

Instructions for SIMATIC S7-1200 TIA-PORTAL 15.1

Version	1		
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Reviewed by		Date	

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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 weather, 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"

K Siemens								
							Totally	/ Integrated Automation PORTAL
Start			Accessible devices					×
Devices & networks	A	Show all devices Online status			Type of the PG/PC interf	ace: <mark>V_PN/IE</mark> ace: W Realtek F	°Cle GbE Family Cor	ntroller 🔻 🕄
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Motion & technology				Device	Device type	Interface type	Address	MAC address
Visualization								
Online & Diagnostics	1							
		Accessible devices	Flash LED					
			Online status informatio	n:			Display on	<u>Start search</u> ly error messages

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

Accessible devices					
	Accessible nodes of th	Type of the PG/PC inte PG/PC inte e selected interface:	rface: PN/IE rface: Realtek	PCIe GbE Family Contro	Iler V 🕅
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Manufacturer Information	
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Serial number: 7	
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Go to the "Assign IP Address" and see whether we have correct MAC address or not.

Controller Accessible devi	ice [E0-DC-A0-78-9A-C8] > Accessible device [E0-DC-A0-78-9A-C8] 🛛 🗖 🖬 🗙
	Assign IP address
Functions Assign IP address Assign PROFINET device na	Assign IP address to the device Devices connected to an enterprise network or directly to the internet must be app protected against unauthorized access, e.g. by use of firewalls and network segme For more information about industrial security, please visit http://www.siemens.com/industrialsecurity
	MAC address: E0 -DC -A0 -78 -9A -C8 Accessible devices
	IP address: 0 . 0 . 0
	Subnet mask: 0 . 0 . 0
	Use router Router address: 0 .0 .0 Assign IP address

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

terface: 102 168 0	162 Ava	
Internet Address	Physical Address	Type
192 168 0 1	00-0d-48-17-b5-ec	dynamic
192 168 0 69	00-1h-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	dynamio
192.168.0.106	00-17-c8-0e-0a-e3	dynamio
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

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.



Controller > Accessible devi	ice [E0-DC-A0-78-9A-C8] › Accessible device [E0-DC-A0-78-9A-C8] 🛛 🗕 🖬 🗮 🗙
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	MAC address: E0 -DC -A0 -78 -9A -C8 Accessible devices
	IP address: 192 . 168 . 0 . 50
	Subnet mask: 255 . 255 . 0
	Use router Router address: 0 . 0 . 0 . 0 Assign IP address

C:\Users\EIT>arp -a		
Interface: 192.168.0.	162 0xa	
Internet Address	Physical Address	Туре
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	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.



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					Totally Integrated Automation PORTAL
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Configure then after Add New Device

	First steps	
Open existing project	Project: "Project1" was opened successfully. Please select the next step:	
Create new project	Start	
Migrate project		
Close project		
2	Devices & Configure a device	
	PLC programming Write PLC program	
 Welcome Tour First steps 	Motion & Configure technology objects	
	Visualization Configure an HMI screen	

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

Start 🦂	>	Add new device
Devices & 💕	Show all devices	Device name:
PLC programming Metion & technology Visualization Online & Diagnostics	Add new device Configure networks Help	PEC_1 Controller Controller
		Open device view Add



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.

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	PLC alarm text lists						
	Local modules						



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.



Proj	ect1 → PLC_1 [CP	U 1212C AC/DC/Rly]			_∎∎×
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Download to the Device and Load & Finish it then Go online.

Status	1	Target	Message	Action
+I	%	▼ PLC_1	Ready for loading.	Load 'PLC_1'
	▲	 Protection 	Protection from unauthorized access	
	A		Devices connected to an enterprise network or directly to the internet must be appropriately protected against unauthorized access, e.g. by use of firewalls and network segmentation. For more information about industrial security, please visit http://www.siemens.com/industrialsecurity	
	0	Device configurati.	Delete and replace system data in target	Download to device
	0	 Software 	Download software to device	Consistent download
	0	Text libraries	Download all alarm texts and text list texts to device	Consistent download
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If everything is good then there will be dark green at the left and then Run "Monitoring ON" with a small spectacles sign.

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Device proxy data							Word logic operations	V1
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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.



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Save the project in your destination.