

Robots and Design CO., Ltd

WTR Controller Ethernet Driver

Supported version

TOP Design Studio

V4.9 or higher



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We want to thank our customers who use the Touch Operation Panel.

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Select a TOP model and an external device.

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Describes how to set the TOP communication.

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Describes how to set up communication for external devices.

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Refer to this section to check the addresses which can communicate with an external device.

1. System configuration

The system configurations of TOP and "Robots and Design – WTR Controller Series Ethernet" are as follows:

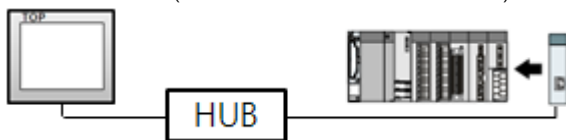
Series	CPU	Communication method	System setting	Cable
Robots and Design	WTR Controller	Ethernet (TCP / UDP)	3. TOP communication setting 4. External device	Twisted pair cable *Note 1)

*Note 1) Twisted pair cable

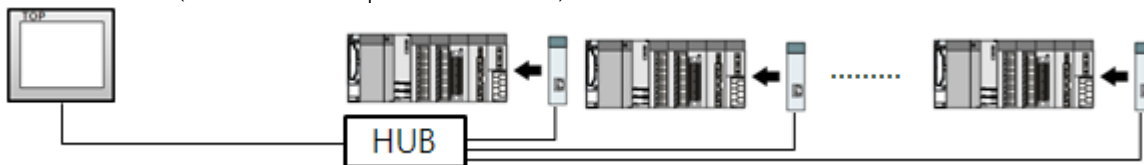
- Refer to STP (Shielded Twisted Pair Cable) or UTP (Unshielded Twisted Pair Cable) Category 3, 4, 5.
- Depending on the network configuration, you can connect to components such as the hub and transceiver, and in this case, use a direct cable.

■ Connectable configuration

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

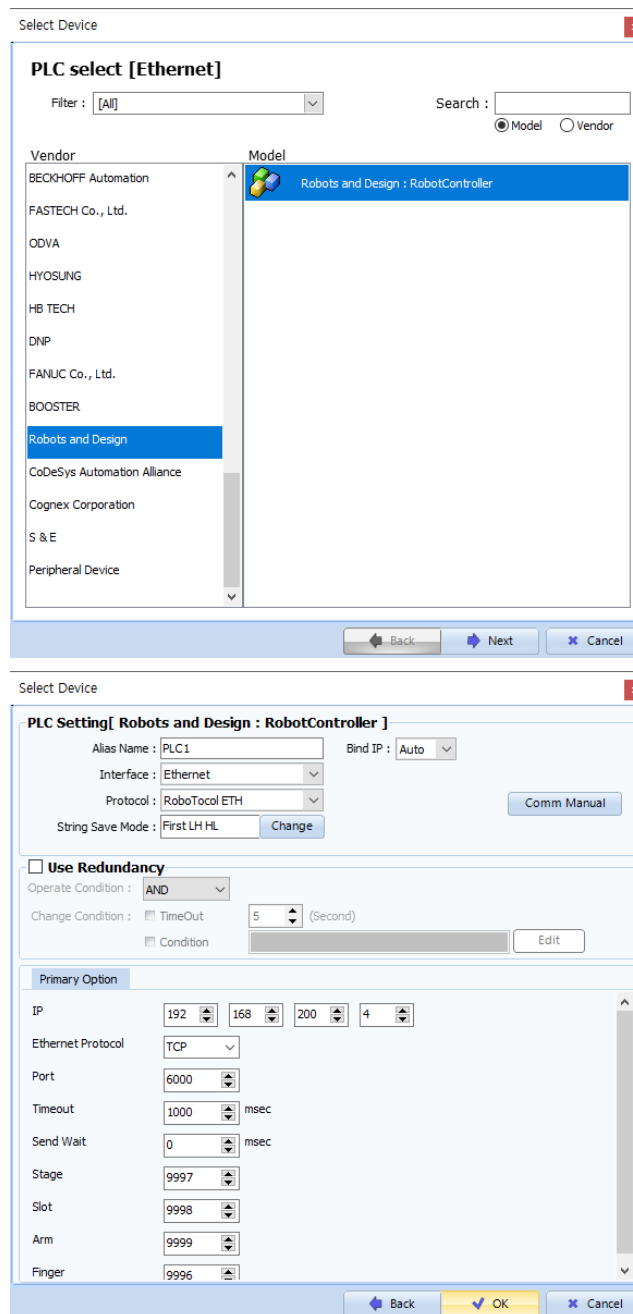


- 1:N connection (one TOP and multiple external devices) connection



2. External device selection

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



Settings		Contents					
TOP	Model	Check the display and process of TOP to select the touch model.					
External device	Vendor	Select the vendor of the external device to be connected to TOP. Please select " Robots and Design ".					
	PLC	Select the external device to be connected to the TOP. <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th>Model</th> <th>Interface</th> <th>Protocol</th> </tr> </thead> <tbody> <tr> <td>WTR Controller</td> <td>Ethernet</td> <td>RoboTocol ETH</td> </tr> </tbody> </table> <p>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.</p>	Model	Interface	Protocol	WTR Controller	Ethernet
Model	Interface	Protocol					
WTR Controller	Ethernet	RoboTocol ETH					

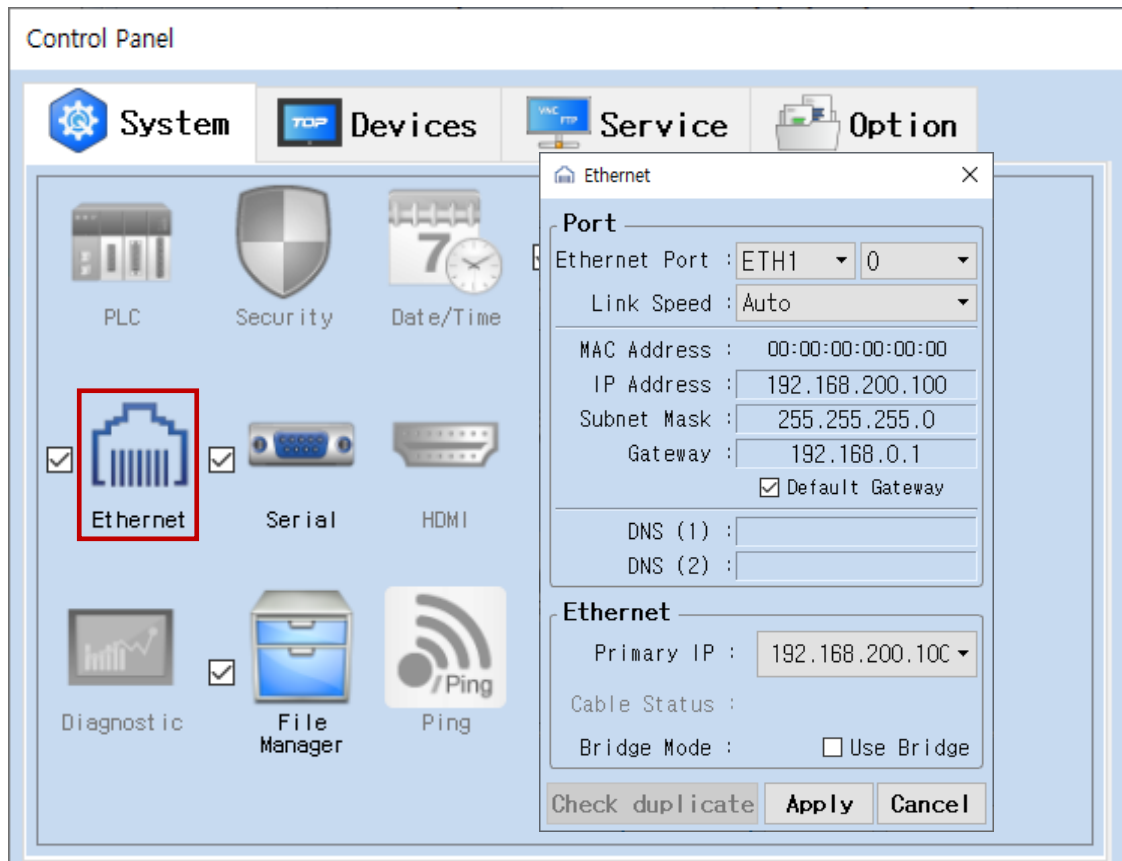
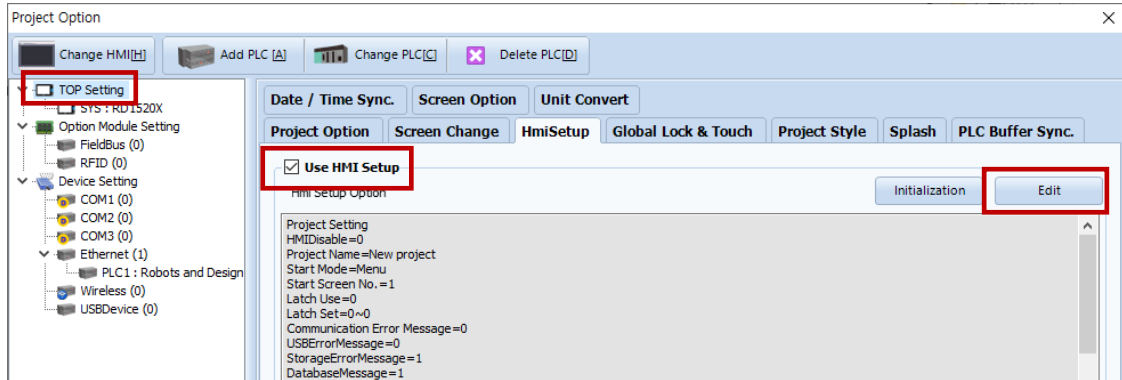
3. TOP communication setting

The communication can be set in TOP Design Studio or the 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 Property > TOP Setting] → [Project Option > "Use HMI Setup" Check > Edit > Ethernet]
- Set the TOP communication interface in TOP Design Studio.



Items	TOP	External device	Remarks
IP Address *Note 1) Note 2)	192.168.200.100	192.168.200.4	
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 . 200 . 0) should match.

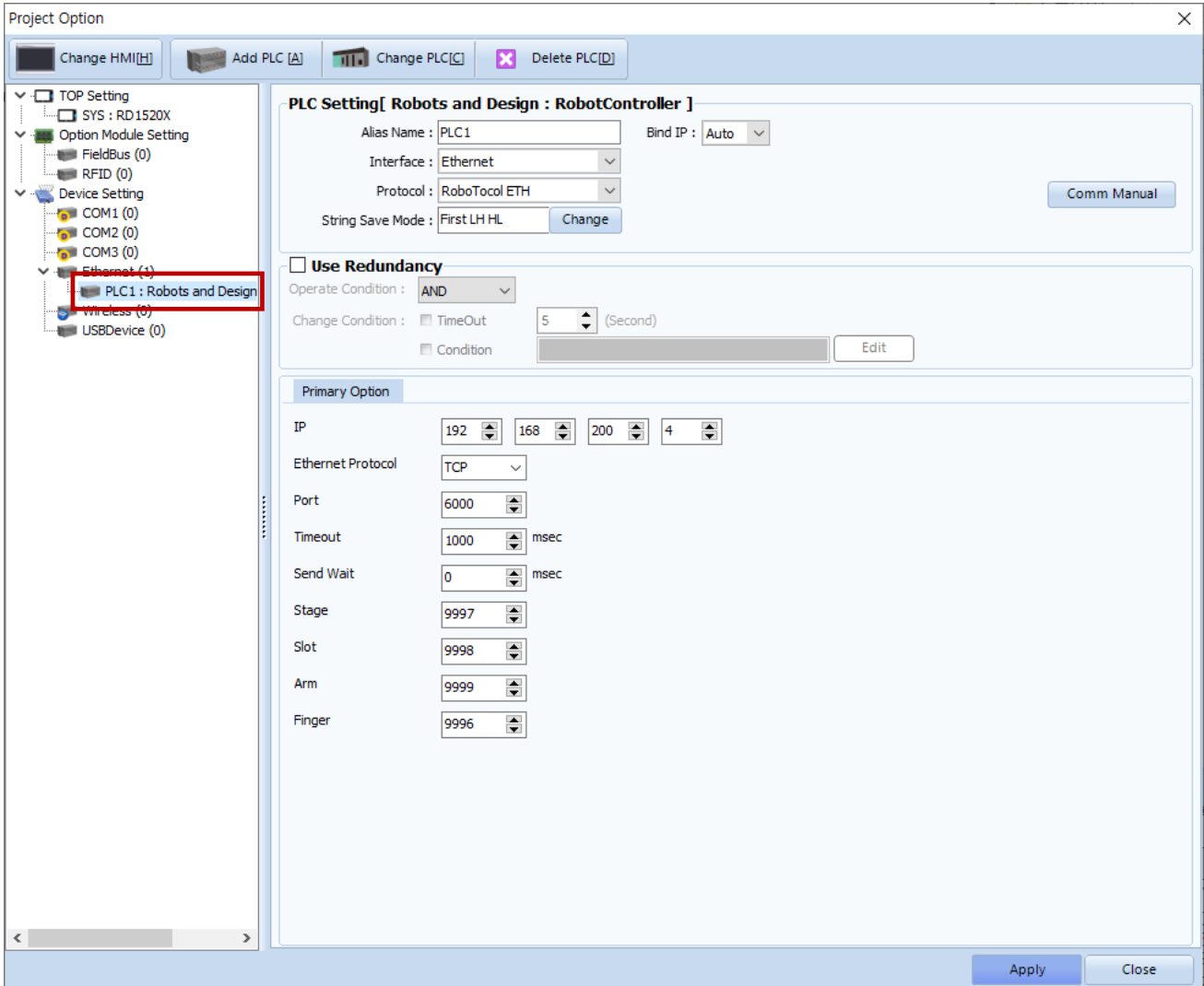
*Note 2) Do not use duplicate IP addresses over the same network.

* The above settings are examples recommended by the company.

Items	Description
IP Address	Set the IP address of the TOP.
Subnet Mask	Enter the subnet mask of the network.
Gateway	Enter the gateway of the network.

(2) Communication option setting

- [Project > Project Property > Device Setting > ETHERNET > "PLC1 : Robots and Design"]
 – Set the options of the WTR Controller Series Ethernet communication driver in TOP Design Studio.

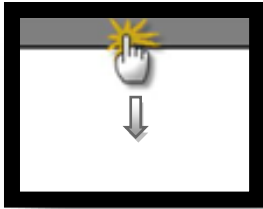


Items	Settings	Remarks
Interface	Select "Ethernet".	Refer to "2. External device selection" .
Protocol	Select "RoboTocol ETH".	
IP	Enter the IP address of an external device.	
Ethernet Protocol	Select the Ethernet protocol between the TOP and an external device.	
Port	Enter the Ethernet port number of 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.	
Stage	Enter the address of the internal System Buffer in which the Stage value is saved.	
Slot	Enter the address of the internal System Buffer in which the Slot value is saved.	
Arm	Enter the address of the internal System Buffer in which the Arm value is saved.	
Finger	Enter the address of the internal System Buffer in which the Finger value is saved.	

3.2. Communication setting in TOP

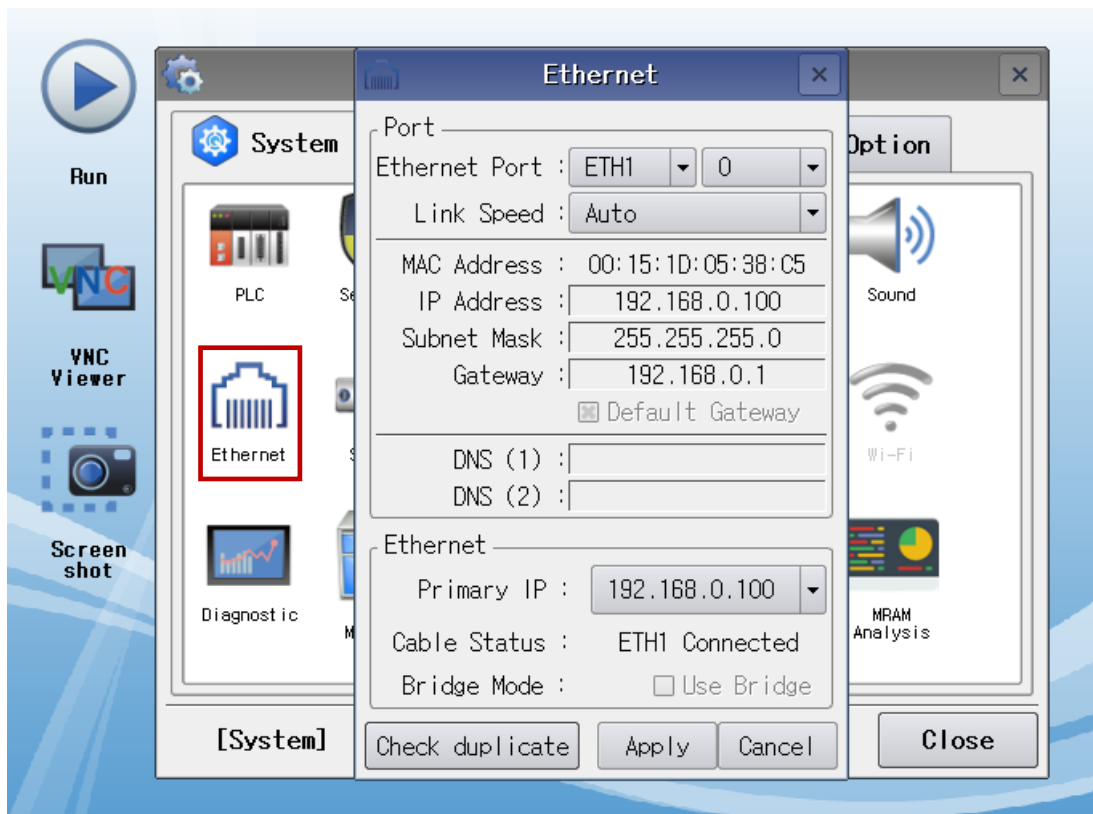
* This is a setting method when "Use HMI Setup" in the setting items in "3.1 TOP Design Studio" is not checked.

- 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)	192.168.200.100	192.168.200.4	
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 . 200 . 0) should match.

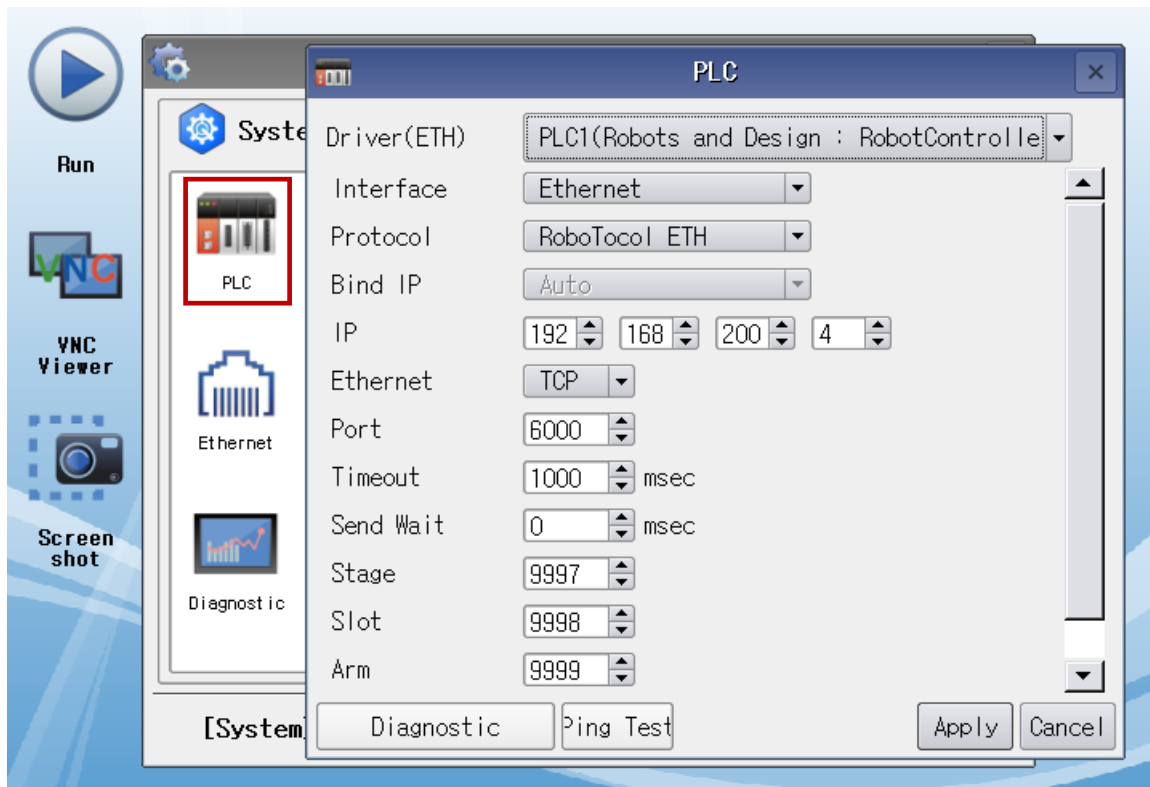
*Note 2) Do not use duplicate IP addresses over the same network.

* The above settings are examples recommended by the company.

Items	Description
IP Address	Set the IP address of the TOP.
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]



Items	Settings	Remarks
Interface	Select "Ethernet".	Refer to "2. External device selection".
Protocol	Select "RoboTocol ETH".	
IP	Enter the IP address of an external device.	
Ethernet Protocol	Select the Ethernet protocol between the TOP and an external device.	
Port	Enter the Ethernet 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.	
Stage	Enter the address of the internal System Buffer in which the Stage value is saved.	
Slot	Enter the address of the internal System Buffer in which the Slot value is saved.	
Arm	Enter the address of the internal System Buffer in which the Arm value is saved.	
Finger	Enter the address of the internal System Buffer in which the Finger value is saved.	

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 if the ETH port settings you want to use in [Control Panel > Ethernet] are the same as those of the external device.

- 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

For more detailed setting method than that described in this example, refer to the PLC user manual.



Do not use duplicate IP addresses over the unit network.

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 take caution to not deviate from the address range supported by the device you want to use.

Device	Bit Address	Word Address	Comment	Remark
VER	0.00 – 40.15	0 – 40	Read controller version Read controller version (using string)	R
SERVO	0.00 – 0.15	0 – 0	Servo power Read : Reads the current servo status value. Write : 1 >> Supply the power to the servo. 0 >> Disconnect the power to the servo.	
ERR	0.00 – 0.15	0 – 0	Read error code Read current error code.	R
ERRRESET	0.00 – 0.15	0 – 0	Error reset Clear the error status, which occurs now.	W
NMPS	1.00 – 6.15	1 – 6	(Motor coordinate system) Read current position Requires the robot's current motor coordinate position.	R 32BIT
NPOR	1-999:1-5.00 – 1-999:1-5.31	1-999:1-5 – 1-999:1-5	Read saved teaching data Read the saved teaching data (POINTDATA).	R 32BIT
_NPOR	1-999:1-6.00 – 1-999:1-6.31	1-999:1-6 – 1-999:1-6	Register saved teaching data Does not communicate and has only a value. Communicates with this value and writes teaching data (POINT DATA) when using POA.	32BIT
POA	1.00 –999.31	1 –999	Enter POINT DATA Enters POINT data.	W 32BIT
TI	1.00 –999.15	1 –999	Teaching interlock Teaching interlock	
NIDO	1.00-999.15	1-999	Read OUTPUT signal status Reads the current OUTPUT signal status starting from the specified channel number.	R 32BIT
NIDI	1.00-999.15	1-999	Read INPUT signal status Reads the current INPUT signal status starting from the specified channel number.	R 32BIT
IDO	1.00-999.15	1-999	Signal status of INPUT whose address has been translated Current OUTPUT signal status whose address has been translated starting from the specified channel number	32BIT

Device	Bit Address	Word Address	Comment	Remark
IDI	1.00~999.15	1~999	<p>Read signal status of INPUT whose address has been translated</p> <p>Reads signal status of INPUT whose address has been currently translated starting from the specified channel number.</p>	R 32BIT
RIDO	1.00~999.15	1~999	<p>Read external I/O OUTPUT signal status</p> <p>Reads the status of the OUTPUT signal of the expansion I/O board.</p>	R 32BIT
RIDI	1.00~999.15	1~999	<p>Read external I/O INPUT signal status</p> <p>Reads the status of the INPUT signal of the expansion I/O board.</p>	R 32BIT
ORG	0.00 – 0.15	0 – 0	<p>Robot initialization and homing</p> <ul style="list-style-type: none"> - Performs homing operation along with robot initialization operation. - Originates from the coordinates saved in teaching data No. 498. - After supplying the power to the controller, the robot initialization operation shall be performed once. 	W
HOME	0.00 – 0.15	0 – 0	<p>Homing</p> <ul style="list-style-type: none"> - Performs homing operation. - Originates from the coordinates saved in teaching data No. 498. 	W
JOG	1.00 – 6.15	1 – 6	<p>JOG operation</p> <ul style="list-style-type: none"> - Performs JOG move for the designated axis. - Immediately from the moment the command is received, the device continues to move until the device reaches the soft limit of the corresponding axis or the limit sensor. 	W
FMD	1.00 – 6.15	1 – 6	<p>Set axis's free mode</p> <p>Activates the free mode of the designated axis.</p>	W
NMMI	0.00 – 0.15	0 – 0	<p>Robot's relative movement</p> <p>Performs relative movement for each axis of the robot by a specified value.</p>	W
_NMMI	0.00 – 6.31	0 – 6	<p>Register Robot's relative movement</p> <p>The device does not communicate, only has values. When using NMMI, the device communicates with this value and performs relative movement as much as the value.</p>	32BIT
NMMA	0.00 – 0.15	0 – 0	<p>Robot's absolute movement</p> <p>Performs absolute movement for each axis of the robot by a specified value.</p>	W

Device	Bit Address	Word Address	Comment	Remark
_NMMA	0.00 – 6.31	0 – 6	<p>Register Robot's absolute movement</p> <p>The device does not communicate, only has values. When using NMMI, the device communicates with this value and performs relative movement as much as the value.</p>	32BIT
RETA	0.00 – 0.15	0 – 0	<p>Robot's hand folding motion</p> <p>The robot performs the motion of folding the designated hand at the current position.</p>	W Refer to Arm- DATA.
EXTA	0.00 – 0.15	0 – 0	<p>Robot's hand extending motion</p> <ul style="list-style-type: none"> - The robot performs the motion of extending the hand at the current position. - After the READY motion (GRDY or PRDY or TRDY), the robot must perform the arm stretching motion. 	W Refer to Stage, arm DATA.
GRDY	0.00 – 0.15	0 – 0	<p>GET motion READY operation</p> <p>During the GET motion, even the motion just before extending the arm is performed.</p>	Refer to W Stage, slot,arm DATA.
PRDY	0.00 – 0.15	0 – 0	<p>PUT motion READY operation</p> <p>During the PUT motion, even the motion just before extending the arm is performed.</p>	Refer to W Stage, slot,arm DATA.
TRDY	0.00 – 0.15	0 – 0	<p>READY operation in teaching position</p> <p>This is a motion to check the teaching position, and perform the motion just before extending the arm to the teaching position.</p>	Refer to W Stage, slot,arm DATA.
GET	0.00 – 0.15	0 – 0	<p>GET operation</p> <p>Performs the action to bring the wafer.</p>	Refer to W Stage, slot,arm DATA.
PUT	0.00 – 0.15	0 – 0	<p>PUT operation</p> <p>Performs an action to put the wafer down.</p>	Refer to W Stage, slot,arm DATA.
SGET	0.00 – 0.15	0 – 0	<p>Check only specific blade sensor of HAND upon GET operation</p> <p>Checks only wafer sensor of some blade and performs 5 Hand GET operation.</p>	Refer to Stage, slot, Finger DATA.
SPUT	0.00 – 0.15	0 – 0	<p>Check only specific blade sensor of HAND upon PUT operation</p> <p>Checks only wafer sensor of some blade and performs 5 Hand GET operation.</p>	Refer to Stage, slot, Finger DATA.
POM	0.00 – 0.15	0 – 0	<p>Safe movement to a specific teaching position</p> <p>Moves the robot to the position of specific point data.</p>	W

Device	Bit Address	Word Address	Comment	Remark
ASS	0.00 – 0.15	0 – 0	Stop motion Decelerates and stop all axes immediately during movement.	W
AES	0.00 – 0.15	0 – 0	Stop motion and servo down Stops all axes immediately during movement.	W
PAUSE	0.00 – 0.15	0 – 0	Pause motion Pause the robot during movement. 0 Resume motion 1 Pause	W
DEM	0.00 – 0.15	0 – 0	Read demo mode status Reads the current demo mode settings. Reads 1 for demo mode, Reads 0 for sensor mode.	R
LDM	0.00 – 0.15	0 – 0	Read interlock check set value Reads the current interlock status. Reads 1 for interlock mode, and otherwise reads 0.	R
SSL	0.00 – 0.15	0 – 0	Set the number of stage slots Maximum number of slots in the corresponding stage	Refer to Stage DATA.
SPI	0.00 – 0.15	0 – 0	Set Stage slot pitch Slot pitch of the corresponding stage	Stage DATA.
VDP	0.00 – 0.15	0 – 0	V-axis position	
HMS	1.00 – 6.15	1 – 6	Homing speed Robot's origin motion speed	
HIS	1.00 – 6.15	1 – 6	WAFER ON speed If there is a wafer, the robot's speed % value upon GET and PUT commands	
LOS	1.00 – 6.15	1 – 6	WAFER OFF speed If there is no wafer, the robot's speed % value upon GET and PUT commands	
ZSP	0.00 – 1.15	0 – 1	Z axis UP/DOWN speed The speed at which the robot's Z-axis moves when placing the wafer in the slot after the robot extends its hand during GET/PUT motion.	
_ZSP	0.00 – 1.15	0 – 1	Register Z axis UP/DOWN speed The device does not communicate, only has a value. the device has UP,DOWN values.	
SPD	0.00 – 1.15	0 – 1	System speed Controls the speed of the entire robot.	
JSP	1.00 – 6.15	1 – 6	Jog speed Robot's jog speed	
MST	1.00 – 6.15	1 – 6	Motor acceleration/deceleration time Set the time it takes for the motor for each axis to accelerate from a stopping status to the maximum speed or to decelerate from maximum speed to stopping.	

Device	Bit Address	Word Address	Comment	Remark
_MST	1.00 – 6.15	1 – 6	Register motor acceleration/deceleration time The device does not communicate, only has values. This is used to write a MST command.	
RMSP	1.00 – 6.15	1 – 6	Read motor speed for each axis Calls up the currently set motor speed for each axis.	R
RMAC	1.00 – 6.15	1 – 6	Read motor acceleration for each axis Calls up the currently set axis motor acceleration.	R
VDP	0.00 – 0.15	0–0	V-axis position	
ADR	0.00–3.15	0–3	Controller IP	
_ADR	0.00–3.15	0–3	Register controller IP	
TIP	0.00 – 0.15	0–0	Controller PORT number	
FZS	0.00 – 0.15	0–0	Set the origin of each axis Sets the current robot's position as the origin for the specified axis.	W
LIMIT	1–6,0–3.15	1–6,0–3	Set each axis's soft limit 1–6: axis 0–3: Hard limit max Hard limit min Soft limit max Soft limit min	32BIT
_LIMIT	1–6,0–3.15	1–6,0–3	Register each axis's soft limit The device does not communicate, only has values. When using LIMIT, the device communicates with this value and changes as much as the value.	32BIT
MAP	0.00 – 0.15	0–0	Mapping command list Maps the status of wafers contained the cassettes of the corresponding stage.	Refer to Stage DATA.
MPT	0.00 – 0.15	0–0	Detect protruded wafer Detects the protruded wafers contained the cassettes of the corresponding stage.	Stage DATA.
MLD	0.00 – 0.15	0–0	Mapping calibration This is a command to process the result data of mapping after the MAP command.	W
MPS	0.00 – 0.15	0–0	Mapping speed Read: reads the speed of the part which corresponds to the Z UP motion upon the currently set mapping operation. Write: specifies the speed of the part which corresponds to the Z UP motion upon mapping operation.	
WWTH	0.00 – 0.15	0 – 0	Wafer thickness Sets the thickness value for the reference of the wafer thickness upon mapping.	Refer to Stage DATA.
WSCT	0.00 – 0.15	0 – 0	Cross discrimination criteria Sets the criteria range of wafer cross discrimination.	Refer to Stage DATA.
WSDT	0.00 – 0.15	0 – 0	Double discrimination criteria Sets the wafer double discrimination criteria.	Refer to Stage DATA.

Device	Bit Address	Word Address	Comment	Remark
DM	0.00 – 0.15	0 – 0	Use double mapping Set Double Mapping Mode.	
DMD	0.00 – 4.15	0 – 4	Step length for protrusion detection Set protrusion detection step length of the corresponding stage	
MRDY	0.00 – 0.15	0 – 0	Mapping Ready operation Protocol for testing the operation of mapping on the corresponding station	Refer to Stage DATA. W
MEXTA	0.00 – 0.15	0 – 0	Extend mapping arm Protocol for testing the operation of mapping on the corresponding station	Refer to Stage DATA. W
MZDOWN	0.00 – 0.15	0 – 0	Raise mapping z-axis Protocol for testing the operation of mapping on the corresponding station	Refer to Stage DATA. W
MRETA	0.00 – 0.15	0–0	Fold mapping arm Protocol for testing the operation of mapping on the corresponding station	
DMRD	0.00 – 0.15	0–0	Ready operation for protrusion detection	W
DMAD	0.00 – 0.15	0–0	Arm Extend for protrusion detection	W
DMZU	0.00 – 0.15	0–0	Z-axis motion for protrusion detection	W
WXUS	0.00 – 0.15	0–0	XY SELECT 0 : W 1 : X	
TPIDI	0.00 – 0.15	0–0	TPIDI bit field value	
WZPC	0.00 – 0.15	0–0	Position Calibration	
MAO	0.00 – 0.15	0–4	Motor Speed	R
_MAO	0.00 – 0.15	0–4	Register Motor Speed The device does not communicate, only has values. This is used to write a MAO. X1,X2,T,Z,V	
SNM	0.00 – 0.15	0–0	Number of Retry when GET PUT 5Hand operation fails	
VBU	0.00 – 0.15	0–0	Vibration sensor's Enable Flag	
ZEM	0.00 – 0.15	0–0	On Off Flag to check the position	
ZES	0.00 – 0.15	0–0	Allowable value for the position error	
SAVEFLASH	0.00 – 0.15	0 – 0	PARAMETER SAVE Saves flash memory. You should not turn off the controller power until memory save is completed.	W