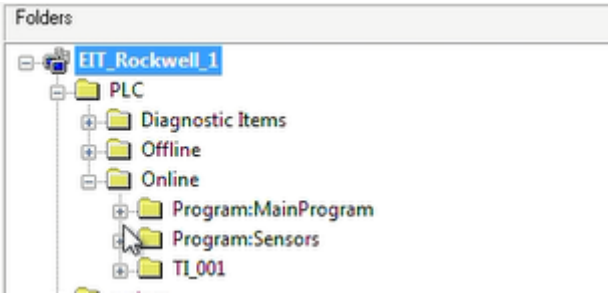
Step 8. Make connection between Numeric display and plc tags.



In tag browser refresh all folders and select online tags, which we want to connect.

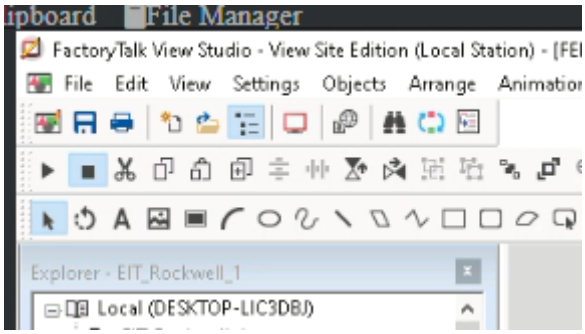


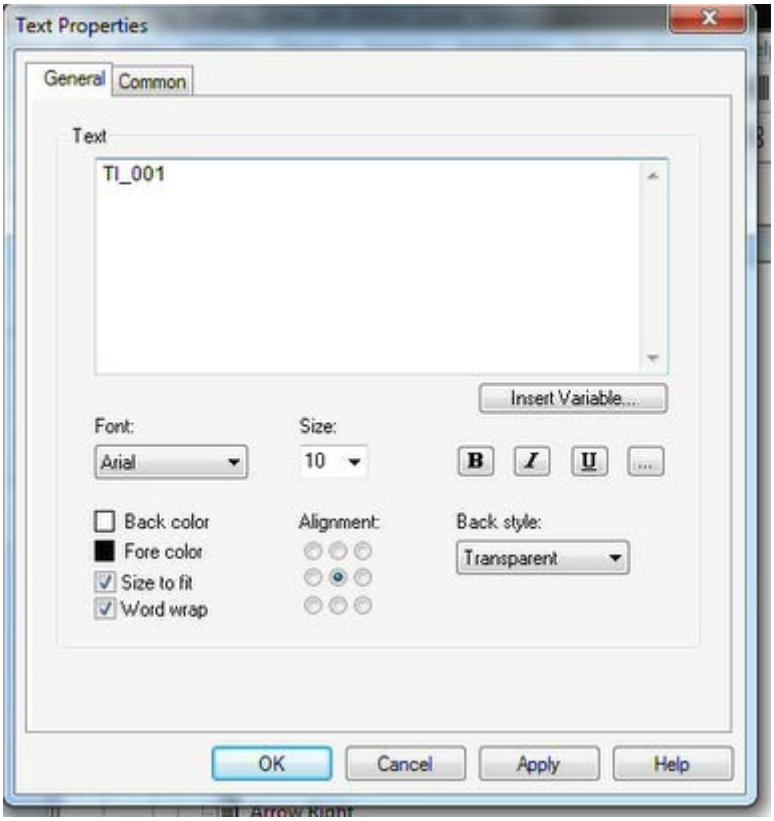




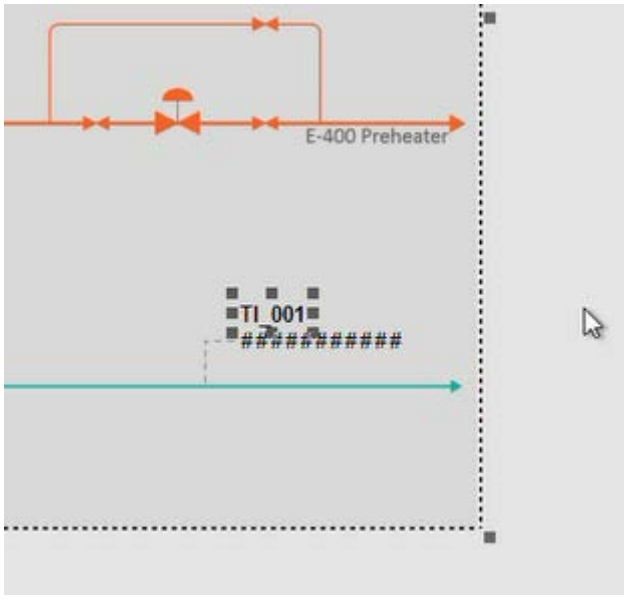
Step 9. Text object

Use the Text tool  to draw a text object. You can then create the text and set up its appearance in the Text Properties dialog box.



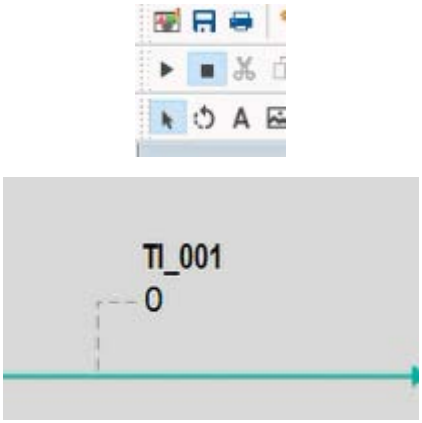


Our application has simple HMI with numeric and text fields. Numeric field connects to plc tag (TI_001.Val) and Text field shows us tag name. In the second part of the laboratory, we will know how to create a process object with name and value automatically with PlantPax library.



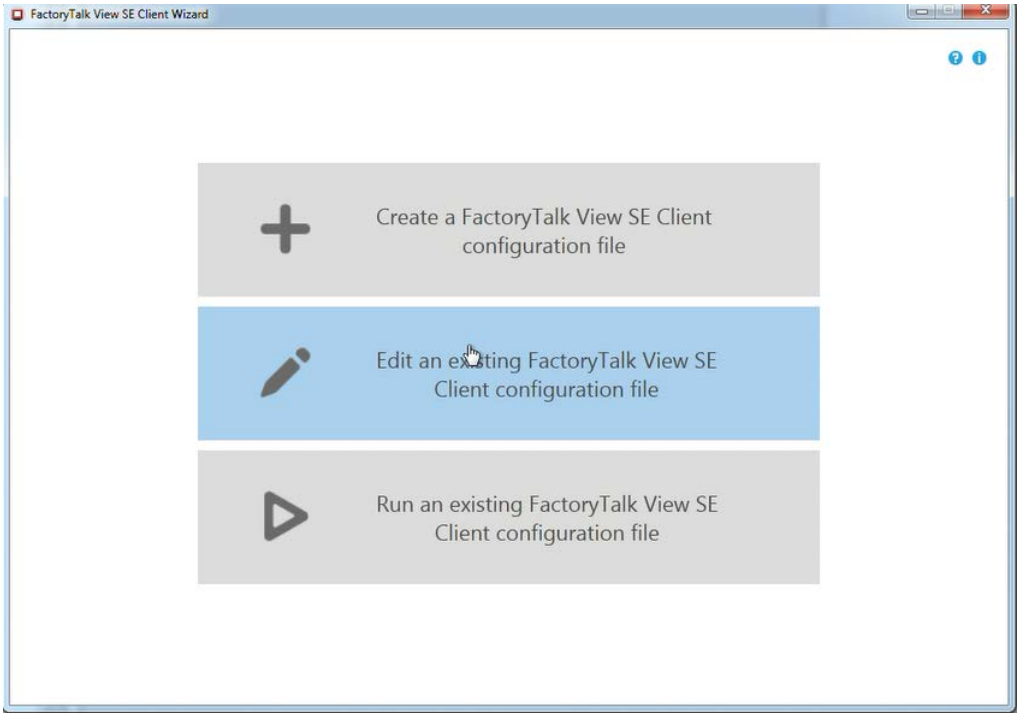
Step 10. Runtime in FactoryTalk.

We can check our connection between numeric object and plc tag in FactoryTalk. We need to start “Test display” mode.

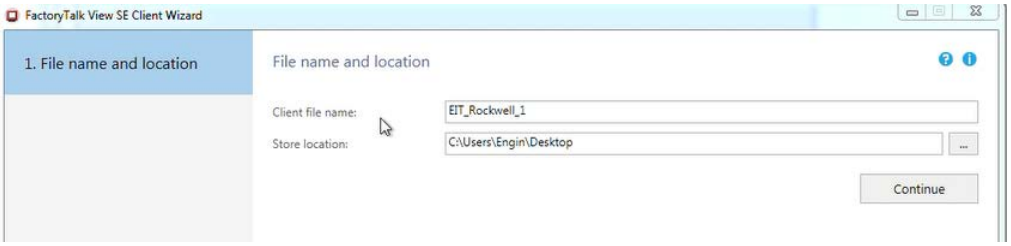


Step 11. Make runtime application.

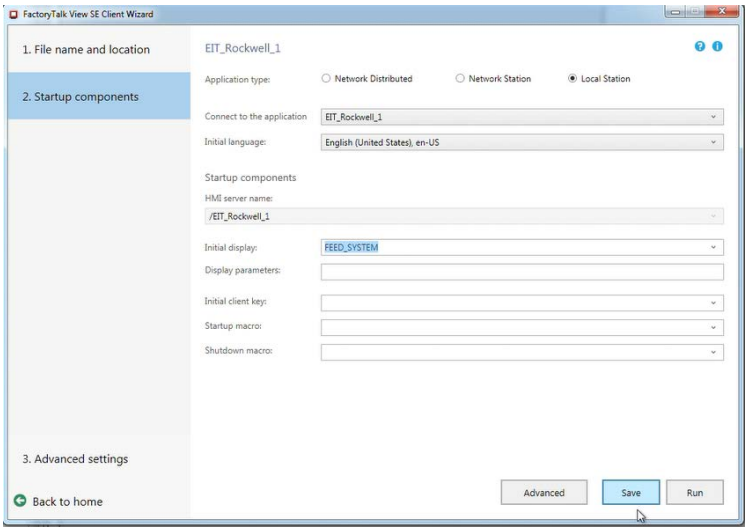
Start “Launch SE client”

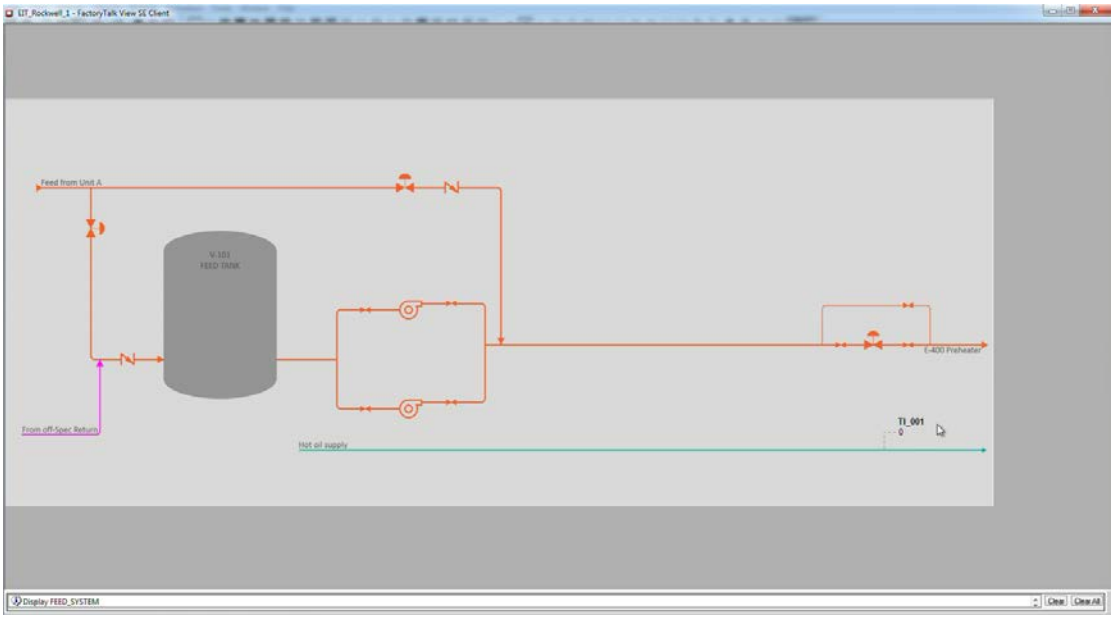


Call your runtime, in our laboratory our application calls “EIT_Rockwell_1”



Select application type, choose FactoryTalk application and language for our runtime. Select initial display and click “run” to start runtime application.





Appendix A. P&ID FEED SYSTEM.