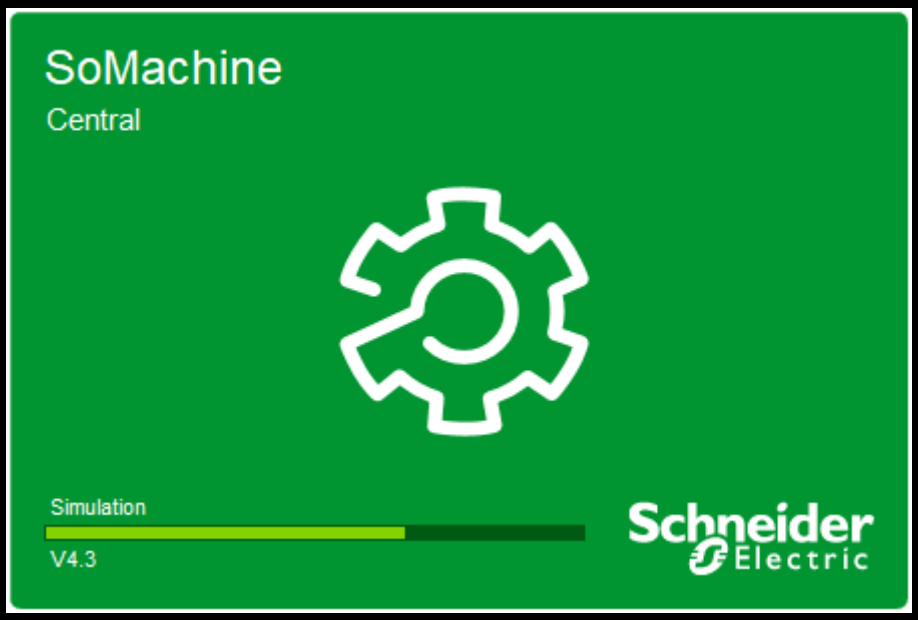
SoMachine V4.3



Software Configuration

Content

SoMachine V4.3

- ## Introduction :

What is the SoMachine Logic Builder?

- **General Information :**

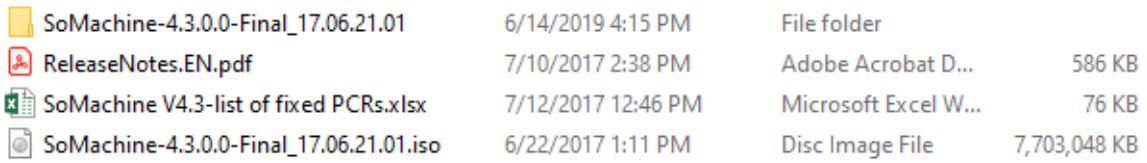
- The Logic Builder provides the configuration and programming environment for the SoMachine Projects you create with SoMachine Central.

- It displays the different elements of your project in separate views that you can arrange on the SoMachine user interface and on your desktop according to your individual requirements. This View structure allows you to add hardware and software elements to your project by drag and drop. The main configuration dialog boxes that allow you to create content for the project are provided in the center of the Logic Builder screen.

- In addition to easy configuration and programming, the Logic Builder also provides powerful Diagnostic and maintenance features.

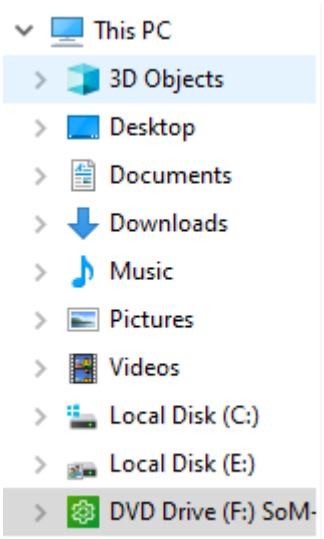
Somachine V4.3 Installation Procedure

- Go to your file directory,
- Double click on SoMachine **.ISO** file format.



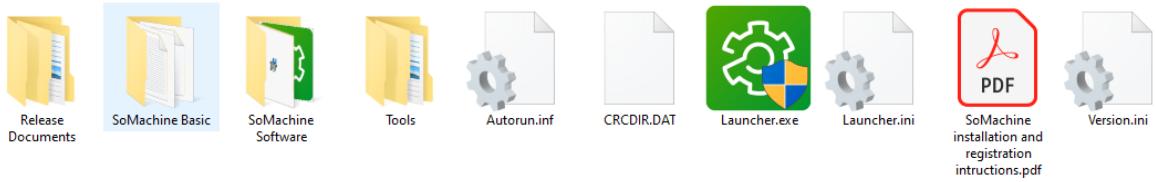
SoMachine V4.3 Installation file Directory

- You get Symbol as per attached image.
- Here, you get **SoMachine V4.3 CD drivce**.



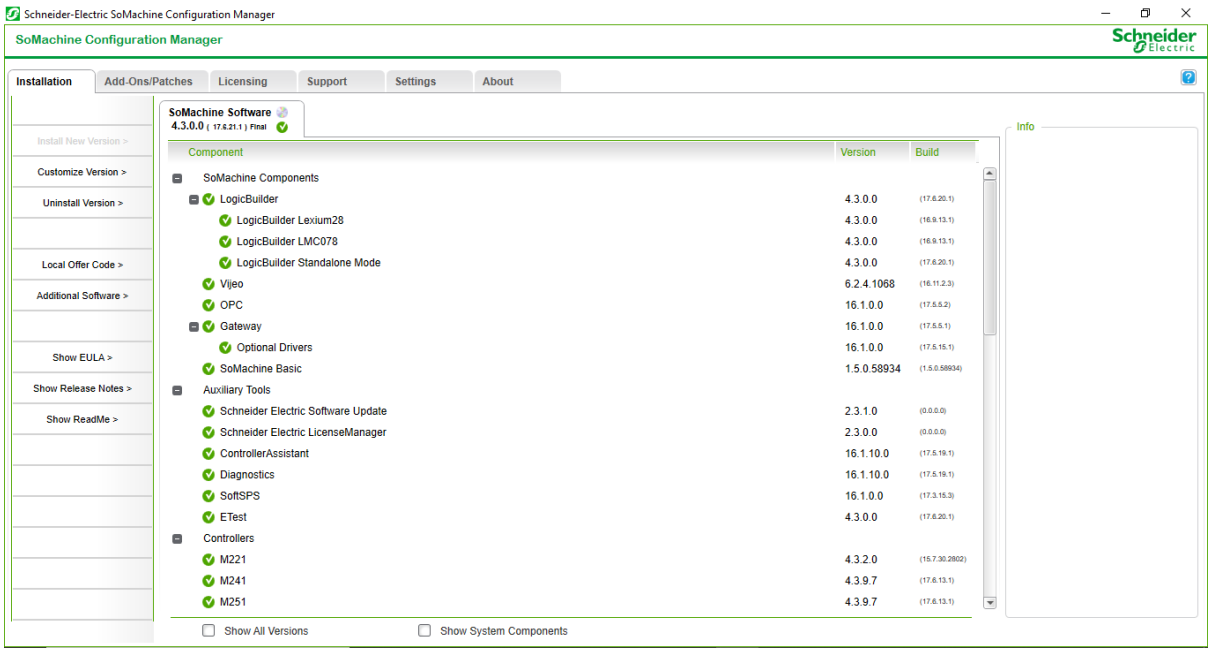
SoMachine V4.3 CD Drive creation

- You get some files of the Somachine V4.3 installation files,



Installation Files in CD Drive of the SoMachine V4.3

- Double Click on **Launcher.exe** file.
- As per attached below image you get one configuration page for the Somachine V4.3.
- Follow below procedure for the Installation SoMachine V4.3.



SoMachine V4.3 installation Configuration

- Check all marks and Click on **Install** button.
- Wait for the installation.
- Here, take a time more time for the installation, so don't cancel installation and wait for the installation.
- After completion installation, reboot your system.
- Now Installation Completed.

SoMachine V4.3

List of Supported PLC for the SoMachine V4.3 :

- Below PLC Models are supported in only SoMachine V4.3.
- Different PLC models have a different property and communication protocols.

SoMachine V4.3 supported Controller List

- SoMachine V4.3 have supported below listed Controller List :
    1. **Logic Controller**
    2. **Motion Controller**
    3. **Drive Controller**
    4. **HMI Controller**
    5. **Magelis HMI&iPC**
    6. **Communication Element**

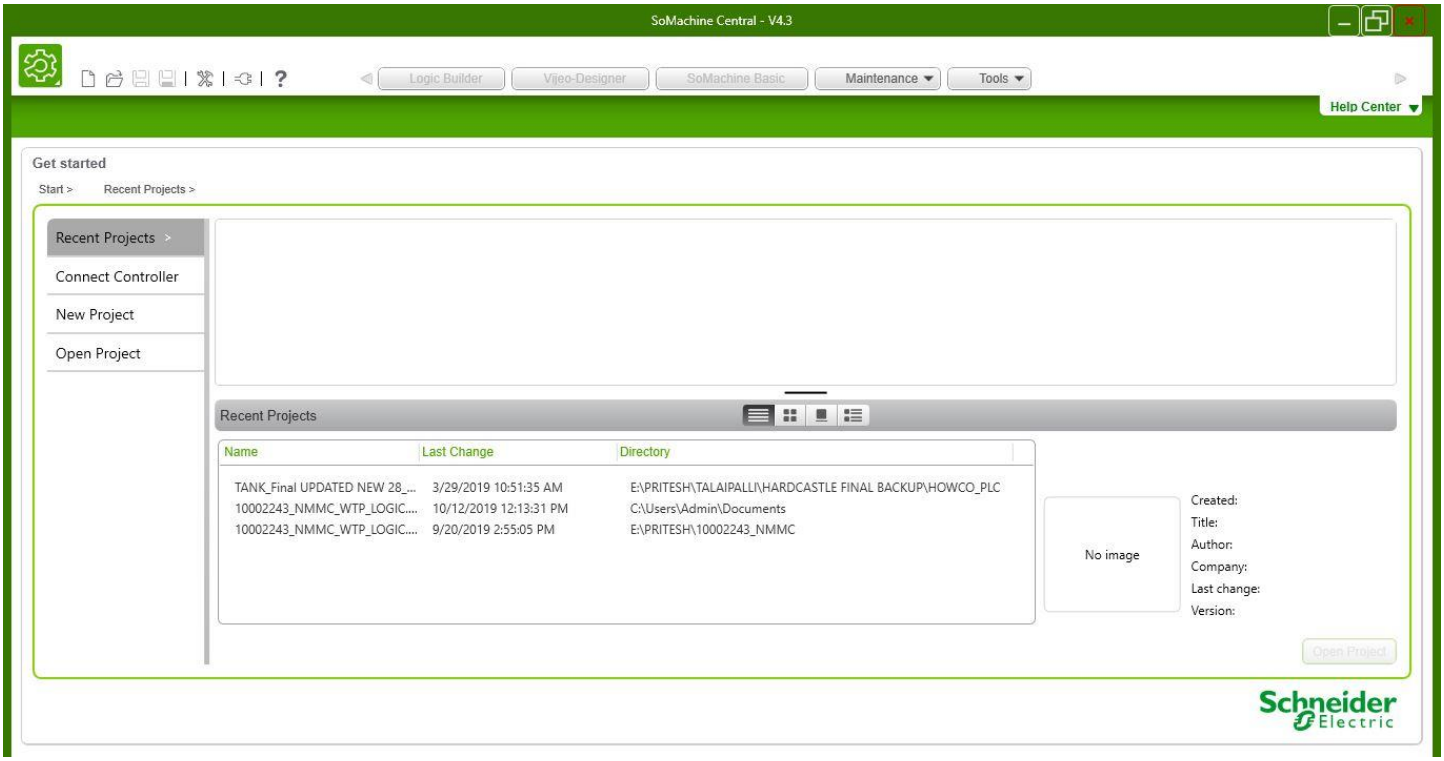
Logic Controller :

- Logic Controller have supported below listed models of the controller.
- **TM221 Controller have supported with the SoMachine V4.3 and all the instruction already given in SoMachine basic software, Please refer SoMachine basic software document.**

Logic Controller	Logic Controller Models
TM238	TM238LDA24DR TM238LDD24DT TM238LFAC24DR TM238LFDC24DT
TM241	TM241C24R TM241C24T/U TM241C40R TM241C40T/U TM241CE24R TM241CE24T/U TM241CE40R TM241CE40T/U TM241CE24R TM241CE24T/U
TM251	TM251MESC TM251MESE
TM258	TM258LD42DT TM258LD42DT4L TM258LF42DR TM258LF42DT TM258LF42DT4L TM258LF66DT4L

SoMachine V4.3 Software :

- SoMachine and the devices supported by SoMachine are continuously improved. Therefore, new updates of SoMachine and its associated supports are released on a regular basis. SoMachine Software provides, in most cases, a simple, and straight forward way to migrate projects created with previous versions of SoMachine to the current version.

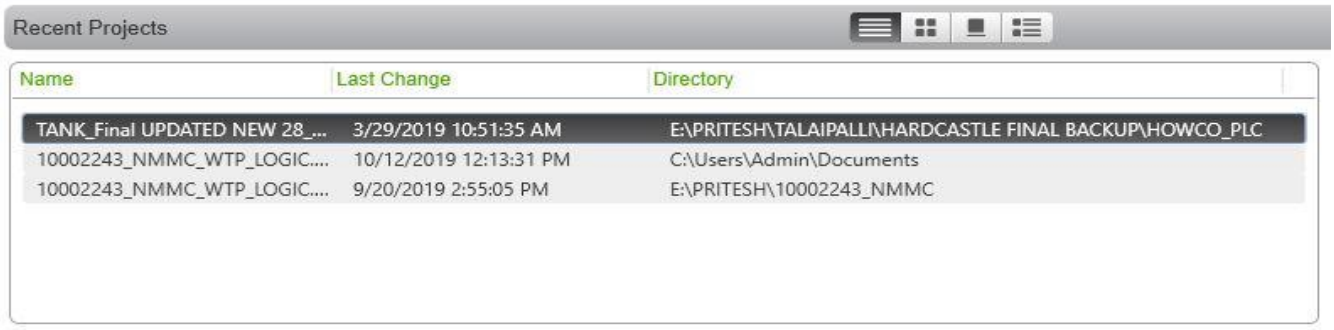


SoMachine V4.3

- **SoMachine V4.3 Used for the development of the PLC logic, In this SoMachine software compatible with the Motion controller, Drive controller and IPC HMI configuration and Much more.**
- **Different Controller have different protocols for the communication.**
- **Please refer Controller information and choose what you have require.**

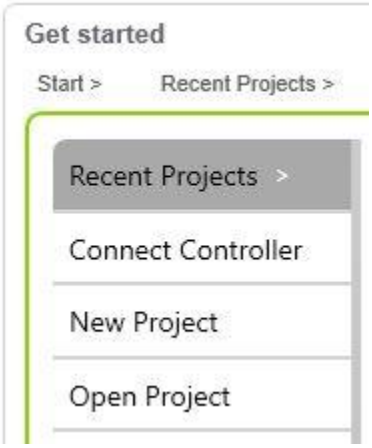
Recent Tab :

- **If you are already developed or used Somchine software and developed any project in SoMachine V4.3, So you have shown recent project option in recent tab.**



- **If you have to open recent project, simply double click on listed project name.**
- **Here you are entered in development section.**

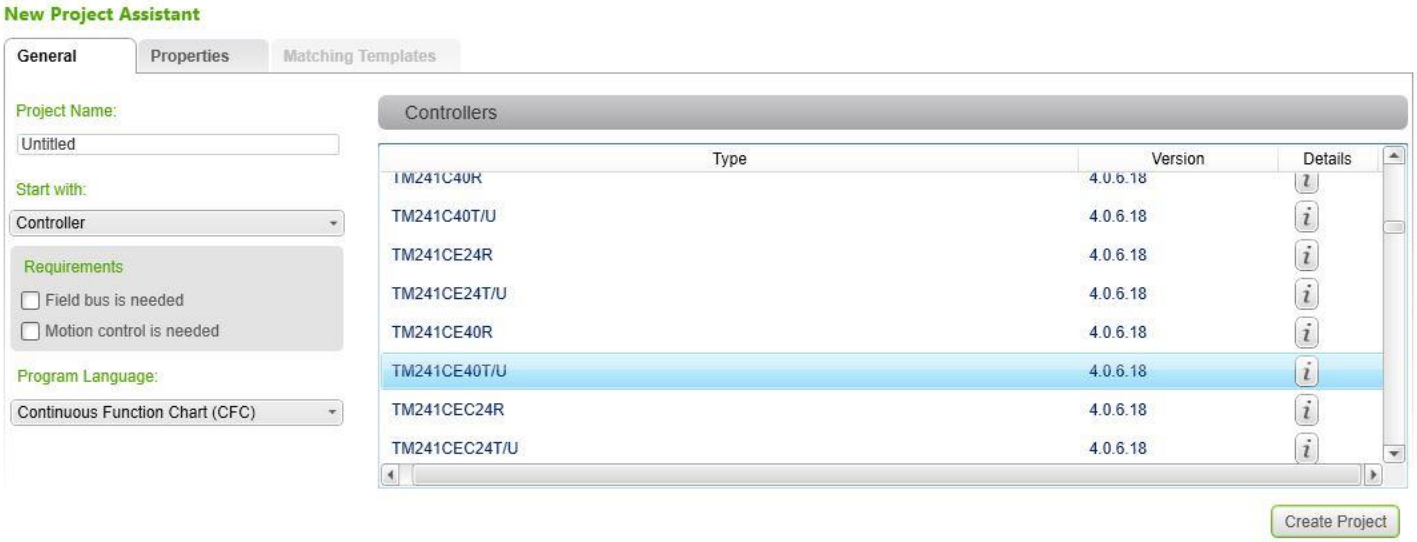
New Project Creation :



- **New project creation with SoMachine V4.3, Follow below procedure.**
- As per attached image **Get Started** SoMachine V4.3.
- Click on New Project
- Four Options available,
    1. **Using Assistant**
    2. **Template Based**
    3. **Empty Project**
    4. **New Library**

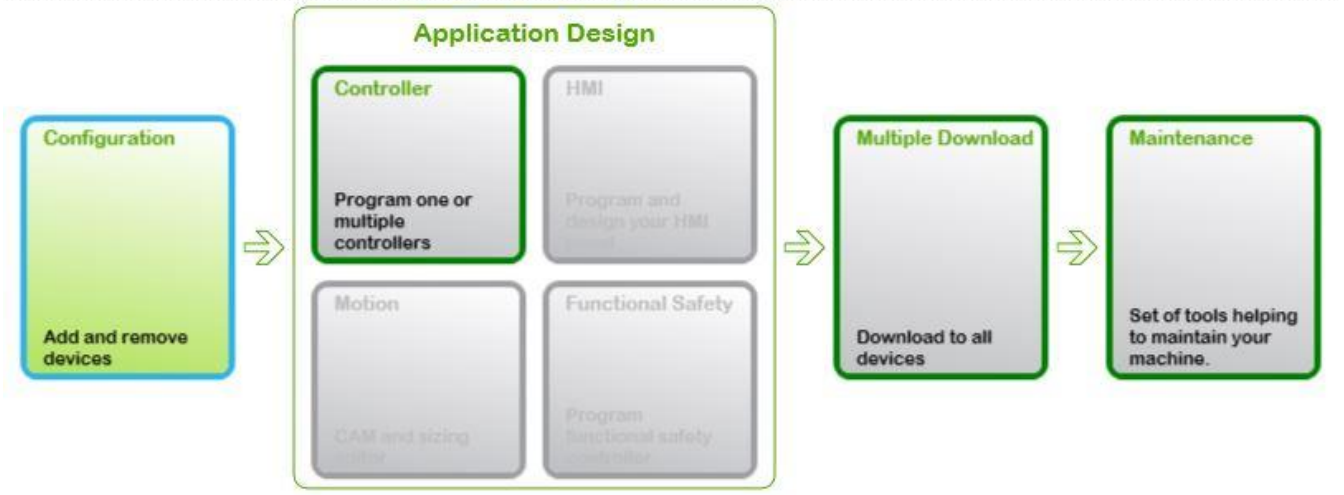
Get Started with SoMachine V4.3

- **Choose you want and create new project. For Example** I created project based on **Using Assistant.**
- Type **Project Name**,
- Choose **Controller**
- Choose Requirement
- Choose **Programming Language**
    1. **CFC (Continuous Function Chart)**
    2. **FBD (Function Block Diagram)**
    3. **IL (Instruction List)**
    4. **LD (Ladder Diagram)**
    5. **SFC (Sequential Function Chart)**
    6. **ST (Structured Text)**



New Project Creation with SoMachine V4.3

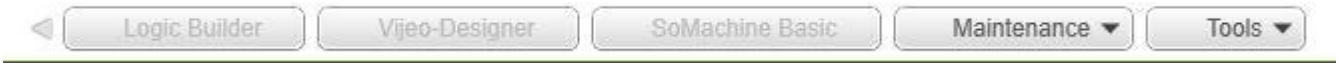
- Click on **Create Project button**.



Controller Work Flow Diagram

- In this controller work flow architecture, you have an option for the controller configuration, Program downloading.
- You can easily Add and remove devices through the controller configuration function.

Configuration Section :

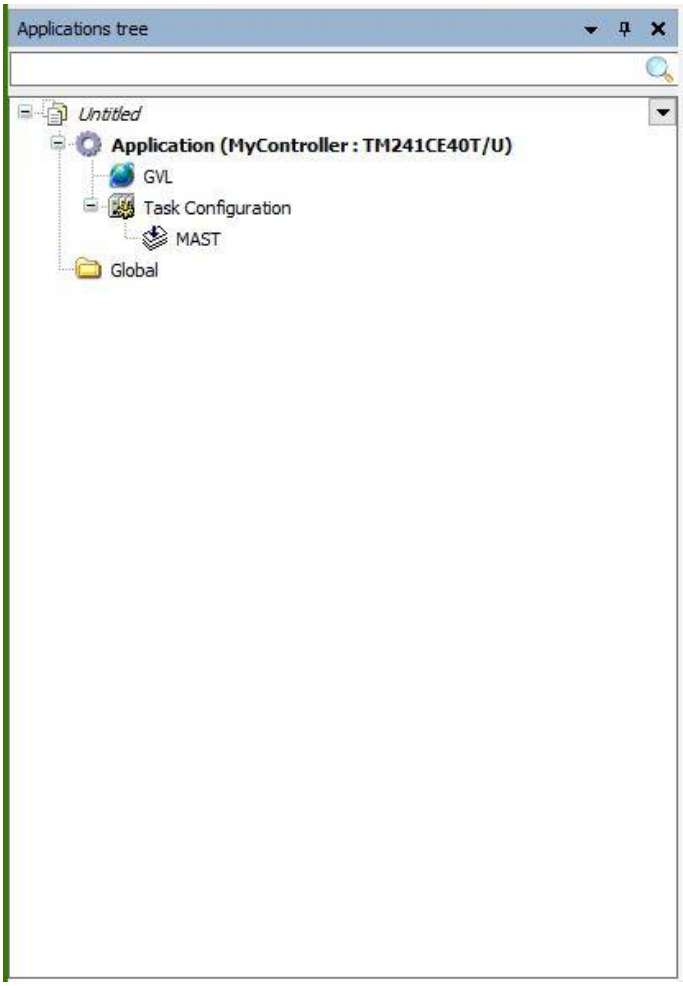


- Logic Builder – Building PLC Logic
- Vijeo-Designer – HMI Screen developing
- SoMachine Basic – Building project for the **TM221 Controller**
- Maintenance – Firmware Downloading and Diagnostic function
- Tools – SoMachine Software Registration Tools

Logic Builder :

- Here, you have to build your PLC logic.
    1. **Device Tree**
    2. **Application Tree**
    3. **Tools Tree**
- There are three trees available.

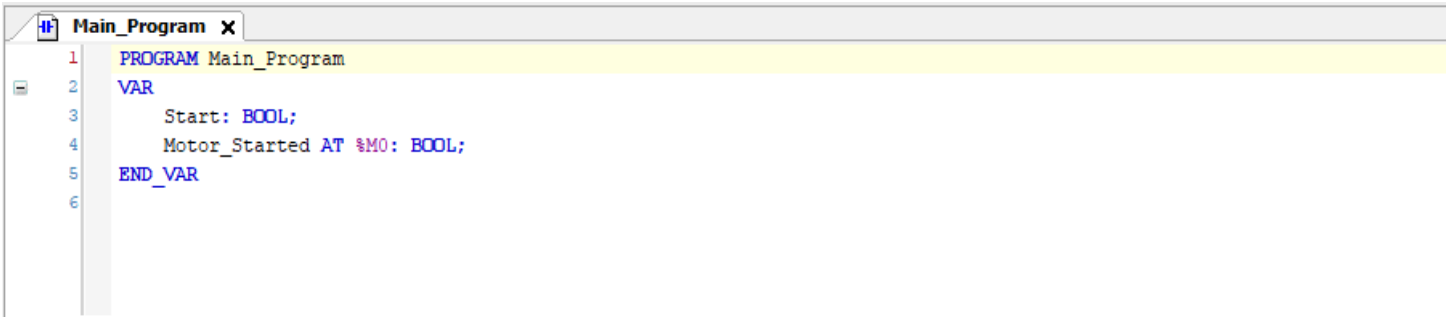
Application Tree :



- Here, you can develop your PLC Logic.
- Create One POU with selection of **Program** and selected programming language.
- **GVL** is Global variable list, that variable list require used for the data transmit from one device to other.
- Data transferring as per your communication protocol.
- First you have require to create one POU for in the Application Tree.
- Develop your logic in that POU with selected programming language.
- Various programming languages supported in SoMachine Software, that list already have mention in Get Started page.
- One's you can developed your logic in POU, You need to Program call in Mast section.
- Without calling POU in Mast your program can't run.
- **Example :** One can press Start button, Motor will be started.

Application Tree Configuration

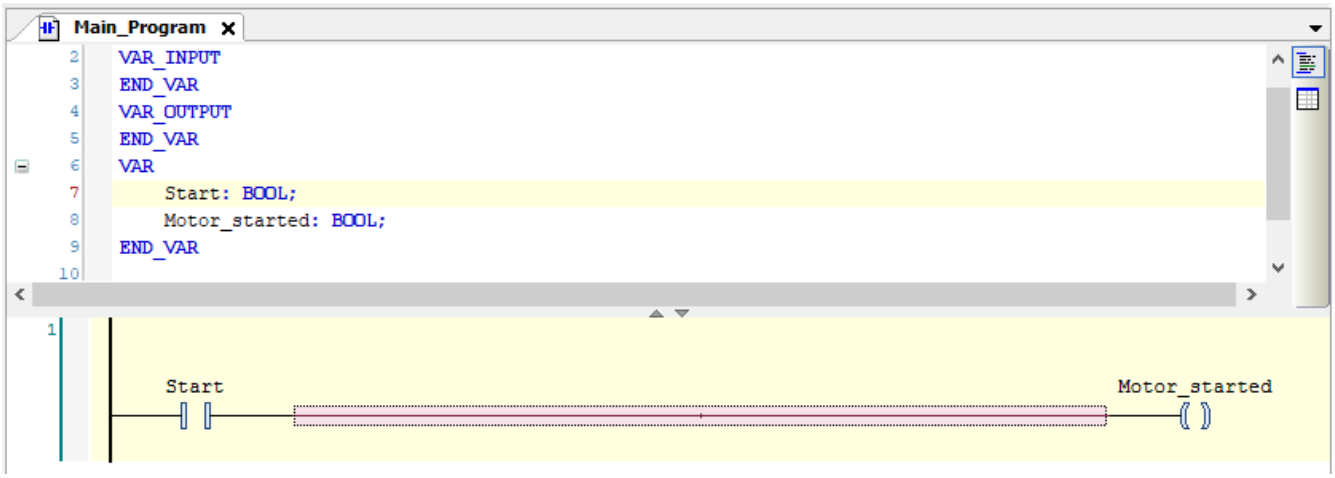
- Use this Function and developed logic as you have require.
- Function can change as per selected programming language.



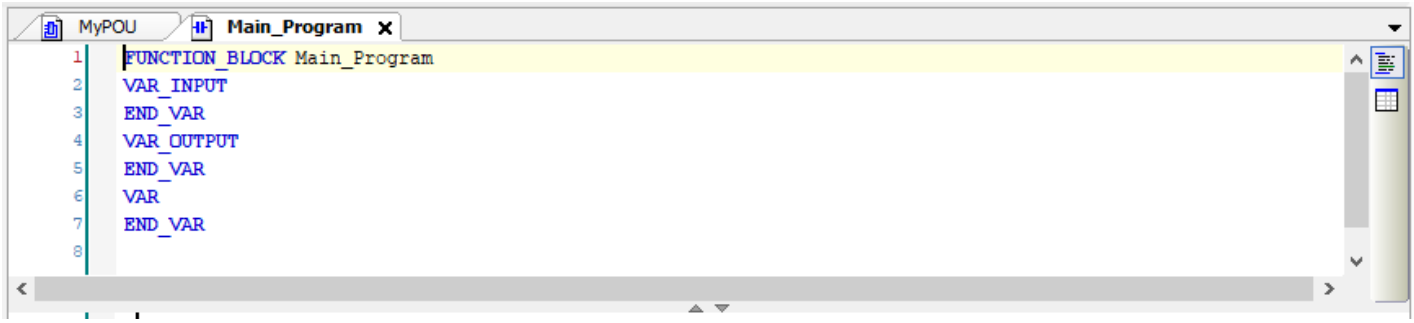
SoMachine Addressing

Addressing Format in SoMachine V4.3:

- Here, You have same addressing format of SoMachine Basic.
- %M, %MW, %MD, %MW used for the internal addressing.
- You can configure your address in particular POU, Otherwise you have an option to do addressing in Global Variable List.
- See attached image and configure as per that.
- This Standard format use for the communication PLC Controller to any other devices.



Logic building in POU

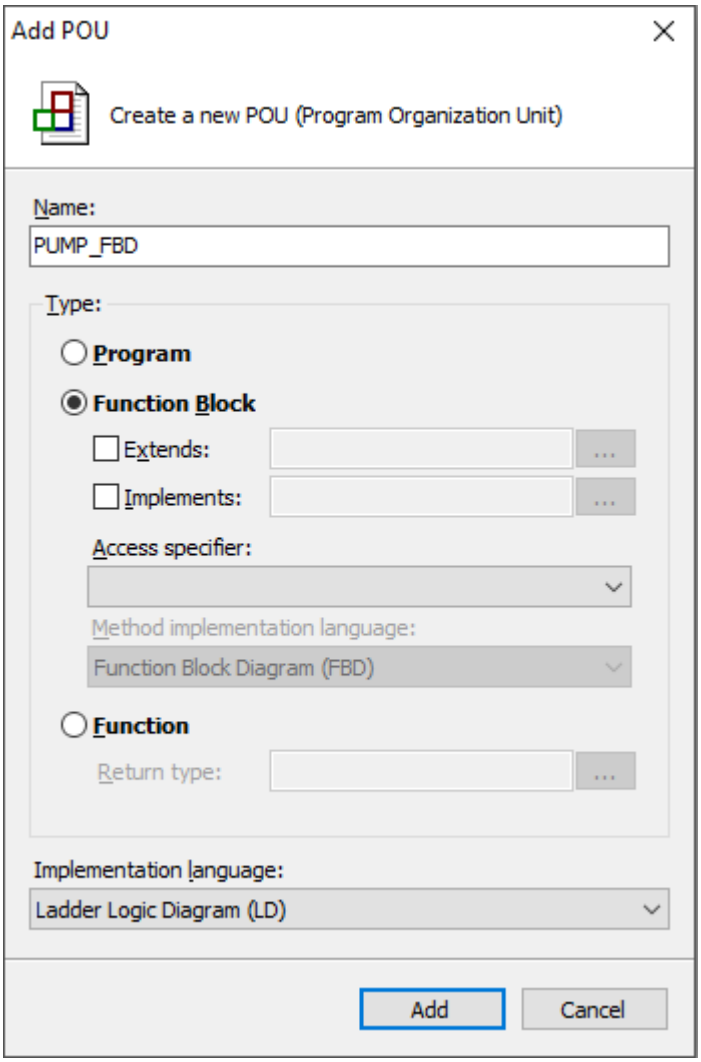


Function Block Variable Configuration

- Define Function blocks Inputs and Outputs Variables here,
- Local Variable define below the Var.
- Define global variable in GVL (**Global Variable List**)

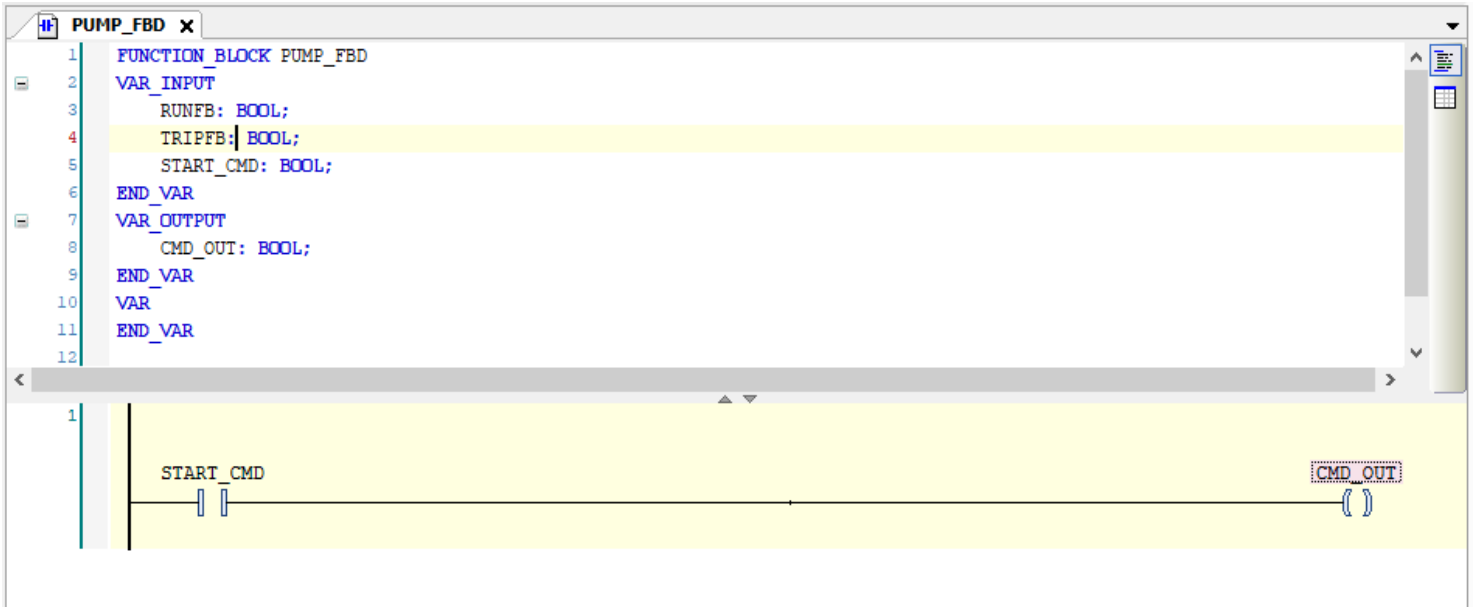
User Define Function Block :

- Follow below procedure for the **Creation User Define Function Block**.
- First create one **Function Block** as per attached image.
- Here, I have created **PUMP_FBD** name Function Block diagram using Ladder Language.
- After adding Function block, Open that created Function Block and developed Logic which you have require.
- This particular function block you can use multiple times for the Logic development.
- In this example I have created one PUMP Logic and use this function block multiple times in my project.
- It's Called **Derived Function Block** or **User define function block**.



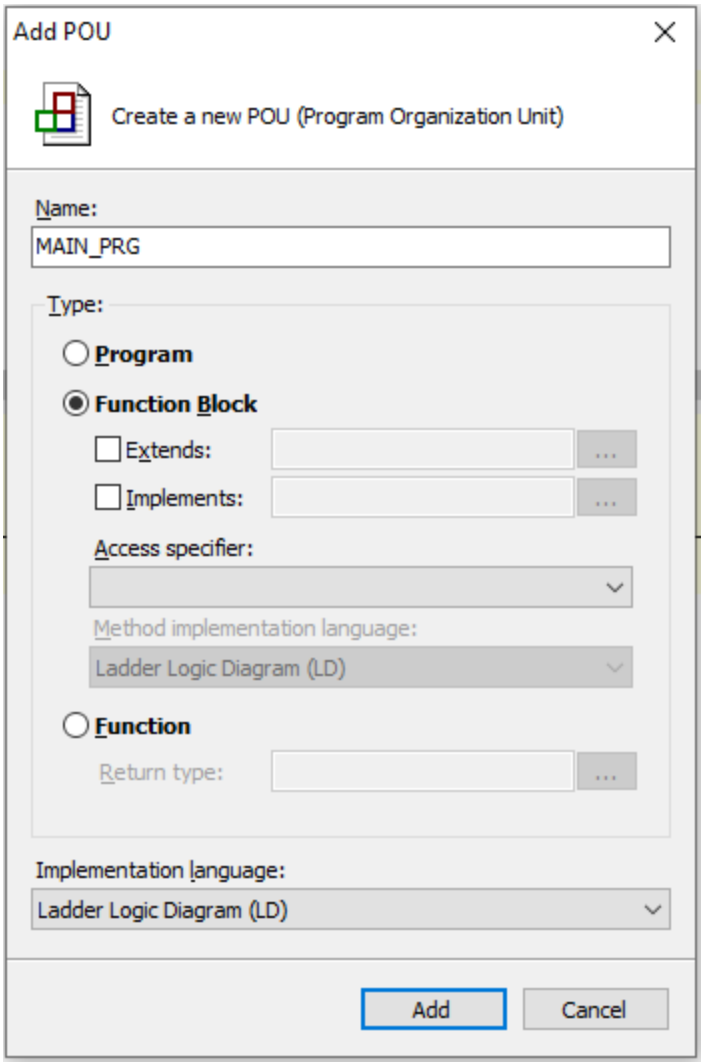
Create Function Block

- Write down all the variables inputs and outputs in Top of the created user define function block.
- Here, you can easily understand, I have mention some inputs of the pump define in **Var_Input** and Some Pumps outputs define in the **Var_Output**.
- After write down all the require Inputs and outputs in the **Var_Input** and **Var_Output**, build your project.
- **After building project develop logic as per have requirement.**



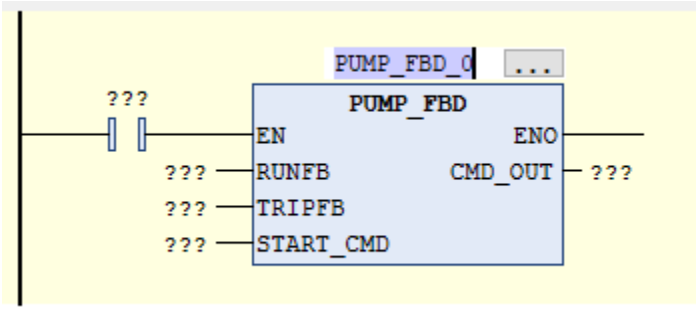
PUMP_FBD Function Block

- See, how can use this developed PUMP_FBD function block multiple times or other sections.
- Follow below procedure and configure as well.

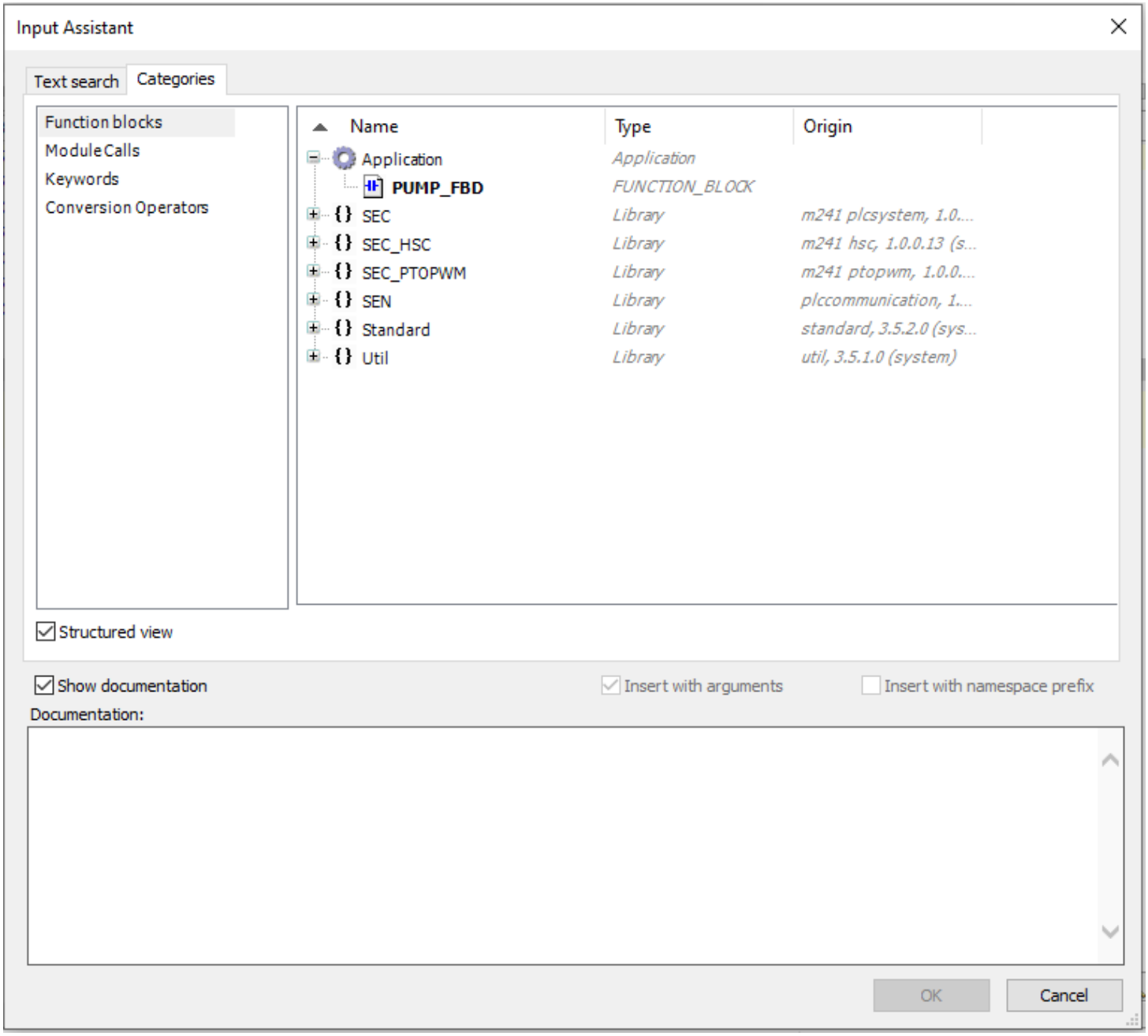


- Create One more POU as per your require selected programming language.
- **Here, in example I have create MAIN_PRG Program block using Ladder Language.**
- After Creation this function block simply, Add created **PUMP** Function block in **MAIN_PRG** program block.
- **Click on this button for the calling function block in this section.**
- After clicking this symbol you get one window for the calling function block in particular section.
- See, below attached image, Double click on created used define function block.
- Give a name of the function block, like PUMP_FBD_0.

MAIN_PRG Function Block Creation



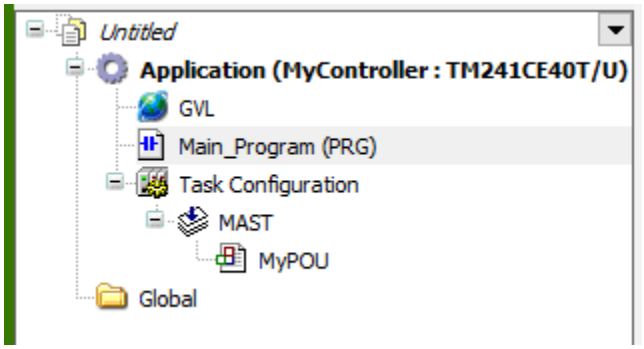
Calling PUMP_FBD in MAIN_PRG Section



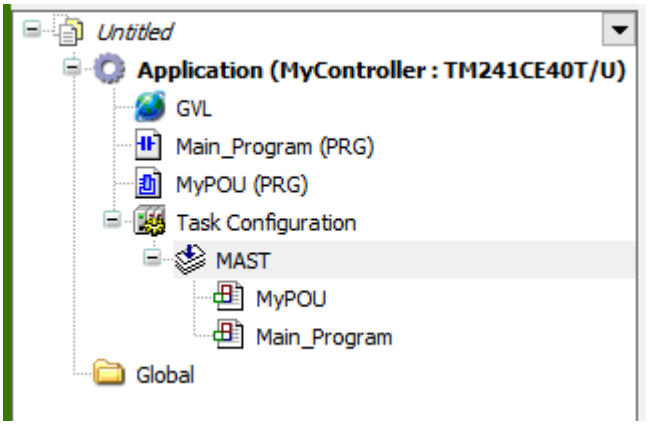
Adding PUMP_FBD Function Block

Program Call In Mast :

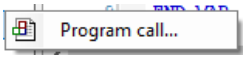
- **First you have require to developed PLC Logic in the POU and then after do this procedure.**
- This procedure can configure your POU in Mast Section.
- See in image, Here **Main_Program** Program Block created.
- Now, I have require to add this section in Mast section.
- Follow Below Procedure,



Program Block Creation



Main_Program Added in Mast Section

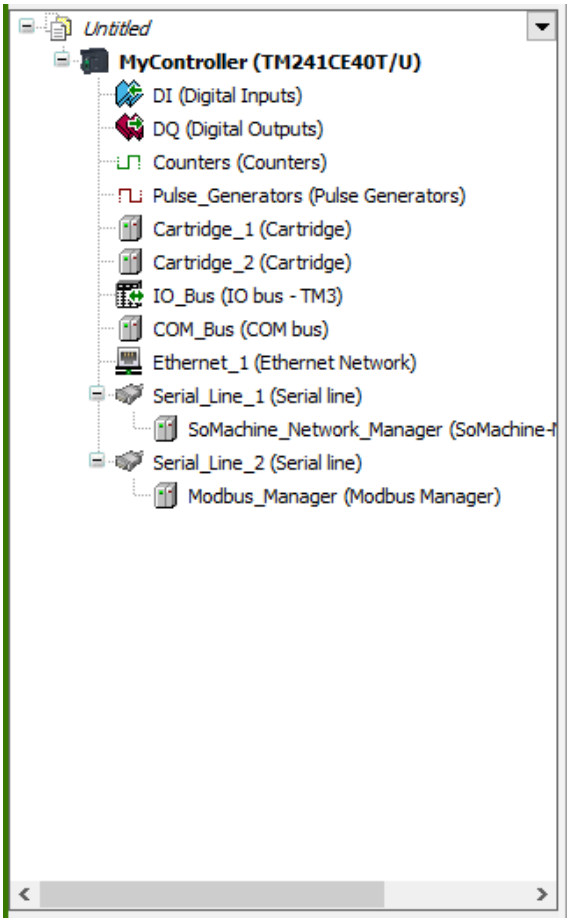
1. Click on Add button.
2. Select Program Call 

3. **Add POU in the Mast Section**
4. **After Adding POU in Mast section, Your Program Can be able to execute.**

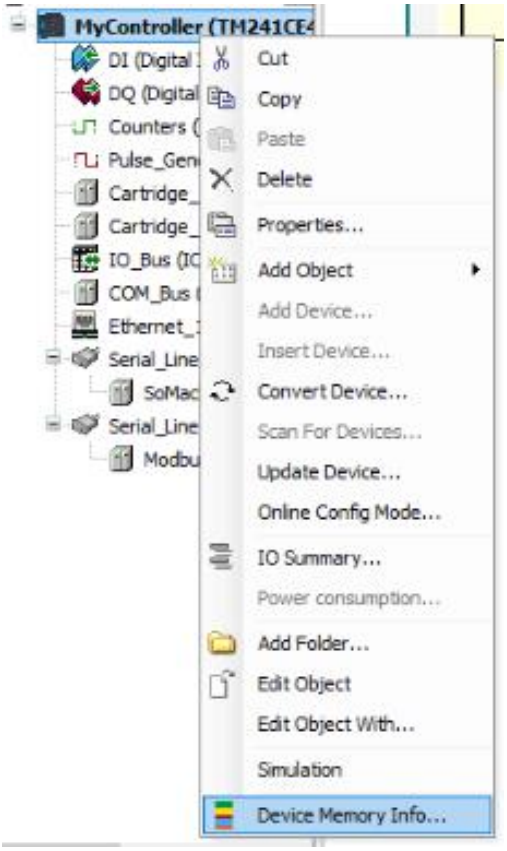
Devices Tree :

- **Devices Tree** used for the below listed configuration,
    1. **IO List**
    2. **Communication Bus**
    3. **IO Bus**
    4. **Ethernet Communication**
    5. **Serial Line Communication**
    6. **IO Scanner**

- **TM241** controller have only **14 remote IO Supported**.

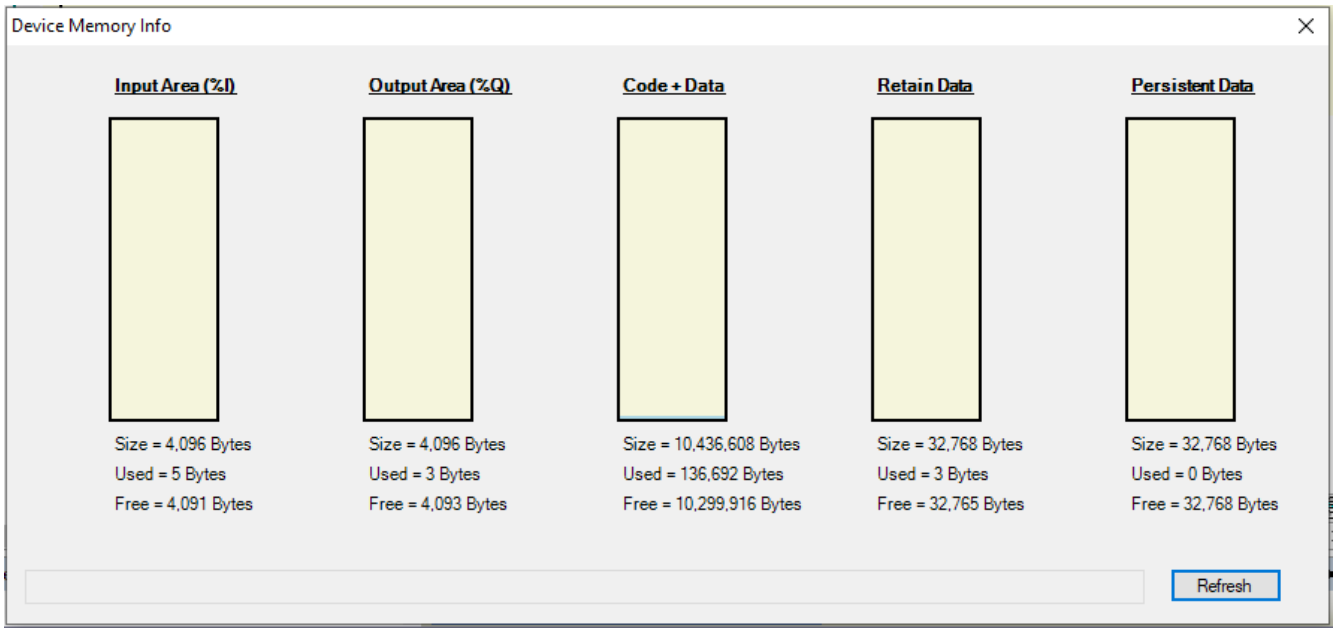


Memory Management :



- **Right Click on My Controller and select Device Memory Info….**
- Here, you have get Memory information of the Controller.
- Click on **Refresh** button for the execute memory and get Standard memory information of the controller.

Device Memory Info



Device Memory Info

IOs Configuration :

- **Double Click** on **DI** or any other IO.
- See below listed Inputs and extract first one.
- You have get your selected DI or selected IO list as per attached image.

I/O Mapping | I/O Configuration

Channels

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Inputs							
idwDI_IDW0		IDW0	%ID0	DWORD			
ibDI_IB1		IB1	%IB4	BYTE			

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
Inputs							
idwDI_IDW0		IDW0	%ID0	DWORD			
		I0	%IX0.0	BOOL			Fast input, Si...
		I1	%IX0.1	BOOL			Fast input, Si...
		I2	%IX0.2	BOOL			Fast input, Si...
		I3	%IX0.3	BOOL			Fast input, Si...
		I4	%IX0.4	BOOL			Fast input, Si...
		I5	%IX0.5	BOOL			Fast input, Si...
		I6	%IX0.6	BOOL			Fast input, Si...
		I7	%IX0.7	BOOL			Fast input, Si...
		I8	%IX1.0	BOOL			Regular input...
		I9	%IX1.1	BOOL			Regular input...
		I10	%IX1.2	BOOL			Regular input...
		I11	%IX1.3	BOOL			Regular input...
		I12	%IX1.4	BOOL			Regular input...
		I13	%IX1.5	BOOL			Regular input...
		I14	%IX1.6	BOOL			Regular input...
		I15	%IX1.7	BOOL			Regular input...
		I16	%IX2.0	BOOL			Regular input...
		I17	%IX2.1	BOOL			Regular input...
		I18	%IX2.2	BOOL			Regular input...
		I19	%IX2.3	BOOL			Regular input...
		I20	%IX2.4	BOOL			Regular input...
		I21	%IX2.5	BOOL			Regular input...

Reset mapping | Always update variables

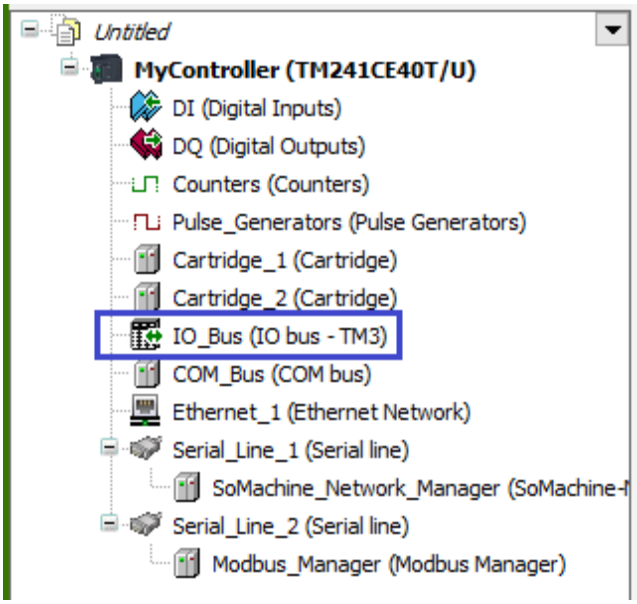
= Create new variable | = Map to existing variable

DI List in Devices Tree

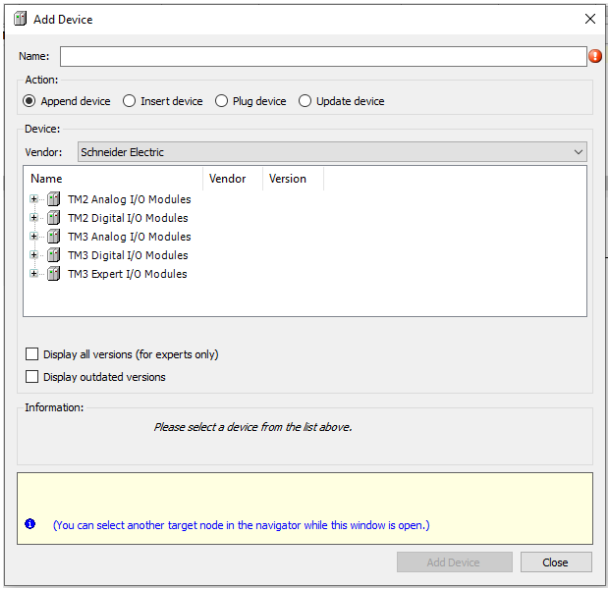
- **%IX0.0 to %IX0.7** it's Address list of the DI Input Card.
- **%I0, %I1,…, etc.** input channel list of the Digital Input card.
- Description Column shown Input channel characteristic, Like : **Regular Input or Fast Input**.

IO Bus Configuration :

- Click on Add button on IO_Bus.
- IO_Bus used for the IOs configuration, which is connected with the controller.
- See attached image, and **Add IO** card which you have require.



IO_Bus Configuration

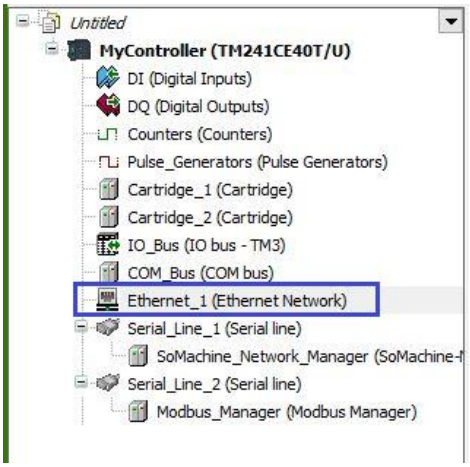


- **Add I/O in** Add device section**,**
- TM2 I/O Analog Modules
- TM3 I/O Analog Modules
- TM2 I/O Digital Modules
- TM3 I/O Digital Modules
- TM3 Expert I/O Modules
- Different controller have supported different modules.
- If I/O module not supported with selected controller then you have get Error in Message Box, Double click on Error message and troubleshoot that.

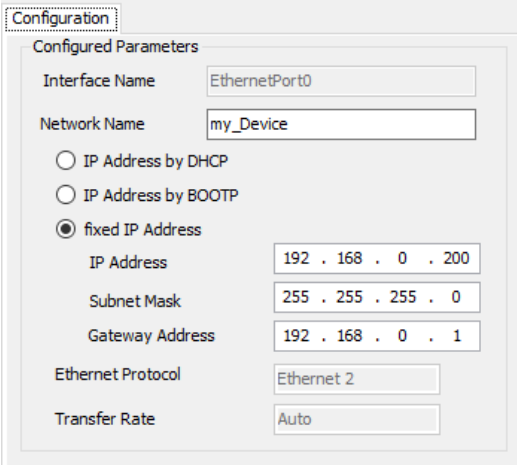
Adding Devices in I/O BUS

Communication Configuration :

Ethernet Configuration :

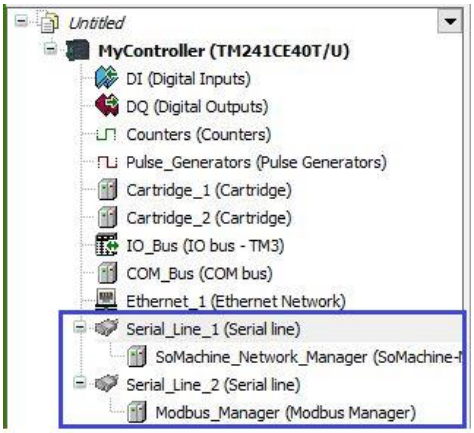


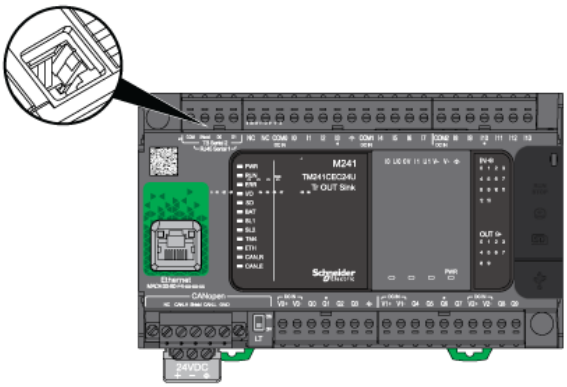
- Double click on **Ethernet Network** and give IP Address of the controller.
- See below Ethernet configuration.



Serial Line Configuration :

- TM241CE40T/U controller have two serial line ports, Serial Line 1 have RJ45 Pinout and Serial Line 2 have Screw terminal.
- See attached image, Serial line 1 and Serial Line 2 ports,
- **Procedure :**
- Double Click on **Serial_Line_1 (Serial Line).**
- **Serial_Line _1** RJ45 connector Pin available on top of the Controller.



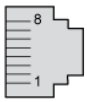


Serial_Line_1 Pinout :

- Make cable as per **Physical medium** and below attached image,

Pin Assignment

The following figure shows the pins of the RJ45 connector:



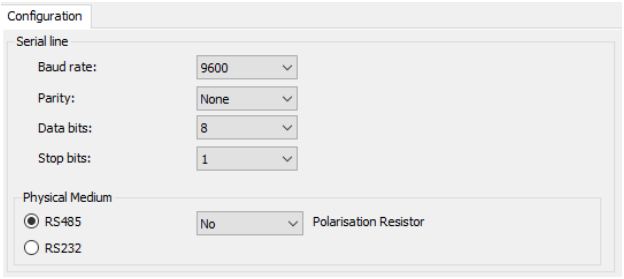
The table below describes the pin assignment of the RJ45 connector:

Pin	RS232	RS485
1	RxD	N.C.
2	TxD	N.C.
3	N.C.	N.C.
4	N.C.	D1
5	N.C.	D0
6	N.C.	N.C.
7	N.C.*	5 Vdc
8	Common	Common
* 5 Vdc delivered by the controller. Do not connect.		

N.C.: No Connection
RxD: Received Data
TxD: Transmitted Data

- Note down your slave devices below details :
    1. **Baud Rate**
    2. **Parity**
    3. **Slave ID**
    4. **Stop bit**
    5. **Data bit**
    6. **Physical Medium**
- Same configuration do in selected controller.

- First Select physical medium of the device
- Make cable as per selected physical medium
- Configure Serial_Line_1 configuration
- Save Changes
- Build your changes



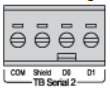
Serial_Line_1 Configuration

Serial_Line_2 Pinout :

- Serial_line_2 port as Screw terminal block.
- As per below attached image, Do connection of the slave devices.

Pin Assignment

The following figure shows the pins of the removable terminal block:

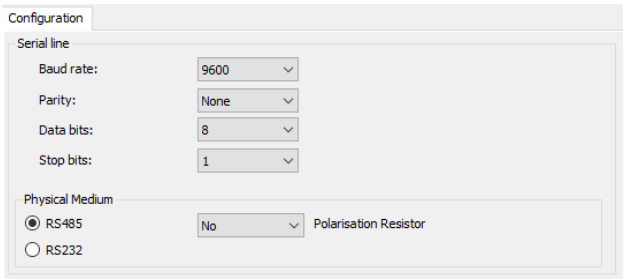


Pin	RS485
COM	0 V com.
Shield	Shield
D0	D0 (B-)
D1	D1 (A+)

Refer to Removing Terminal Block.

- Note down your slave devices below details :
    1. **Baud Rate**
    2. **Parity**
    3. **Slave ID**
    4. **Stop bit**
    5. **Data bit**
    6. **Physical Medium**
- Same configuration do in selected controller.

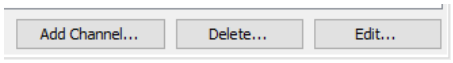
- First Select physical medium of the device
- Make cable as per selected physical medium
- Configure Serial_Line_1 configuration
- Save Changes
- Build your changes



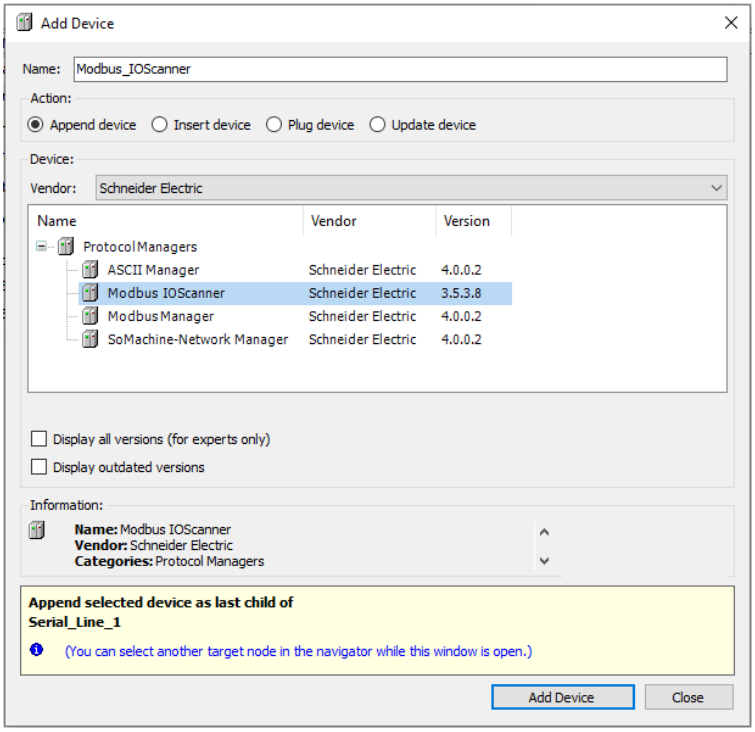
Serial_Line_2 Configuration

IO Scanner :

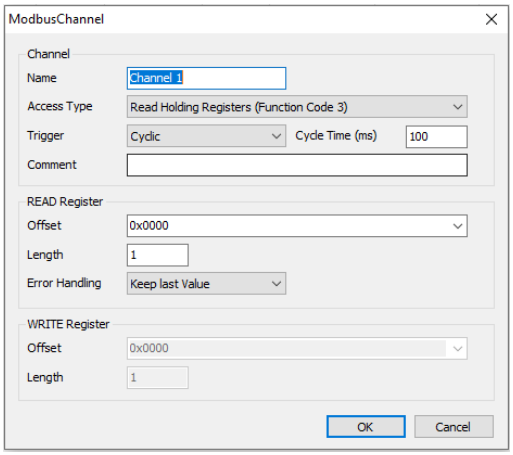
- **Add IO Scanner** in Serial_Line_1 network.
- Click on Modbus **IO Scanner** and Add device.
- Add **Generic Modbus Slave device** in IO Scanner and follow below procedure for the configuration of the IO Scanner.
- Go to Slave **Modbus Slave Channel**
- Inside the Channel, Add the channel which you have to require.
- Click on **Add Device** as per below attached image.



- See below attached image and configure require settings.



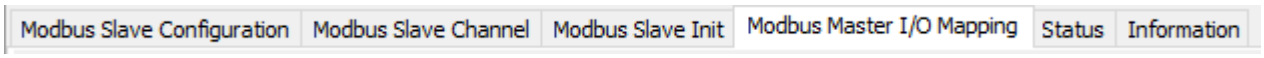
Modbus IO Scanner



Modbus Channel Setting

- **Access Name :** Select which you have to read From the Slave device.
- **READ Register :** Write First Object of the Address
- **WRITE Register :** Write First Object of the Address

IO Scanner :



Modbus Slave Configuration :

- Click on Modbus Slave Configuration and Write Slave Id of the Slave device.

Modbus Slave Channel :

- Click on Modbus Slave Channel.
- Add Channels which you have read from the Slave device.

Modbus Master I/O Mapping :

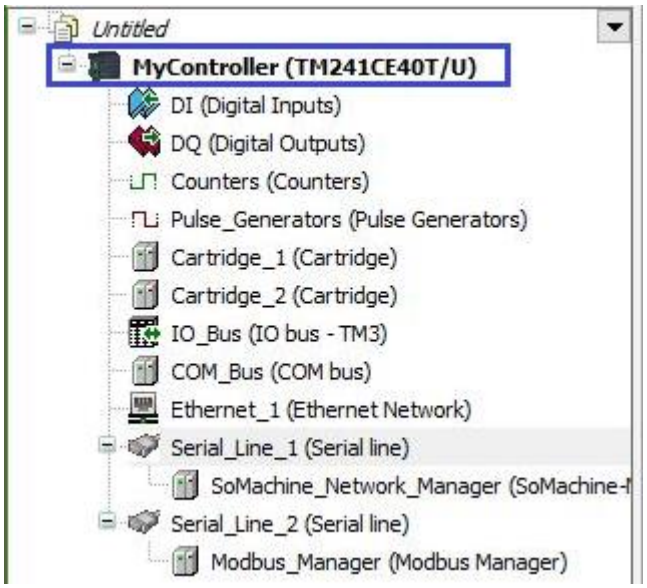
- Click on Modbus Master I/O Mapping.
- Use Register in the program, in particular register you have get the values from the Slave devices.

Status :

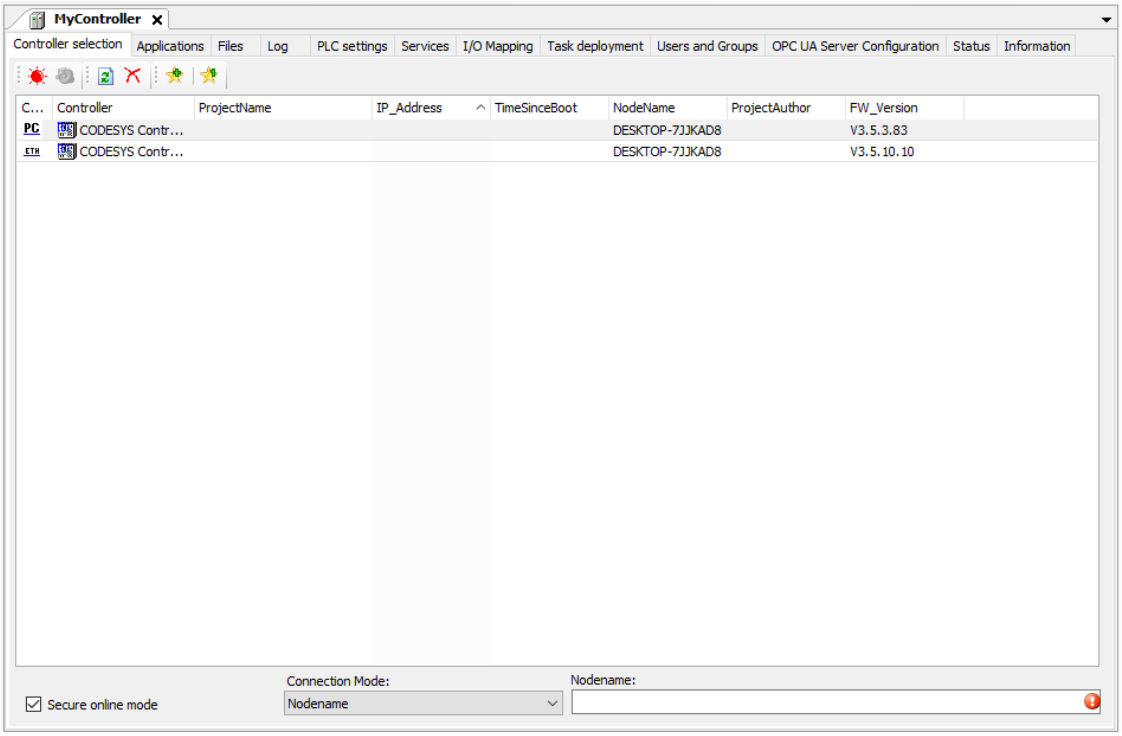
- Click on Status.
- You have get **Modbus IO Scanner Status**.

Commissioning Section :

- Double Click on **My Controller**, for the PLC program Download and Upload.
- Here, You get a list of the controller, Which are connected with same network.
- Connect your network, using below information,
- Double click on below selected address and go to login with the controller.
    1. **IP Address**
    2. **Node Name**
    3. **Controller Name**
- **Click on**  **Login button and connect with controller.**

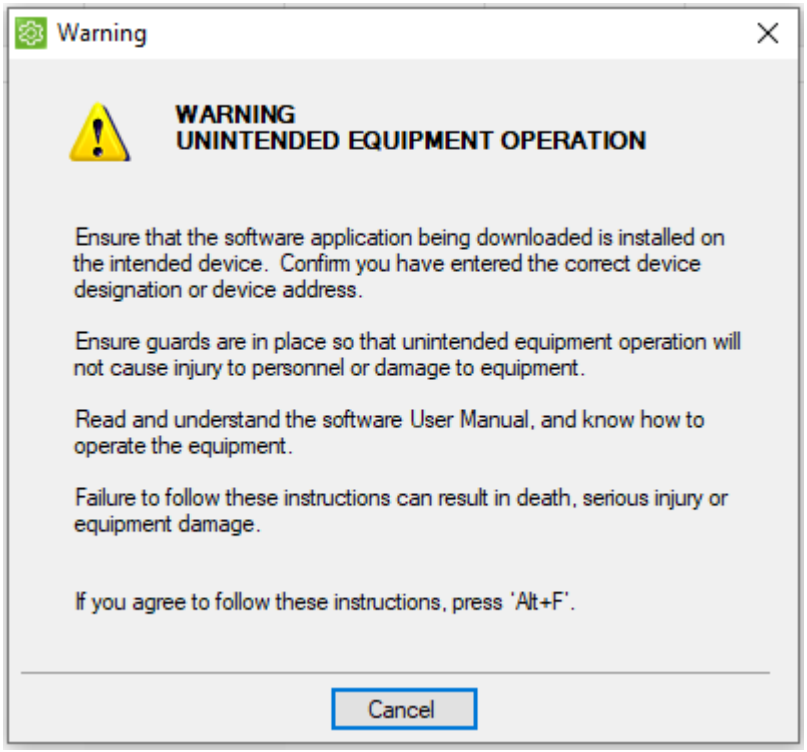


My Controller Login



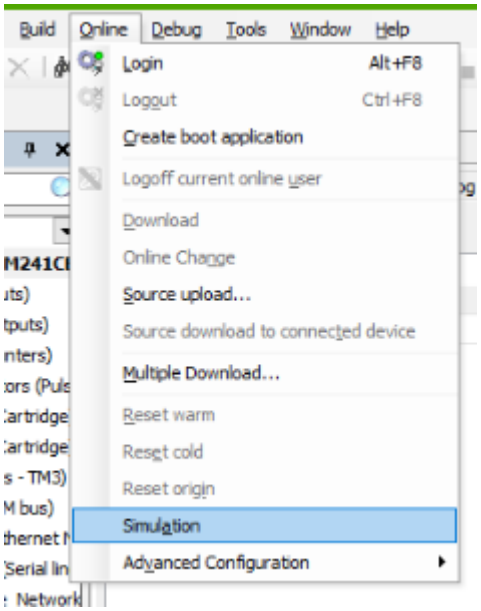
Controller Login Section

- Press **Alt+F** for the analyzed program and checked Error messages.
- If any Error getting while analyze time, So First troubleshoot error and again do analyze program.
- After Analyzing download and Upload program with the controller.



Simulation Mode :

- If you want to simulate program without controller, then select Simulation option from the Online Tab .
- Check as per attached image **Simulation symbol** on right bottom of the corner.
- Analyze program and check Error messages,
- If have getting any Error, First troubleshoot error and again analyze the program.
- **Click online button and download program.**
- **RUN** program and simulate your logic without controller.

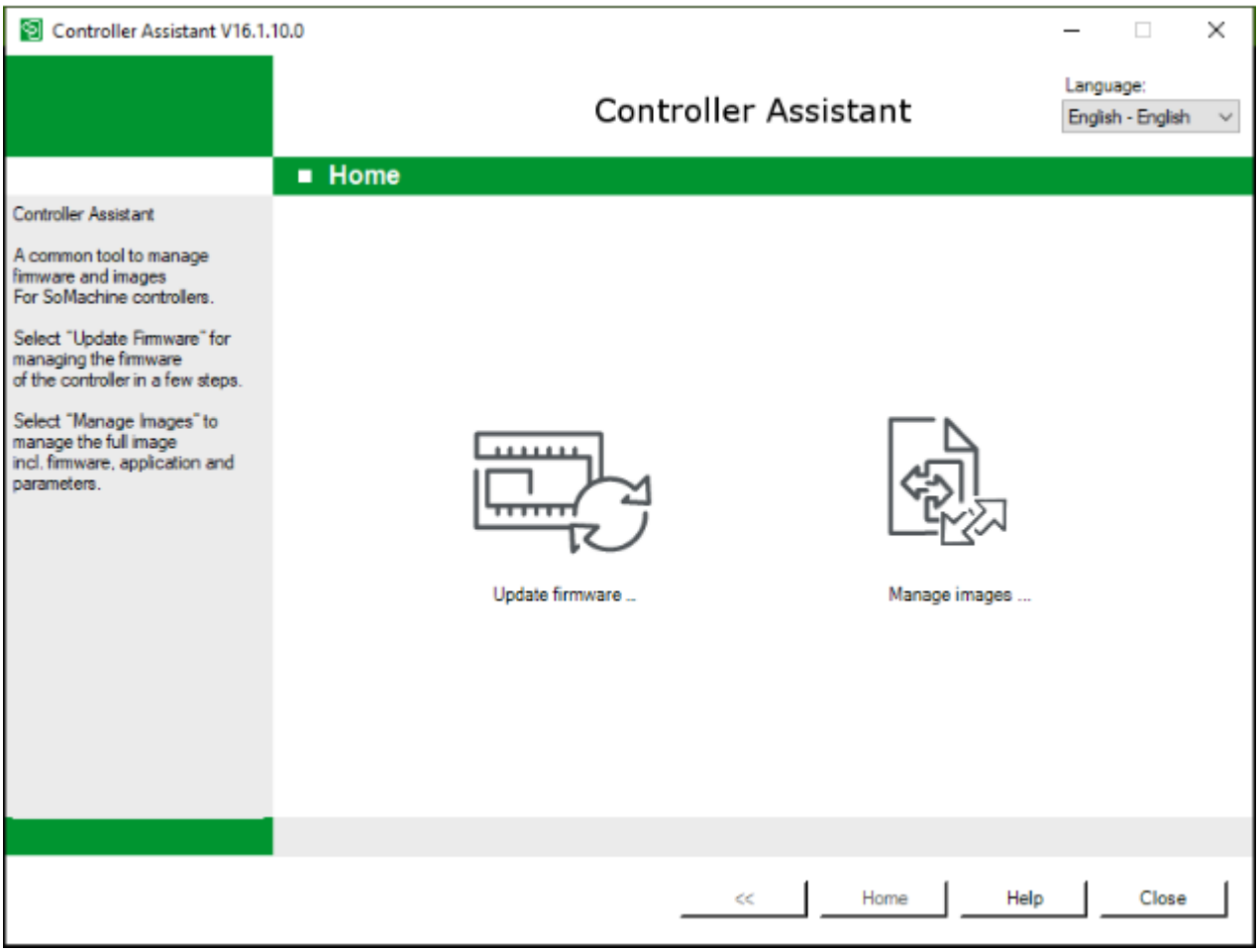


Firmware Upgradation :

- **Used Controller Assistant for the Controller firmware Upgradation.**
- **Click on Update Firmware**
- **Click below link for the better understanding how to do firmware upgradation.**
- https://www.se.com/ww/en/faqs/FA272065/

- **There are two methods of updating the M241/M251 firmware.**

- **Below are the instructions for M241/M251 Firmware Update using SoMachine Controller Assistant:**



Using SD Card :

- **Use a SD Card that has been Formatted Fat32**
- **From SoMachine Central > Select Maintenance**
- **Select Controller Assistant**
- **Select Update Firmware..**
- **Choose the controller Type M241 or M251 (don't get these mixed up from the pick list**
- **Select the Latest Firmware and the correct Controller**
- **Select Next**
- **Select Next**
- **Select Write to..**
- **Select Write**
- **After it completes the Write.**
- **Select Close**
- **Eject the SD Card.**
- **Power off the M251**
- **Insert the SD card.**
- **Power on M251**
- **SD light should be flashing.**
- **After about 3 minutes**
- **SD Light should be now on Solid.**
- **Power off M251 and remove SD card.**

Using Ethernet or USB cable:

- **Use a SD Card that has been Formatted Fat32**
- **From SoMachine Central > Select Maintenance**
- **Select Controller Assistant**
- **Select Update Firmware..**
- **Controller Type M241/M251**
- **Select the Latest Firmware and the correct Controller**
- **Select Next**
- **Select Next**
- **Select Write to Controller...**
- **Select the Controller from the list of devices on the SoMachine Network by double-clicking on it**
- **Click "Connect"**
- **A progress bar will appear. Wait until the transfer is complete**
- **Wait until the RUN light is flashing steadily after completion**
- **Follow steps 1 to 9 (or find the Controller Selection screen in SoMachine) and observe the Firmware Version column to confirm the firmware version is up to date**