



# Instructions for SIMATIC S7-1200

## TIA-PORTAL 15.1

<b>Version</b>	1		
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<b>Reviewed by</b>		<b>Date</b>	

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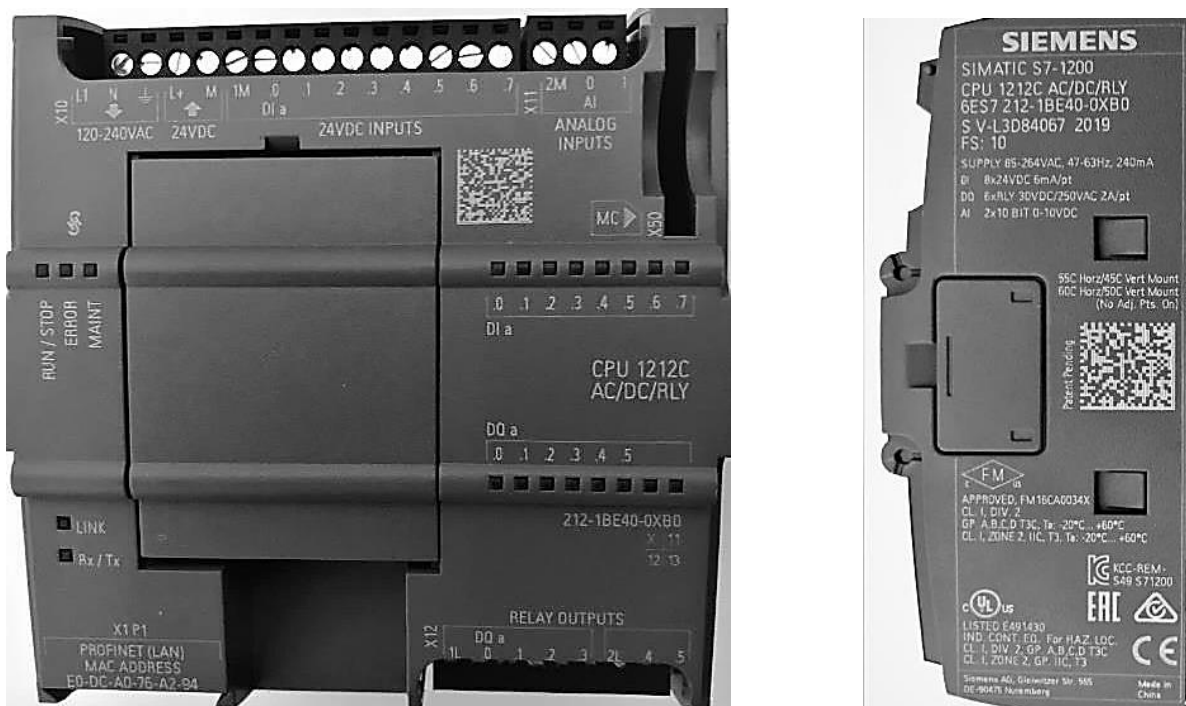
## SIMATIC S7-1200 (TIA-PORTAL 15.1)

We are using **Simatic S7-1200 Siemens PLC** kit through its latest Graphical Software **TIA Portal 15.1** where there will be different 8 inputs, 6 outputs and 2 analog inputs which we can see in the form of small LED interconnected internally through normal relays circuit.

This kit is normally made for simple PLC programming where student can try different form of PLC language e.g. ladder, FBD etc. with writing a code for logic gates, timers, switching logics, Set/Reset etc. Siemens-1200 learning kit document have following parts as shown below.

1. Siemens Simatic S7-1200 PLC Device
2. Secondary Power Source + Switching Relays +Led Switch, Output Led
3. Interconnected Input/output Wiring
4. TIA Portal 15.1 Software
5. Ethernet Connection (Mac Address)
6. PLC Programming

### 1. Siemens Simatic s7-1200 PLC Device



Front view (left) and side view (right). Sourced [here](#)

## SIMATIC S7-1200 PLC CPU 1212C AC DC Relay 6ES7212-1BE40-0XB0

Model No.: S7-1200 PLC CPU 1212C S7-1212C Relay output

**Power Supply: AC 85-264 V AC at 47-63 Hz**

**Output Type: 6 Bits Relay Output.**

**Digital Input: 8 Bits 24V DC Inputs.**

**Analog Input: 2 Channels Analog 0-10 V DC input.**

**Storage: Program/data memory 75 KB**

### 2. Independent Power Source, Switching Relays, Led Switch, Output Led:

**Independent Power Source:** It is used to provide the power supply for the relay circuit and input/output led switch through +5v/12v/24v. We can use the PLC's own internal +24v supply but it is not practical idea to use its internal supply due to hamper in the plc circuit.

**Switching Relay:** We can directly use output switch from PLC to on/off small led but 220 bulb we cannot do because of limitation of current in the internal relay. It is necessary to switch another high rating relay to control the huge load through external relay.

**Led Switch:** We are using led switch which will glow in different colour to display the switch is active or not and similarly 220v colour bulb can also be used to control it independently through the help of the switching relay.

### 3. Interconnected Input/output Wiring:

The interconnection of wiring system in **EIT Siemens Training Kit** is simple where we are having **8 Digital Inputs, 6 Digital Output & 2 Analog Input**. The power supply of **220v** is provided to the Siemens 1200 through the pin (**L1, N, Ground**) and similarly siemens also produce its own **" +24v "** from pin number (**L+, M**) which is used to provide input switching voltage for individual 8 Digital Inputs to control Digital Output. There are two analog inputs (**0-10v**) which can also be used to control the digital output. Similarly, there are 6 different individual output [**1L,2L, Do(0-5)**] which is internally open relay circuit and after coding each pin can be closed to control led lights or high watt switching relay.

### 4. Ethernet Connection (MAC Address)

The Siemens-1200 does have ethernet communication with MAC address given which should be linked to computer Tia Portal Software with the internet through independent IP address. To check whether, it is connected with the network or not one has to write instruction in computer through "command prompt" and type (**arp -a**). This will show concerned MAC address written in the Siemens Device, if not you have to check in TIA Portal PLC software and again try to assign MAC address to link with network.

## 5. TIA Portal 15.1 Software:

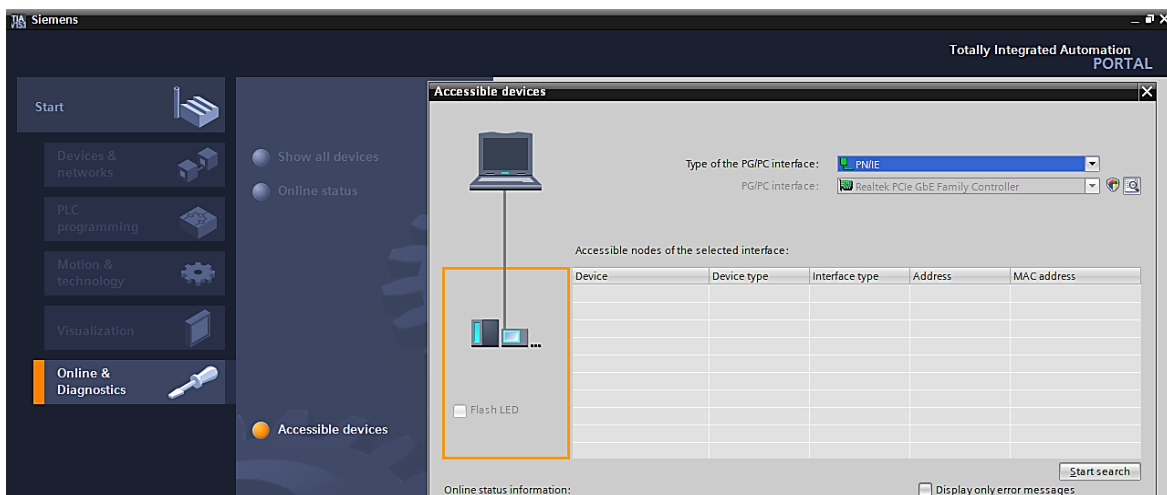
It is the easy and flexible graphical software of Siemens PLC to make comfortable for the programmer, although the drawback of this software is using large memory due to its graphic during operation in result hang in the operation in result making the process slow.

## 6. PLC Programming

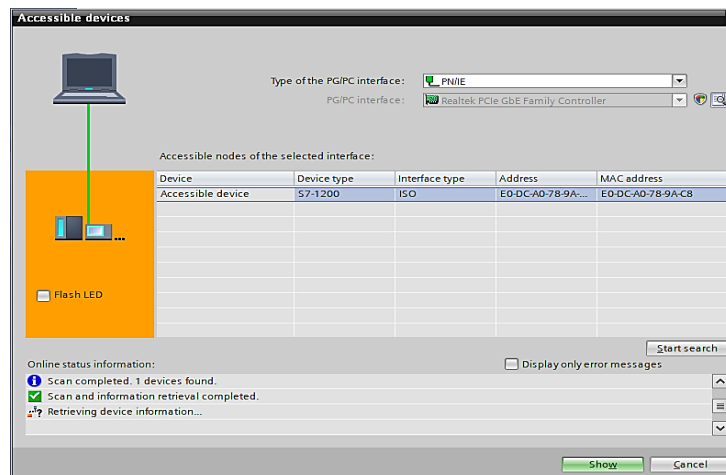
Normal PLC programming is done through this Siemens Training Kit where we will be able to control basic input and output pins. In this training kit student can write their own interlock program, logic gate program, timer program, counter program, analog input control etc. through different individual input and out pins.

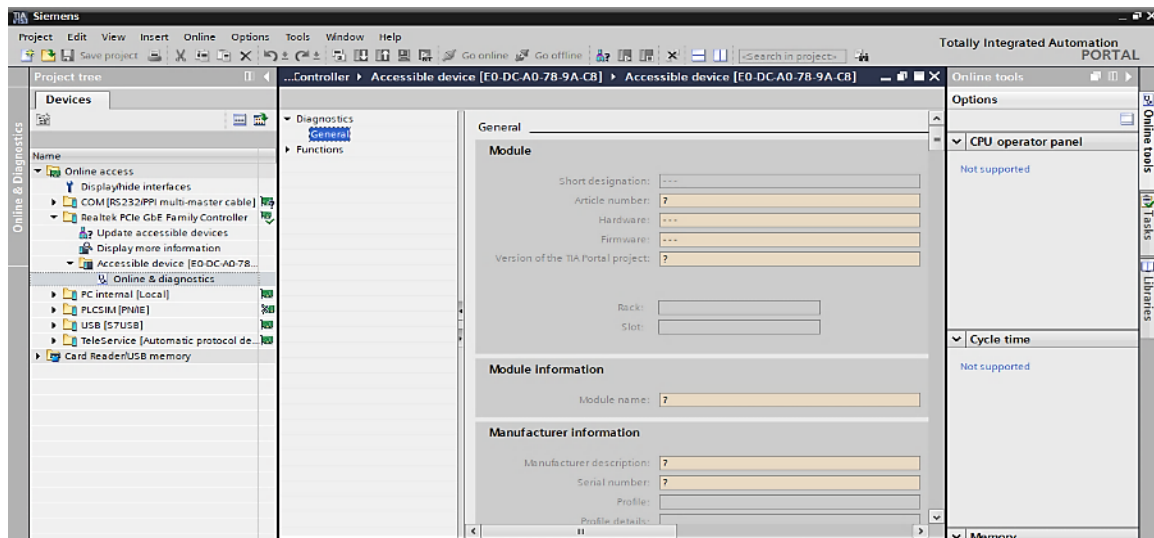
## 7. Assigning and Resetting IP Address in PLC Device.

Open the Tia-Portal, select the "Diagnostics" & "Accessible Devices" & click "Search"

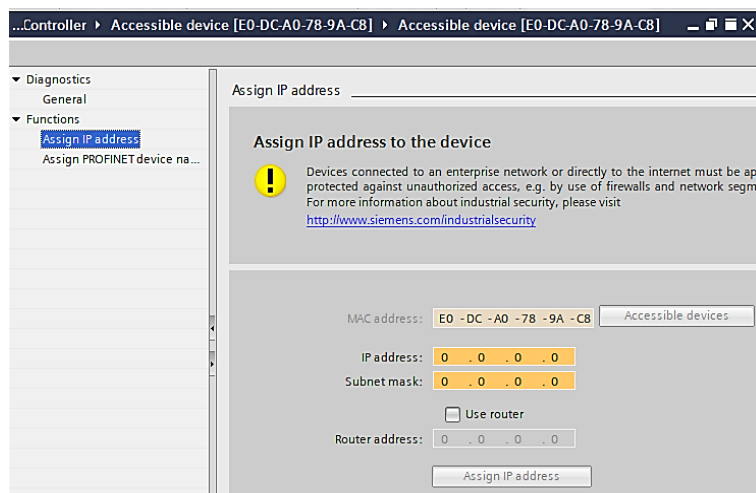


See the "Mac Address" & Click "Show" if not, then there is some problem in PLC device





Go to the "Assign IP Address" and see whether we have correct MAC address or not.



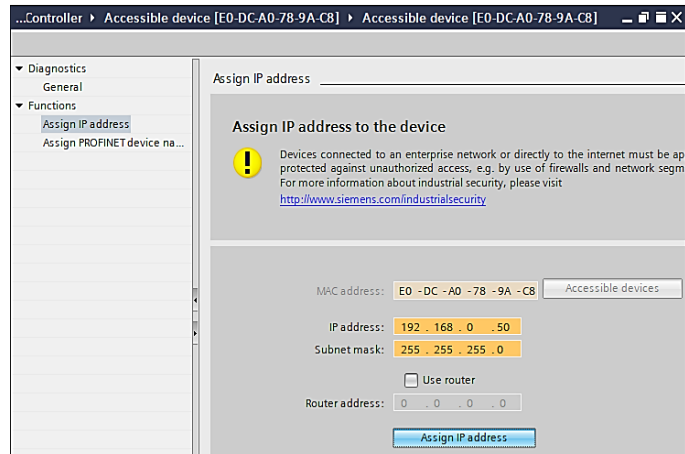
If everything is correct then check the free IP Address in Command Prompt "arp -a"

```
C:\Users\EIT>arp -a

Interface: 192.168.0.162 --- 0xa
Internet Address      Physical Address      Type
192.168.0.1           00-0d-48-17-b5-ec    dynamic
192.168.0.69          00-1b-a9-44-0a-ee    dynamic
192.168.0.98          00-0c-29-53-c4-bb    dynamic
192.168.0.101         30-05-5c-02-fb-0b    dynamic
192.168.0.106         00-17-c8-0e-0a-e3    dynamic
192.168.0.119         00-15-99-9d-25-d1    dynamic
192.168.0.123         30-05-5c-02-fe-a2    dynamic
192.168.0.129         04-d4-c4-e1-3c-31    dynamic
192.168.0.255         ff-ff-ff-ff-ff-ff    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.251           01-00-5e-00-00-fb    static
224.0.0.252           01-00-5e-00-00-fc    static
239.12.255.253        01-00-5e-0c-ff-fd    static
239.255.255.250       01-00-5e-7f-ff-fa    static
255.255.255.255       ff-ff-ff-ff-ff-ff    static

C:\Users\EIT>
```

192.168.0.50 is free so I am assigning this IP address with Subnet mask 255.255.255.0. Your IP address may differ just make sure with the Command Prompt and change the last two number and Subnet address will be same 255.255.255.0.

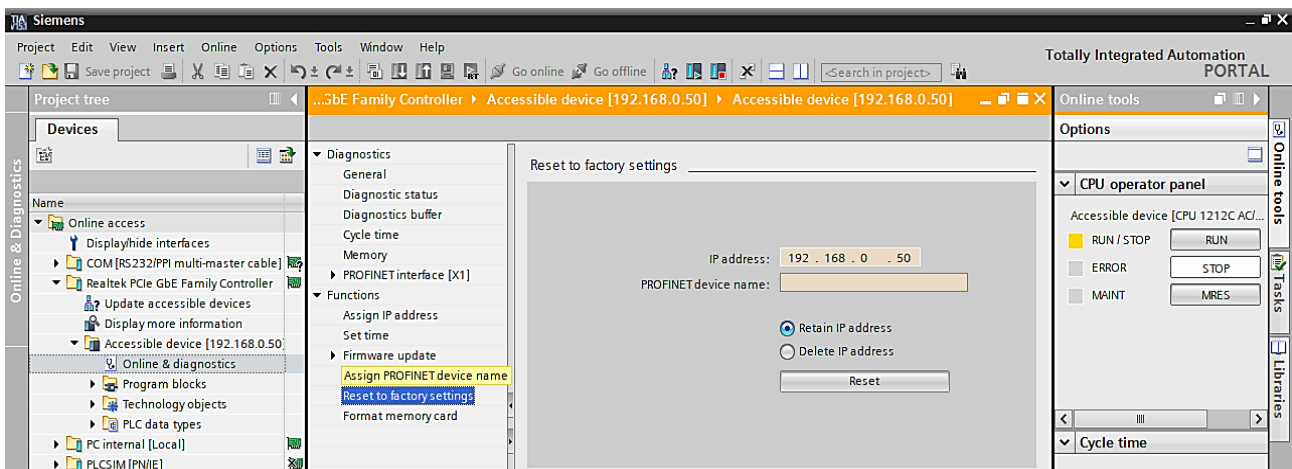


```
C:\Users\EIT>arp -a

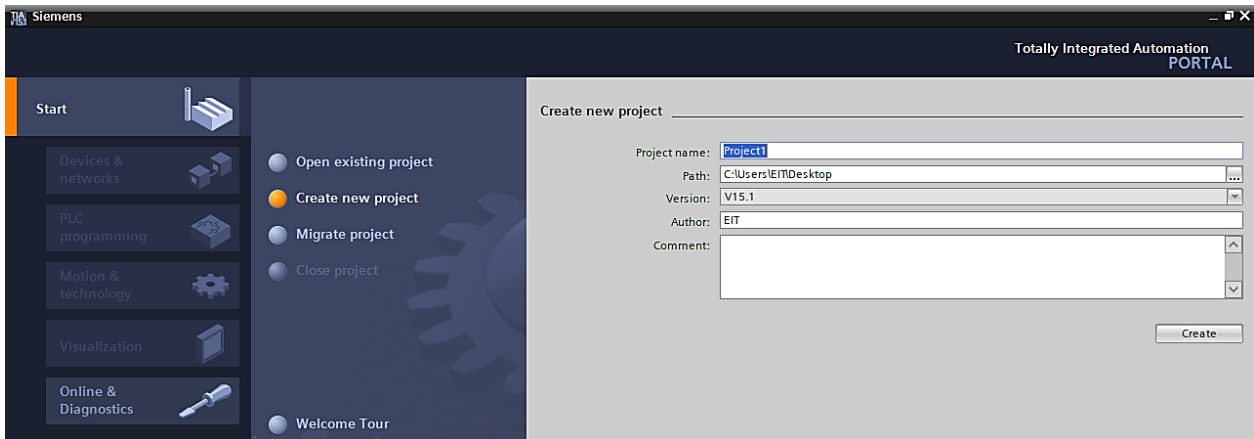
Interface: 192.168.0.162 --- 0xa
Internet Address      Physical Address      Type
192.168.0.1           00-0d-48-17-b5-ec    dynamic
192.168.0.2           00-0d-48-17-b5-ec    dynamic
192.168.0.50          e0-dc-a0-78-9a-c8    dynamic
192.168.0.69          00-1b-a9-44-0a-ee    dynamic
192.168.0.98          00-0c-29-53-c4-bb    dynamic
192.168.0.101         30-05-5c-02-fb-0b    dynamic
192.168.0.106         00-17-c8-0e-0a-e3    dynamic
192.168.0.123         30-05-5c-02-fe-a2    dynamic
192.168.0.167         a0-88-b4-53-51-e8    dynamic
192.168.0.202         f4-b5-20-14-c2-ba    dynamic
192.168.0.255         ff-ff-ff-ff-ff-ff    static
224.0.0.22           01-00-5e-00-00-16    static
224.0.0.251          01-00-5e-00-00-fb    static
224.0.0.252          01-00-5e-00-00-fc    static
239.12.255.253       01-00-5e-0c-ff-fd    static
239.255.255.250      01-00-5e-7f-ff-fa    static
255.255.255.255      ff-ff-ff-ff-ff-ff    static
```

Once you see the IP Address through Command Prompt again go to the "Diagnostics" then "Accessible Devices" then "Start Search" & "Show".

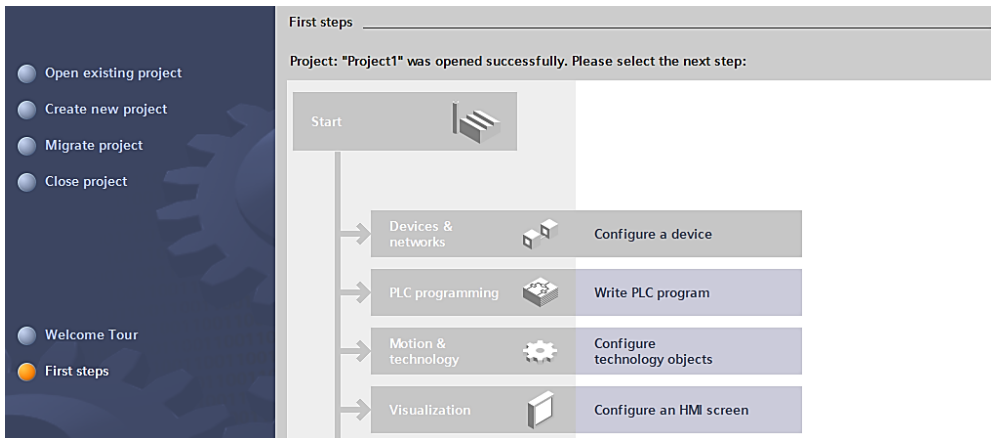
Over here you have the option of deleting IP address through Factory setting and creating new IP address.



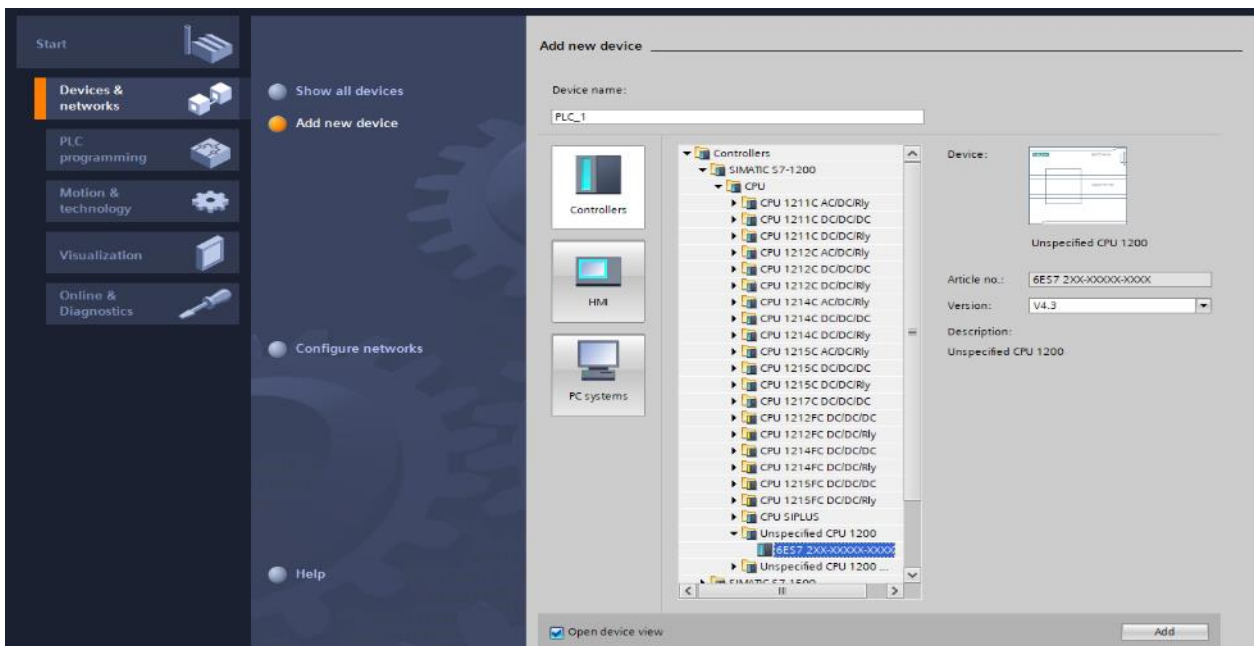
## 8. Creating New Project



### Configure then after Add New Device

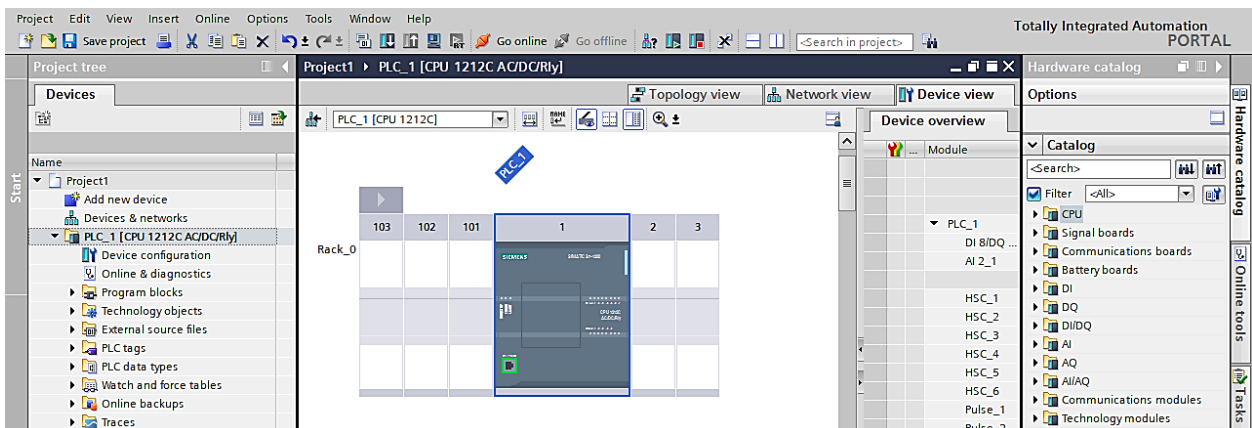
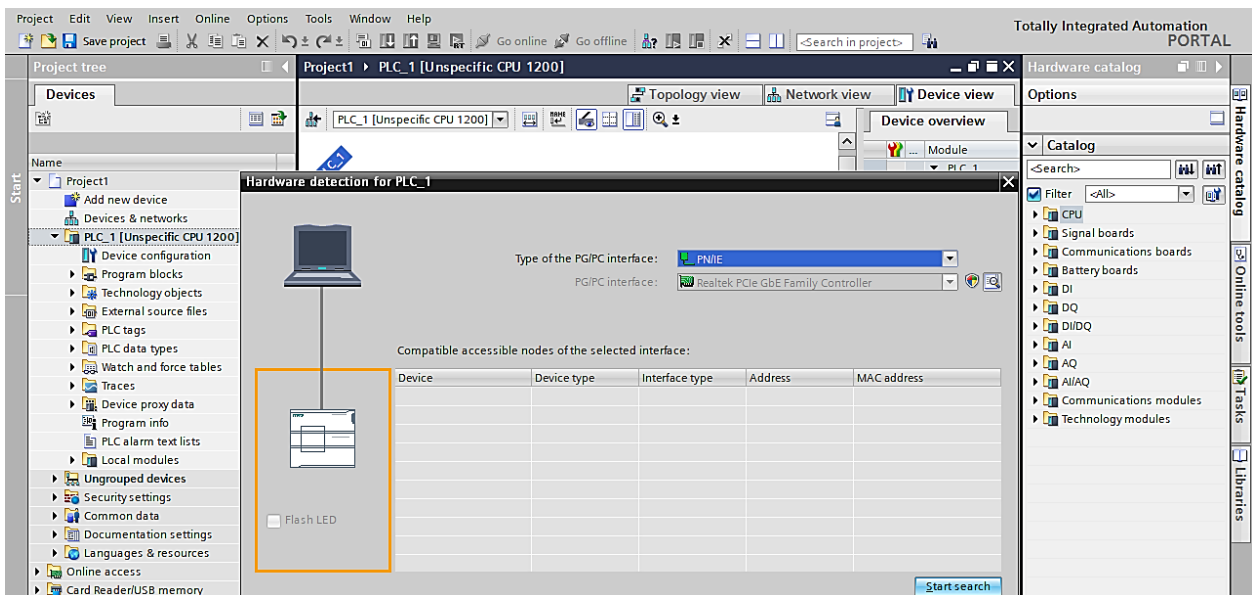
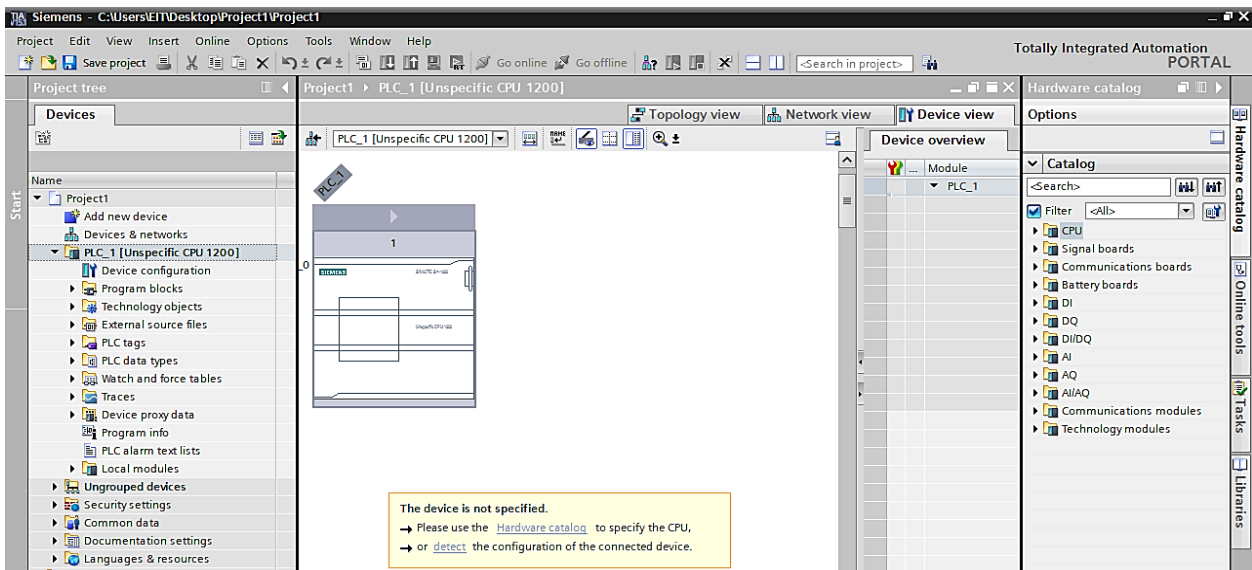


### Go to the Sematic S7-1200/ CPU/ Unspecified CPU 1200



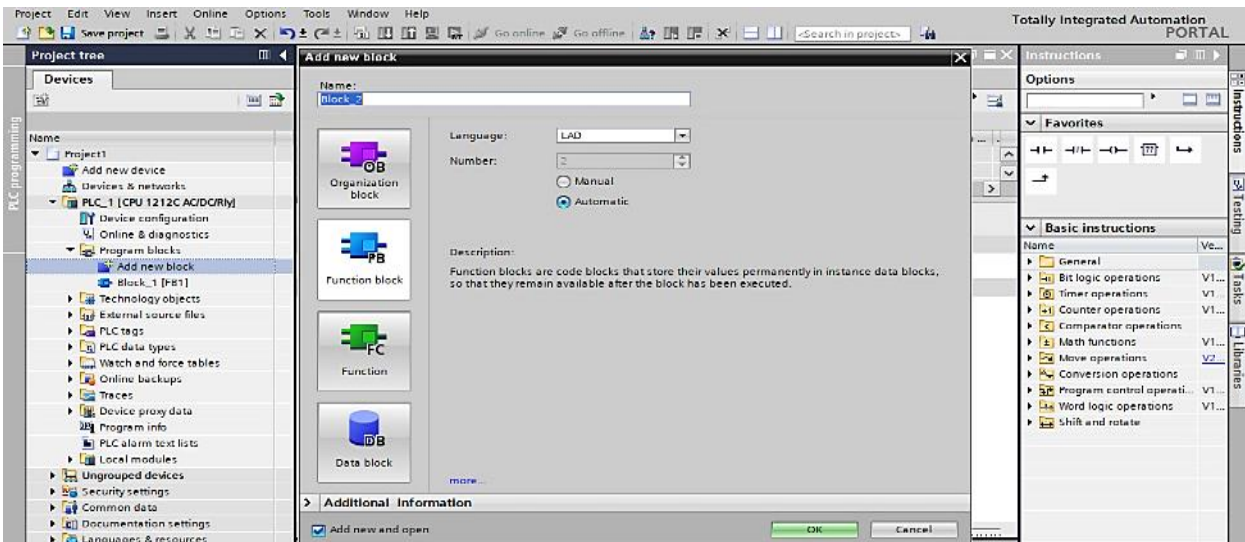
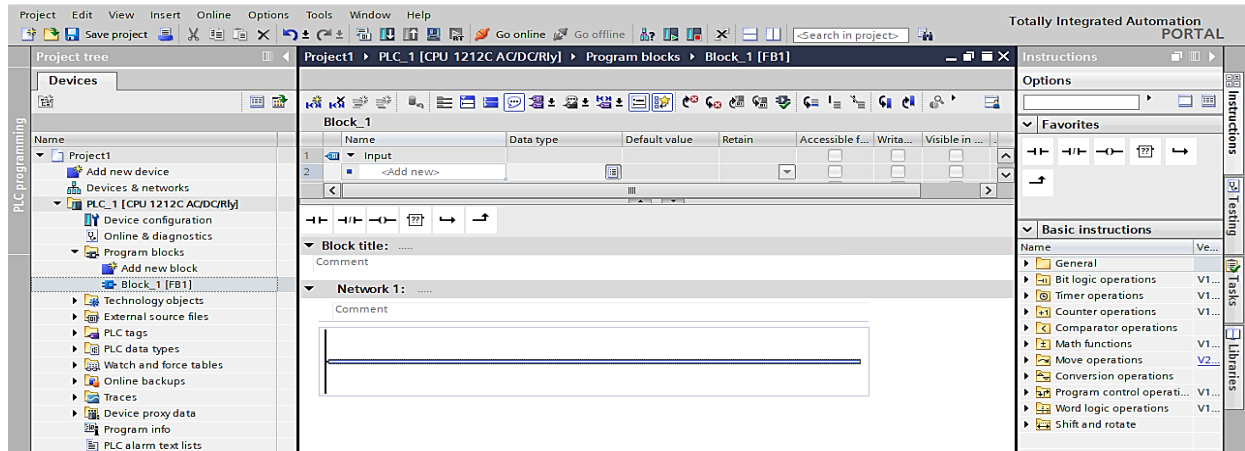


Detect the PLC & Start Search then once it detects real PLC as shown in picture then double click "Ethernet" plug and make sure it has the same IP address 192.168.0.50 and through "Online Diagnostics" you can check the IP address.

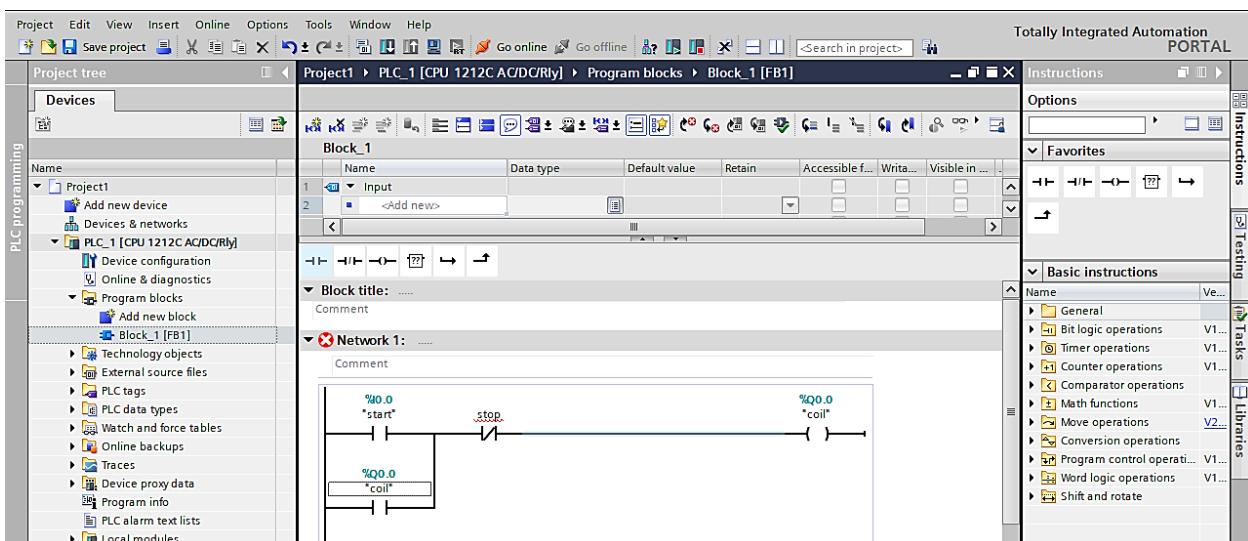


## 9. Programming in Ladder:

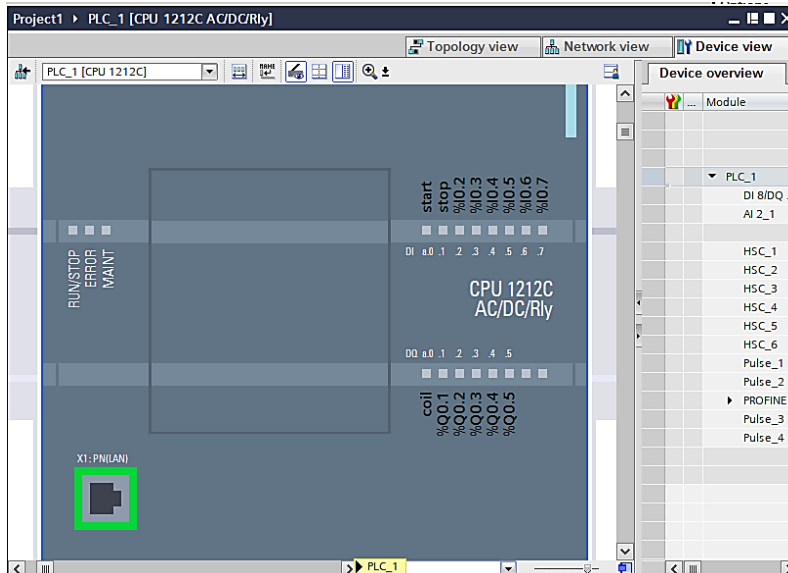
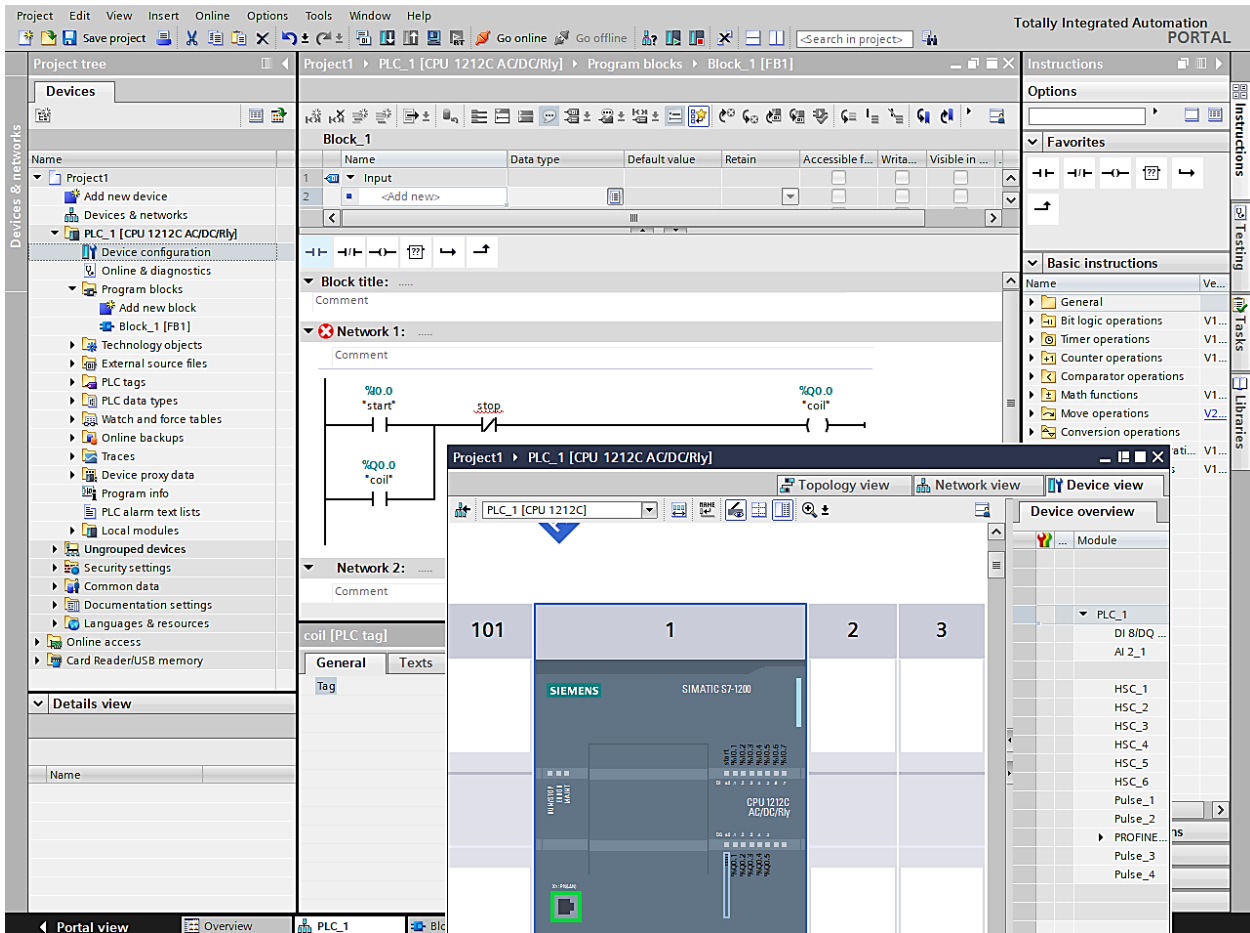
Go to the Program Blocks and double click in "Block" or Add new block where you can program in Ladder, Function Block etc.

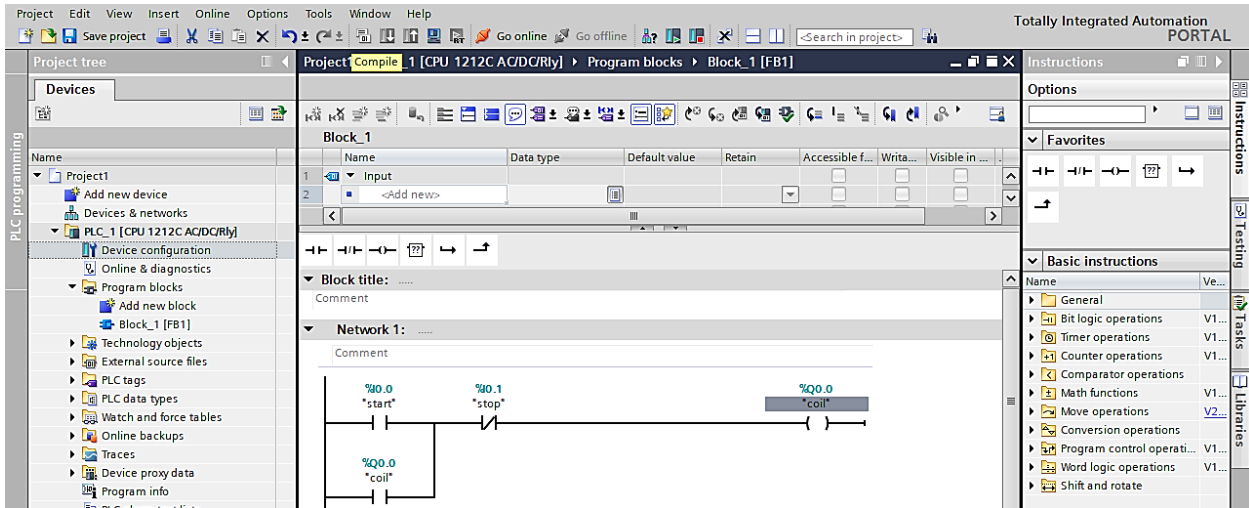


Drag the NC/NO/Output and built an interlock code and Name it as you like.

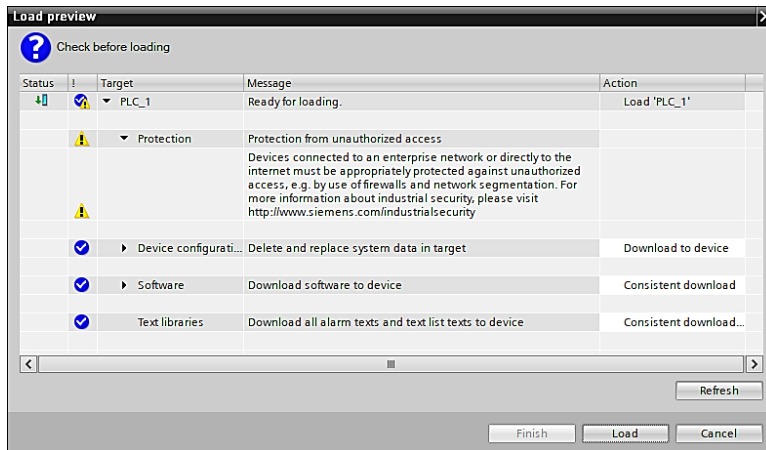


Go to the Device Configuration/ Enlarge the Visual PLC as shown in picture and click the float on it and drag the input and output function individually and fix in PLC input output.

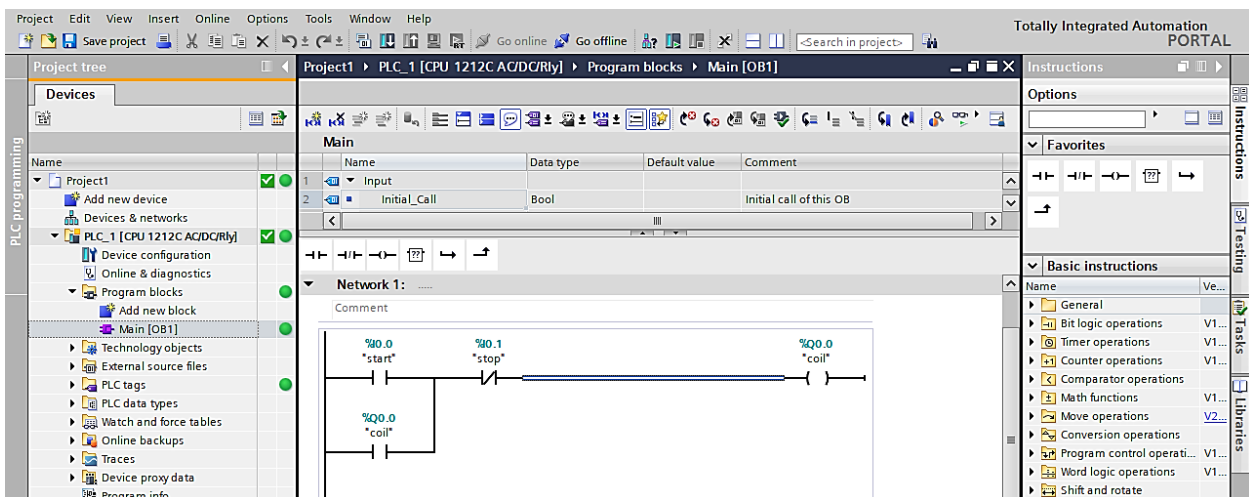




Download to the Device and Load & Finish it then Go online.



If everything is good then there will be dark green at the left and then Run "Monitoring ON" with a small spectacles sign.



After Monitoring On, it will ask you whether to go online or not, just click yes and you will see this screen where all PLC wiring changes the color to green.

The screenshot displays the Siemens Totally Integrated Automation PORTAL software interface. The main window shows a ladder logic program for a PLC. The project tree on the left indicates the current project is 'Project1' and the active program block is 'Main [OB1]'. The main workspace shows a ladder logic network with the following components:

- Network 1:** A normally open contact labeled '%I0.0 \*start\*' is connected to a normally closed contact labeled '%I0.1 \*stop\*'. This network is connected to a coil labeled '%Q0.0 \*coil\*'. Below the coil, there is a self-locking circuit consisting of a normally open contact labeled '%Q0.0 \*coil\*' in parallel with a normally open contact labeled '%I0.0 \*start\*'.
- Network 2:** This network is currently empty.

The right-hand side of the interface features a 'Testing' panel with the following sections:

- Options:** Includes a 'CPU operator panel' for 'PLC\_1 [CPU 1212C AC/DC/Rly]' with buttons for 'RUN / STOP', 'ERROR', 'STOP', 'MAINT', and 'MRES'.
- Call environment:** Shows 'No condition defined.' with a 'Change ...' button.
- Breakpoints:** Includes a checkbox for 'Enable output in run' which is checked, and a note stating 'This device does not support breakpoints.'

Save the project in your destination.