SIEMENS AG.
SIMATIC S7-300/400 Series
Ethernet Driver

Supported version TOP Design Studio V1.0 or higher

CONTENTS

We would like to thank our customers for using M2I's "Touch Operation Panel (M2I TOP) Series". Read this manual and familiarize yourself with the connection method and procedures of the “TOP and external device”.

1. System configuration

The system configuration of TOP and "SIEMENS AG. – S7-300/400 Series Ethernet" is as follows.

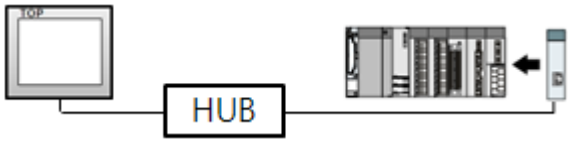
Series	CPU	Link I/F	Communication method	System setting	Cable
SIMATIC S7-300	CPU312 IFM CPU313 CPU314 CPU314 IFM CPU315 CPU315(F)-2 DP CPU315(F)-2 PN/DP CPU316 CPU316-2 DP CPU317-2 DP CPU317F-2 CPU318-2 CPU317-2 PN/DP CPU319-3 PN/DP CPU614 CPU388	CP 343-1 Lean CP 343-1 IT CP 343-1	Ethernet TCP (OP Communication)	3. TOP communication setting 4.1. External device setting 1	Twisted pair cable *Note 1)
			Ethernet TCP (FETCH/WRITE)	3. TOP communication setting 4.2. External device setting 2	
	CPU315-2 PN/DP CPU317-2 PN/DP CPU319-3 PN/DP	CPU built-in Ethernet port	Ethernet TCP (OP Communication)	3. TOP communication setting 4.1. External device setting 1	
SIMATIC S7-400	CPU412-1 CPU412-2 DP CPU413-1 CPU413-2 DP CPU414-1 CPU414-2 DP CPU414-3 DP CPU416-1 CPU416-2 DP CPU416-3 DP CPU417-4 CPU414-3PN/DP CPU416-3PN/DP CPU417 CPU486	CP 443-1 Lean CP 443-1 IT CP 443-1	Ethernet TCP (OP Communication)	3. TOP communication setting 4.1. External device setting 1	
			Ethernet TCP (FETCH/WRITE)	3. TOP communication setting 4.2. External device setting 2	
	CPU414-3PN/DP CPU416-3PN/DP	CPU built-in Ethernet port	Ethernet TCP (OP Communication)	3. TOP communication setting 4.1. External device setting 1	

*Note 1) Twisted pair cable

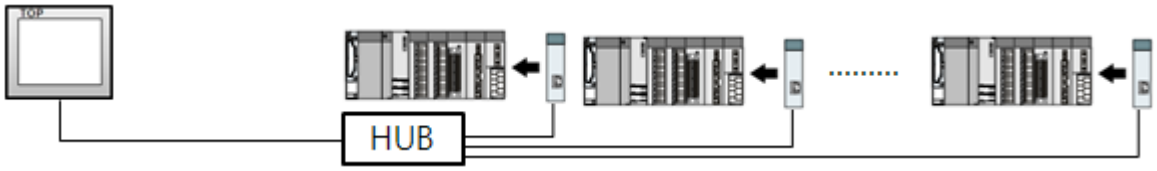
- Refer to STP (Shielded Twisted Pair Cable) or UTP (Unshielded Twisted Pair Cable) Category 3, 4, 5.
- Depending on the network configuration, you can connect to components such as the hub and transceiver, and in this case, use a direct cable.

■ Connectable configuration

・1:1 connection (one TOP and one external device) connection

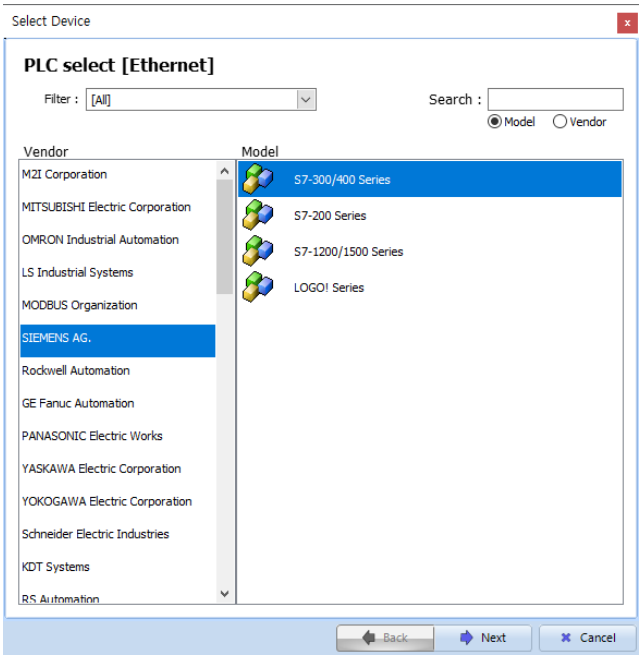


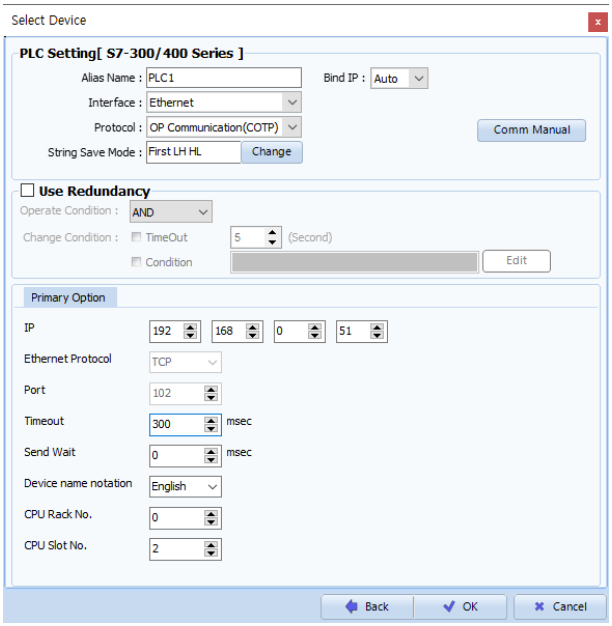
・1:N connection (one TOP and multiple external devices) connection

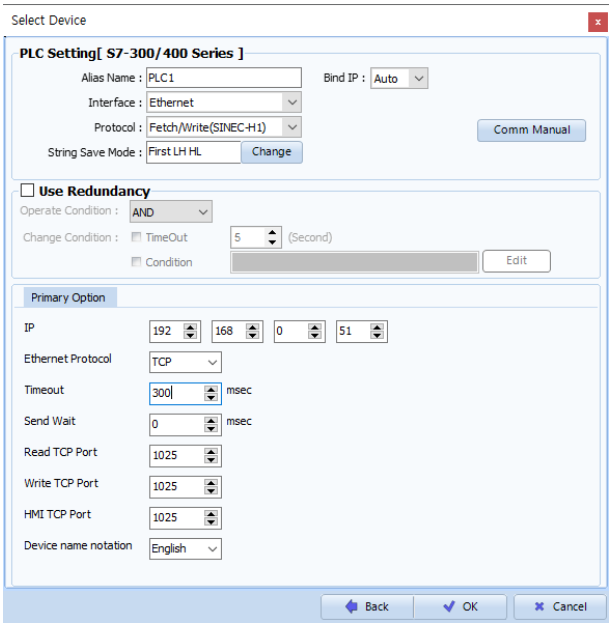


2. External device selection

■ Select a TOP model and a port, and then select an external device.







<table>
<tr><th colspan="2">Settings</th><th>Contents</th></tr>
<tr><td>TOP</td><td>Model</td><td>Check the TOP display and process to select the touch model.</td></tr>
<tr><td rowspan="2">External device</td><td>Vendor</td><td>Select the vendor of the external device to be connected to TOP.
Select “SIEMENS AG.”</td></tr>
<tr><td>PLC</td><td>Select the external device to be connected to the TOP.
<table>
<tr><th>Model</th><th>Interface</th><th>Protocol</th></tr>
<tr><td>S7-300/400 Series</td><td>Ethernet</td><td></td></tr>
</table>
<table>
<tr><th colspan="2">Supported Protocol</th></tr>
<tr><td>OP Communication(COTP)</td><td>Fetch/Write(SINEC-H1)</td></tr>
</table>
Please check the system configuration in Chapter 1 to see if the external device you want to connect is a model whose system can be configured.</td></tr>
</table>

3. TOP communication setting

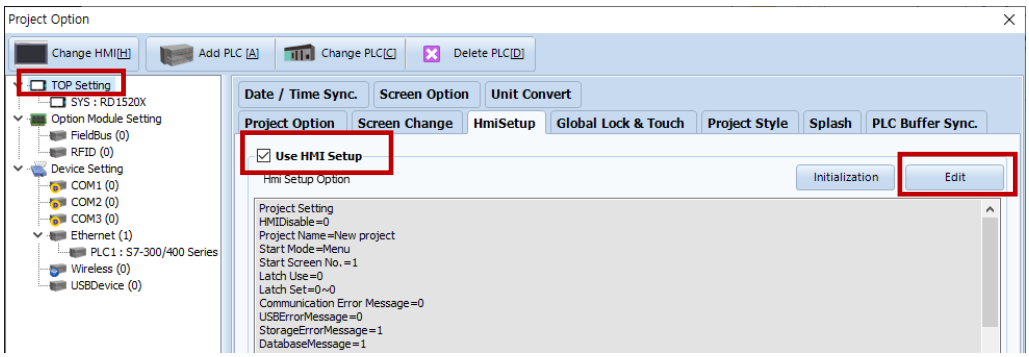
The communication can be set in TOP Design Studio or TOP main menu. The communication should be set in the same way as that of the external device.

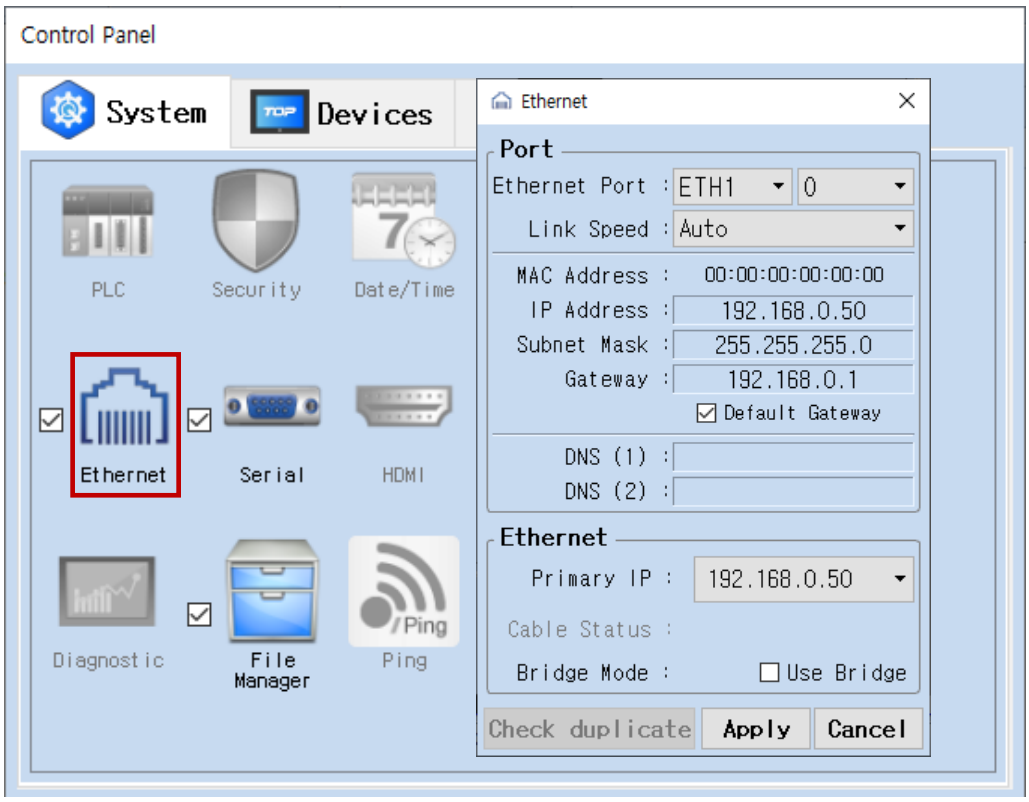
3.1 Communication setting in TOP Design Studio

(1) Communication interface setting

■ [Project > Project properties > TOP settings] → [Project option > Check "Use HMI settings" > Edit > Ethernet]

– Set the TOP communication interface in TOP Design Studio.





Items	TOP	External device	Remarks
IP Address*Note 1) Note 2)	192.168.0.50	192.168.0.51	
Subnet Mask	255.255.255.0	255.255.255.0	
Gateway	192.168.0.1	192.168.0.1	

*Note 1) The network addresses of the TOP and the external device (the first three digits of the IP, 192 . 168 . 0 . 0) should match.

*Note 2) Do not use duplicate IP addresses over the same network.

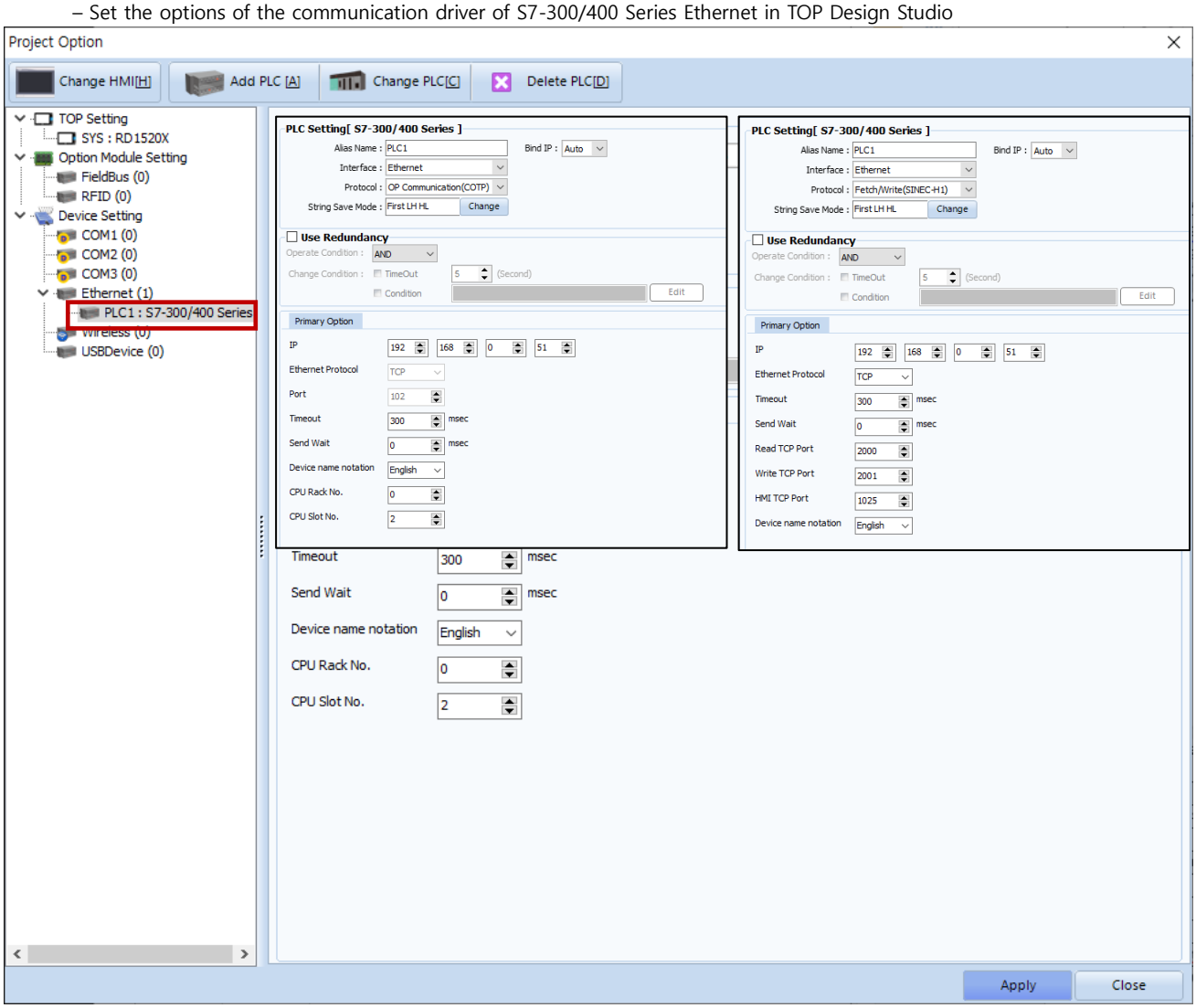
* The above settings are examples recommended by the company.

Items	Description
IP Address	Set an IP address to be used by the TOP to use over the network.
Subnet Mask	Enter the subnet mask of the network.
Gateway	Enter the gateway of the network.

(2) Communication option setting

■ [Project > Project properties > PLC settings > ETHERNET > "PLC1 : S7-300/400 Series"]

– Set the options of the communication driver of S7-300/400 Series Ethernet in TOP Design Studio



* The above settings are examples recommended by the company.

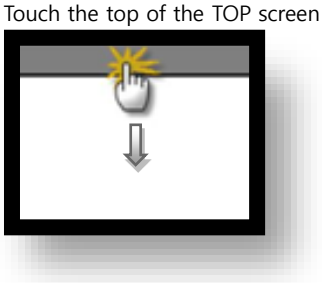
Items	Settings	Remarks
Interface	Select "Ethernet".	Refer to "2. External device selection".
Protocol	Select the communication protocol between the TOP and an external device.	
Communication option items when selecting OP Communication		
IP	Enter the IP address of the external device.	
Ethernet Protocol	Select the Ethernet protocol between the TOP and an external device.	
Port	Enter the Ethernet communication port number of an external device.	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Device name notation	Set the device name display method.	
Communication option items when selecting Fetch/Write(SINEC-H1)		
IP	Enter the IP address of the external device.	
Ethernet Protocol	Select the Ethernet protocol between the TOP and an external device.	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Read TCP Port	Enter the Ethernet communication read port number of the external device.	

Write TCP Port	Enter the Ethernet communication write port number of the external device.	
HMI TCP Port	Enter the Ethernet communication port number of the TOP.	
Device name notation	Set the device name display method.	

3.2. Communication setting in TOP

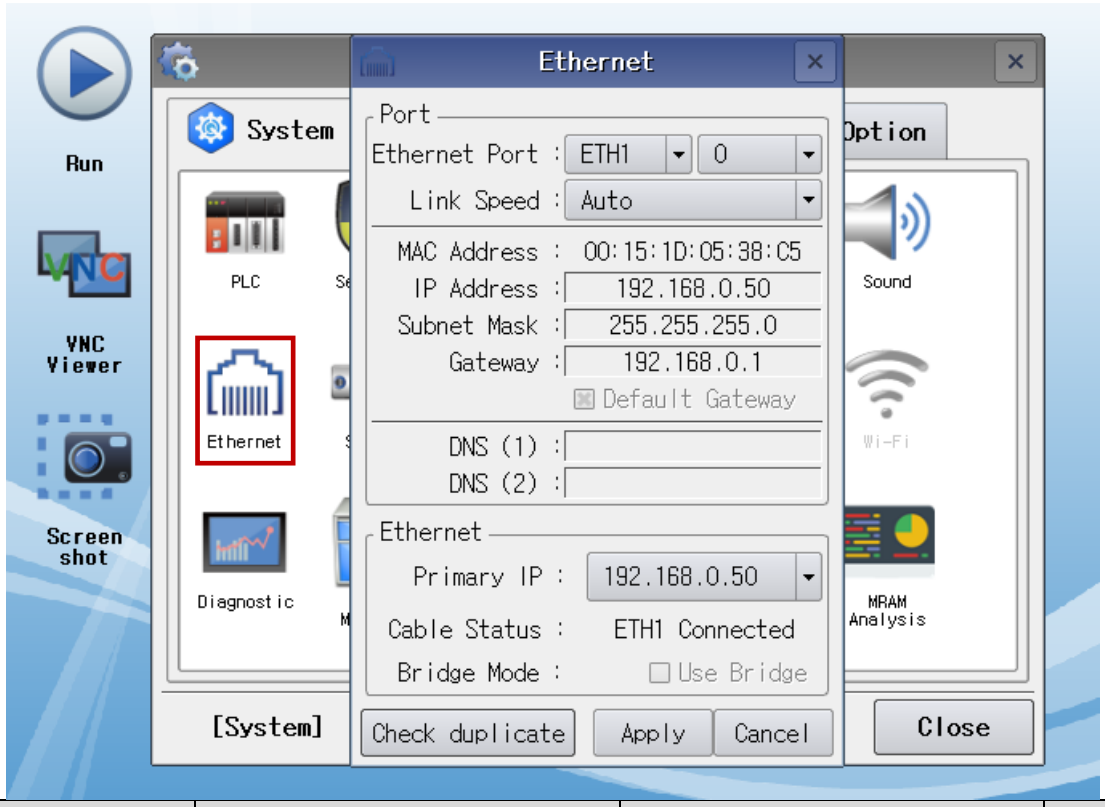
*** This is a setting method when "Use HMI Setup" in the setting items in "3.1 TOP Design Studio" is not checked.**

■ Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.



(1) Communication interface setting

■ [Main screen > Control panel > Ethernet]



Items	TOP	External device	Remarks
IP Address*Note 1) Note 2)	192.168.0.50	192.168.0.51	
Subnet Mask	255.255.255.0	255.255.255.0	
Gateway	192.168.0.1	192.168.0.1	

*Note 1) The network addresses of the TOP and the external device (the first three digits of the IP, 192 . 168 . 0 . 0) should match.

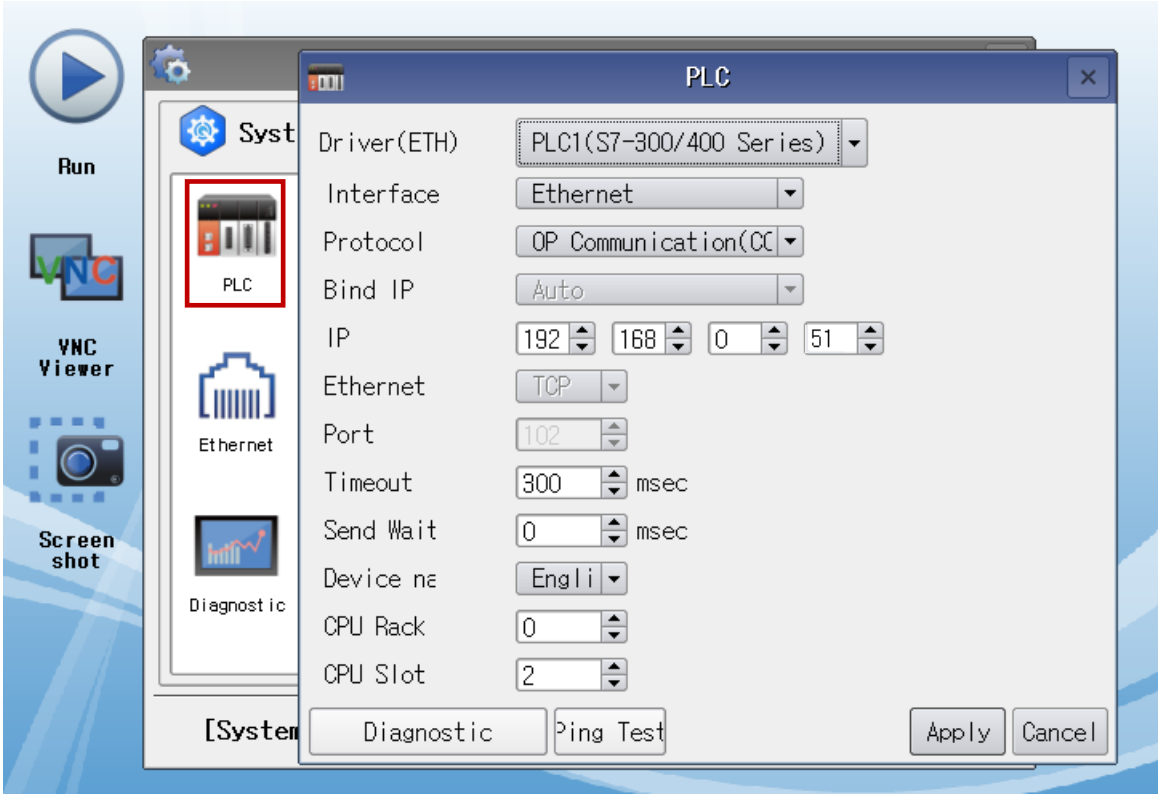
*Note 2) Do not use duplicate IP addresses over the same network.

* The above settings are examples recommended by the company.

Items	Description
IP Address	Set an IP address to be used by the TOP to use over the network.
Subnet Mask	Enter the subnet mask of the network.
Gateway	Enter the gateway of the network.

(2) Communication option setting

■ [Main screen > Control panel > PLC]



* The above settings are examples recommended by the company.

Items	Settings	Remarks
Interface	Select "Ethernet".	Refer to "2. External device selection".
Protocol	Select the communication protocol between the TOP and an external device.	
Communication option items when selecting OP Communication		
IP	Enter the IP address of the external device.	
Ethernet Protocol	Select the Ethernet protocol between the TOP and an external device.	
Port	Enter the Ethernet communication port number of an external device.	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Device name notation	Set the device name display method.	
Communication option items when selecting Fetch/Write(SINEC-H1)		
IP	Enter the IP address of the external device.	
Ethernet Protocol	Select the Ethernet protocol between the TOP and an external device.	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Read TCP Port	Enter the Ethernet communication read port number of the external device.	
Write TCP Port	Enter the Ethernet communication write port number of the external device.	
HMI TCP Port	Enter the Ethernet communication port number of the TOP.	
Device name notation	Set the device name display method.	

3.3 Communication diagnostics

■ Check the interface setting status between the TOP and an external device.

- Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.
- Check whether the port (ETH1/ETH2) settings you want to use are the same as those of the external device in [Control Panel > Ethernet].

■ Diagnosis of whether the port communication is normal or not

- Touch "Communication diagnostics" in [Control Panel > PLC].
- The Diagnostics dialog box pops up on the screen and determines the diagnostic status.

OK	**Communication setting normal**
Time Out Error	**Communication setting abnormal** - Check the cable, TOP, and external device setting status. **(Reference: Communication diagnostics sheet)**

■ Communication diagnostics sheet

- If there is a problem with the communication connection with an external terminal, please check the settings in the sheet below.

Items	Contents		Check		Remarks
System configuration	How to connect the system		OK	NG	1. System configuration
	Connection cable name		OK	NG	
TOP	Version information		OK	NG	2. External device selection 3. Communication setting
	Port in use		OK	NG	
	Driver name		OK	NG	
	Other detailed settings		OK	NG	
	Relative prefix	Project setting	OK	NG	
		Communication diagnostics	OK	NG	
	Ethernet port setting	IP Address	OK	NG	
		Subnet Mask	OK	NG	
		Gateway	OK	NG	
External device	CPU name		OK	NG	4. External device setting
	Communication port name (module name)		OK	NG	
	Protocol (mode)		OK	NG	
	Setup Prefix		OK	NG	
	Other detailed settings		OK	NG	
	Ethernet port setting	IP Address	OK	NG	
		Subnet Mask	OK	NG	
		Gateway	OK	NG	
	Check address range		OK	NG	5. Supported addresses (For details, please refer to the PLC vendor's manual.)

4. External device setting

4.1 External device setting 1 (OP Communication)

Use SIEMETIC S7 Ladder Software [STEP 7] to set as follows. For more detailed setting method than described in this example, refer to PLC user manual.

> ⚠ Do not use duplicate IP addresses over the same network.

Step 1. Create a new project through [New Project] in the top bar of the main menu of [SIMATIC Manager].

Step 2. Select the Menu [Insert] > [Station] > [1 SIMATIC 400 Station] or [2 SIMATIC 300 Station]. ➔ Add CPU

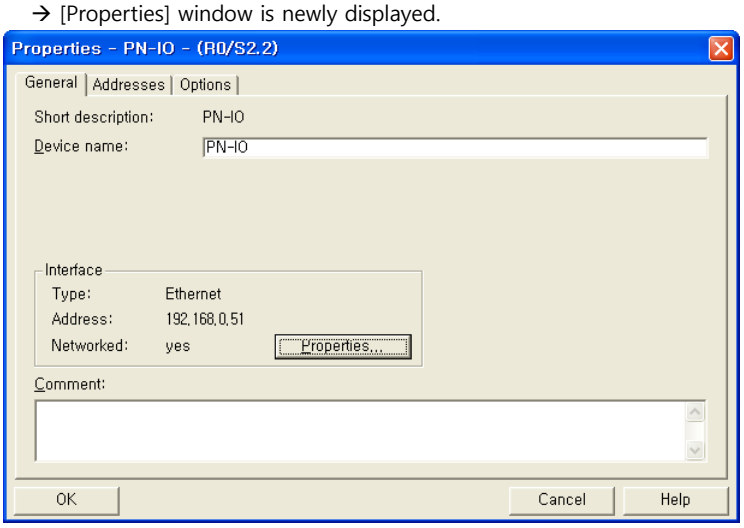
Step 3. Double-click the added "[SIMATIC 400(1)]" or [SIMATIC 300(1)] CPU > Double-click [Hardware] of the corresponding CPU. ➔ [HW Config] window is newly displayed.

Step 4. Open "[SIMATIC 400] > [RACK-400]" or "[SIMATIC 300] > [RACK-300]" in the left tree window of the [HW Config] window to select the Base unit model to be used, and then drag & drop it to the lower right corner of the window to register.

Step 5. Select [SIMATIC 400] > [PS-400] or [PS-300] to select the power unit to be used, and drag & drop it to the current rack.

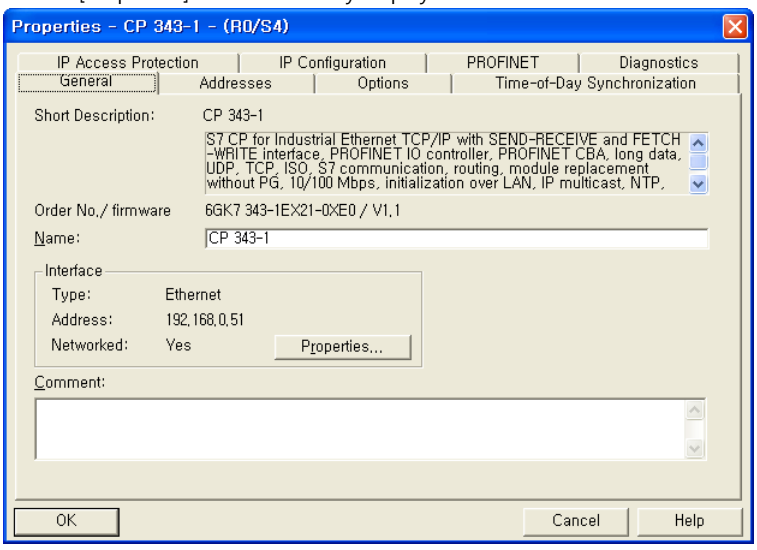
Step 6. Select [SIMATIC 400] > [CPU-400] or [CPU-300] to select the CPU unit to be used, and drag & drop it to the current rack.
(If the [Properties – PROFIBUS interface DP] window is newly displayed, press the [Cancel] key to close the window.)

◆ When setting CPU PN/IO, right-click [PN/IO] registered in X2 of CPU > Select [Object Properties...]
→ [Properties] window is newly displayed.



In case of using a communication card, select [SIMATIC 300] > [CP-300] or [SIMATIC 400] > [CP-400] to select the Ethernet communication unit to be used, and drag & drop it to the current rack.

◆ When setting CP443-1 or CP343-1, right-click [Ethernet communication unit name] > Select [Object Properties...]
→ [Properties] window is newly displayed.

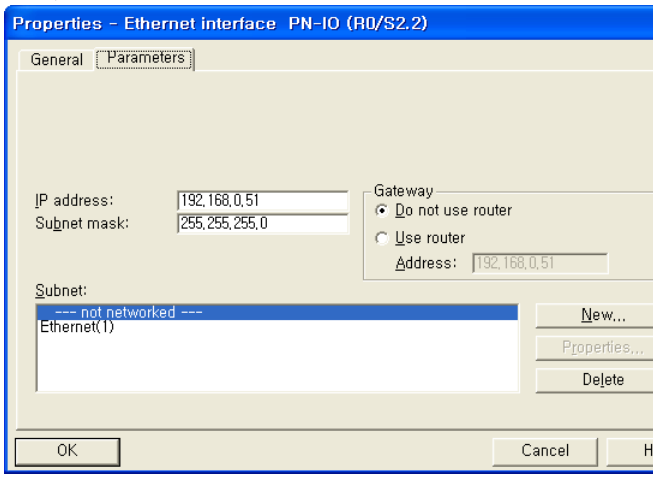


☞ Continued on next page.

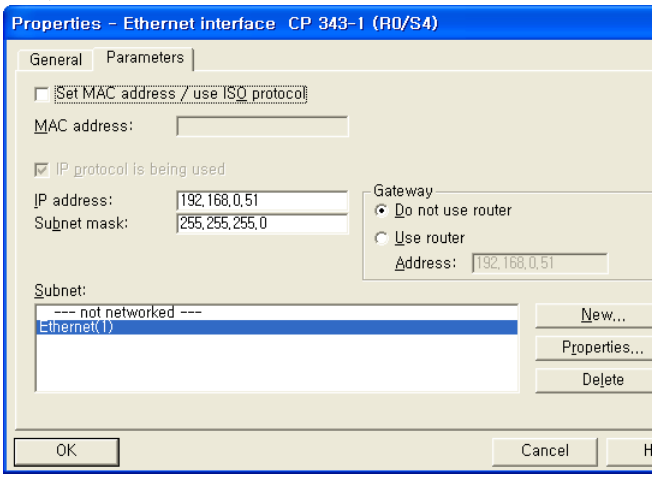
Step 7. Click the [Properties] key of [General] tab > [Interface] in the [Properties] window. → Newly display the [Properties] window.

Step 8. Enter the [IP address] and [Subnet mask] of the Ethernet communication module in the [Parameters] tab of the [Properties] window, and then click the [New...] key to register information.

◆ For PN/IO



◆ For Ethernet communication module



Step 9. Select the main menu [Station] > [Save And Compile] to save the error detection and setting, then download the settings to the PLC.

Step 10. After the download is completed, reset the PLC power.

4.2 External device setting 2 (Fetch/Write(SINEC-H1))

Use SIEMETIC S7 Ladder Software [STEP 7] to set as follows. For more detailed setting method than described in this example, refer to PLC user manual.

> ⚠ Do not use duplicate IP addresses over the same network.

Step 1. Create a new project through [New Project] in the top bar of the main menu of [SIMATIC Manager].

Step 2. Select the Menu [Insert] > [Station] > [1 SIMATIC 400 Station] or [2 SIMATIC 300 Station]. ➔ Add CPU

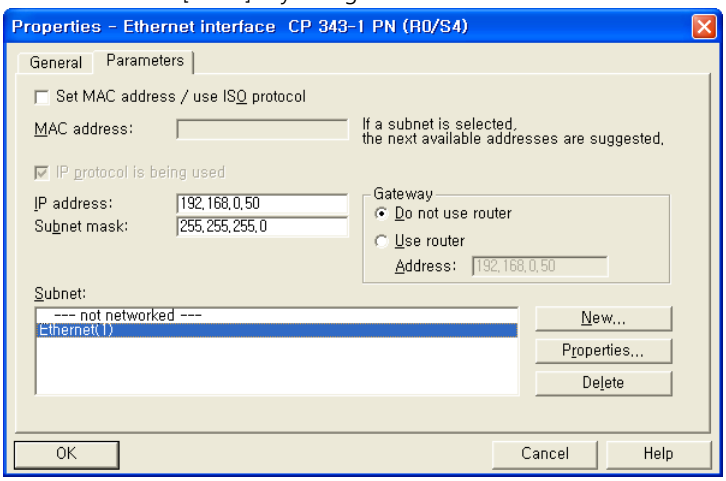
Step 3. Double-click the added "[SIMATIC 400(1)]" or [SIMATIC 300(1)] CPU > Double-click [Hardware] of the corresponding CPU. ➔ [HW Config] window is newly displayed.

Step 4. Open "[SIMATIC 400] > [RACK-400]" or "[SIMATIC 300] > [RACK-300]" in the left tree window of the [HW Config] window to select the Base unit model to be used, and then drag & drop it to the lower right corner of the window to register.

Step 5. Select [SIMATIC 400] > [PS-400] or [PS-300] to select the power unit to be used, and drag & drop it to the current rack.

Step 6. Select [SIMATIC 400] > [CPU-400] or [CPU-300] to select the CPU unit to be used, and drag & drop it to the current rack. (If the [Properties – PROFIBUS interface DP] window is newly displayed, press the [Cancel] key to close the window.)

Step 7. Select [SIMATIC 300] > [CP-300] > [Industrial Ethernet] or [SIMATIC 400] > [CP-400] > [Industrial Ethernet] to select an Ethernet communication unit, and drag & drop it to the current rack. → After drag & drop, [Properties] window is newly displayed. Enter the [IP address] and [Subnet mask] of the Ethernet communication module in the [Parameters] tab of the [Properties] window, and ehtn click the [New...] key to register information.



Step 8. Select the main menu [Options] >[Configure Network]. → The network setting program "NetPro" is executed.

Step 9. Register Fetch Passive (read port setting) and Write Passive (write port setting) on **"NetPro"**.

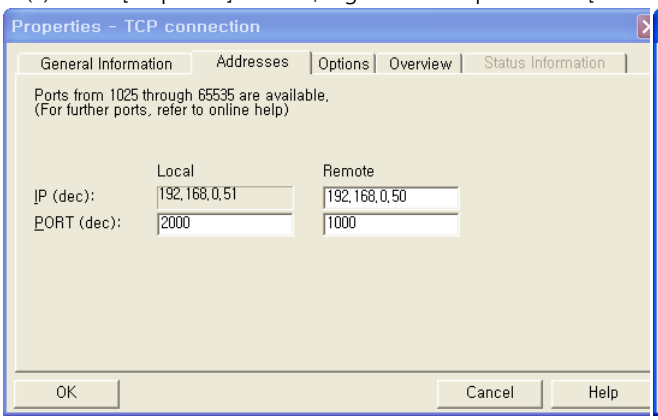
◆ Fetch Passive (Read port setting)

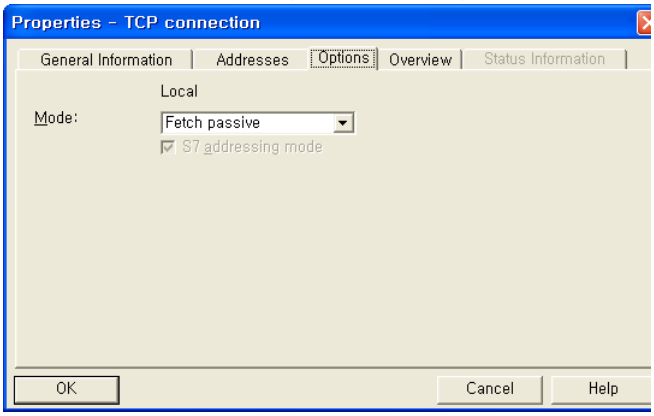
(1) Right-click CPU shown as a picture in "NetPro", select [Insert New Connection], and pop-up the → [Insert New Connection] window.

(2) Select [Type] > [TCP connection] and [Station] > [Unspecified] in the [Insert New Connection] window, and then click [OK].

→ [Properties] window is newly displayed.

(3) In the [Properties] window, register IP and port in the [Address] tab, and [Mode] > "Fetch passive" in the [Options] tab.





※(Caution) Do not duplicate the local port number.

(4) Click [OK] to save the settings.

☞ Continued on the next page.

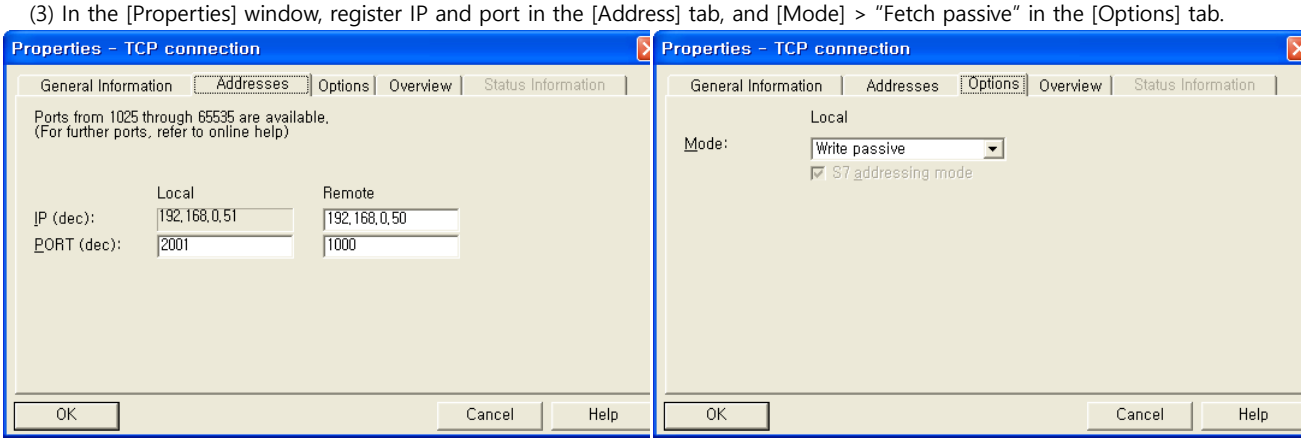
◆ Write Passive (Write port setting)

(1) Right-click CPU shown as a picture in "NetPro", select [Insert New Connection], and pop-up the → [Insert New Connection] window.

(2) Select [Type] > [TCP connection] and [Station] > [Unspecified] in the [Insert New Connection] window, and then click [OK].

→ [Properties] window is newly displayed.

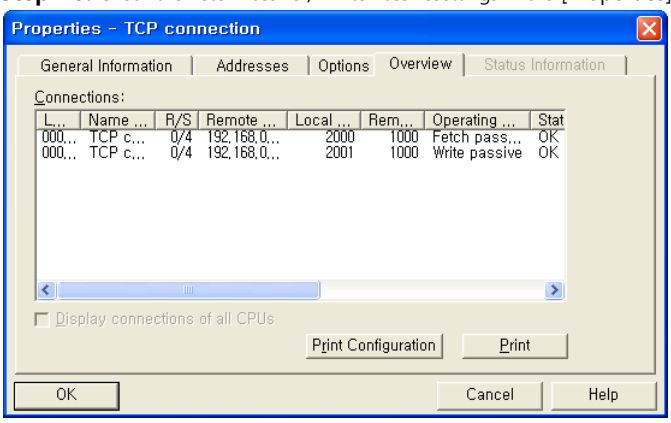
(3) In the [Properties] window, register IP and port in the [Address] tab, and [Mode] > "Fetch passive" in the [Options] tab.



※**(Caution)** Do not duplicate the local port number.

(4) Click [OK] to save the settings.

Step 10. Check the Fetch Passive / Write Passivesettings in the [Properties] > [Overview] tab.



Step 11. Select the main menu [Station] > [Save And Compile] to save the error detection and setting, then download the settings to the PLC.

Step 12. After the download is completed, reset the PLC power.

5. Supported addresses

The devices available in TOP are as follows:

The device range (address) may differ depending on the CPU module series/type. The TOP series supports the maximum address range used by the external device series. Please refer to each CPU module user manual and be take caution to not deviate from the address range supported by the device you want to use.

	Bit address		Word address		32 bits	Remarks
Input relay *Note 1)	I00000.0 – I00127.7	E00000.0 – E00127.7	IW00000 – IW00126	EW00000 – EW00126	**H/L** *Note 4) *Note 5)	—
Output relay *Note 2)	Q00000.0 – Q00127.7	A00000.0 – A00127.7	QW00000 – QW00126	AW00000 – AW00126		—
Data block	DB00001 : DBX00000 – DB65535 : DBX65533.7		DB00001 : DBW00000 – DB65535 : DBW65532			—
Internal memory	M00000.0 – M00511.7		MW00000 – MW00510			—
Timer *Note 3)	—		T00000 – T00255			Cannot be written *Note 6)
Counter *Note 3)	—		C00000 – C00255	Z00000 – Z00255		Cannot be written

*Note 1) Input device (I, IW) is dependent on the built-in I/O according to CPU type, so Write input to the addresses of IW0 ~ IW2 may not be possible. Refer to PLC manual.
*Note 2) Output device (Q, QW, QD) can enable Write value only in Run Mode. In Stop Mode, the output value is reset.
*Note 3) Read-only device
*Note 4) For word devices, 32-bit data is saved in the order of High/Low by 16 bits.
(Example) VW00000 (32bit data, 0x12345678) ➔ VW00000(16bit, 0x1234) VW00002(16bit, 0x5678)
*Note 5) When using 32 bit address, check the “word swap” function.
*Note 6) Process it after turning the time base bit of S5TIME data OFF.

	Not used		Time base		Time 0 ~ 999											
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0