ROBOSTAR ROBOT

RCS Series Option

PROFINET

☑ Option Module

- PROFINET

Robostar

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Composition of User Manual

The User Manual of this product is composed of the following. If this is the first time to use this product, fully understand each and every detail in the manual before use.

- **PROFINET**

  Explains how to connect a connector to RCS series using PROFINET communication modules as well as how to use it.

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ch.1. Overview

1.1 What is a PROFINET Option Card?

PROFINIT, Ethernet-based communication protocols developed by SIMENS, is public standards adopted by many companies including Phoenix Contact and Bosch as a next automobile industry Ethernet solution. PROFINET is protocols designed for communication, configuration and diagnosis in networks and utilizes Ethernet standards along with TCP, UDP and IP.

1.2 System Configuration

PROFINET NRT (Non Real Time) is defined in a non-real-time application. This uses standard protocols as a UDP/IP. In the cycle time of 100 ms or above, PROFINET NRT takes the application in process automation as a subject. For applications with higher requirements in the cycle time like factory automation, PROFINET RT (RealTime) makes an appropriate selection. I/O data is directly exchanged with the use of Ethernet protocols, and a diagnosis and configuration utilize general UDP/IP. PROFINET RT is capable of activate the application with a cycle time of 10 ms or above.

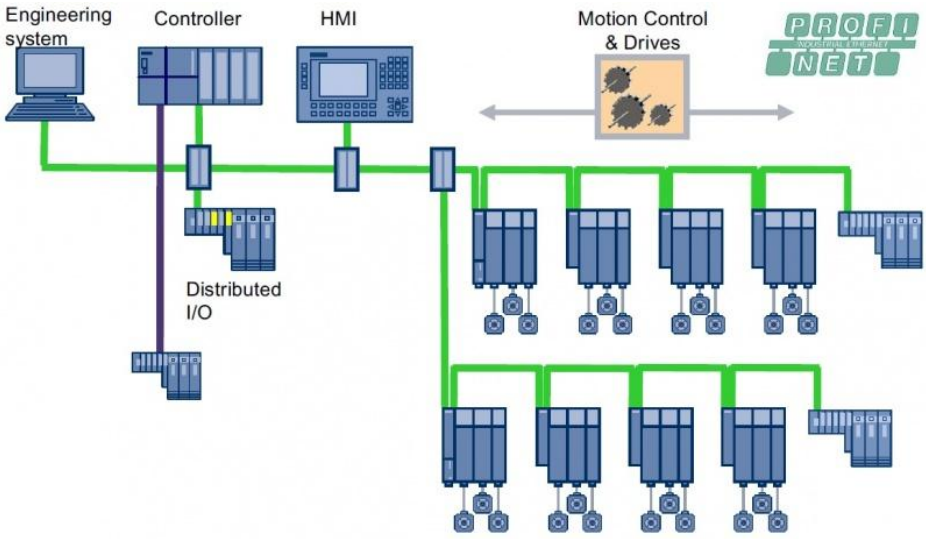


Fig. 1.2 PROFINET System Configuration

ch.2. Function

2.1 Basic Specifications of PROFINET Option Slave

Item	Specifications
Protocol	PROFINET I/O RT
Station Type	PROFINET IO Device
Topology	Line or Star topology
I/O Data Size	32 Bytes Input/32 Bytes Output
Indicators	Refer to "4. LED Indicator"
Baud Rate	100Mbps Full-
Default Name	RCS-PNIO-XXX
Dpram Update Period	1ms

ch.3. Specifications

3.1 PROFINET Option Card Specifications

Fig. 3.1 shows the PROFINET Option Board outside view from front.

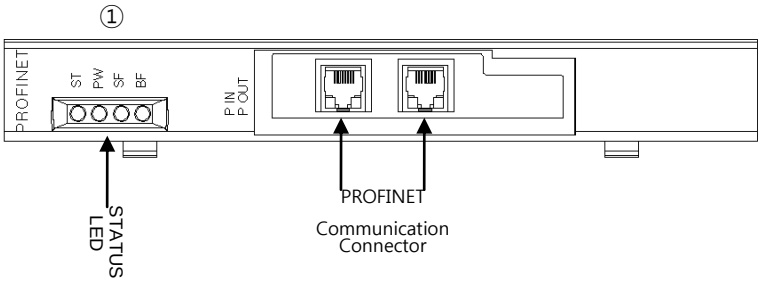


Fig. 3.1 Outside View from Front of CC- PROFINET Option Card

PROFINET Option Board has specifications in Table 3.1.

Function	Description
Status Display	- Status LED
Comm Port	- RJ45 Port x 2 (IN, OUT)
Operating Voltage	- Internal +5V ± 5% : 0.5 A nominal Maximum - External +24V ± 5% : 0.15 A nominal Maximum
Operating Temperature	- Temperature : operating 0 ~ 40 ℃ storage -15 ~ 60 ℃
Operating Humidity	- Humidity : 20 ~ 80% RH (non-condensing)

Table 3.1 PROFINET Option Board Specifications

3.2 Definition of lED Function

PROFINET Option Board comes with a total of 4 LEDs, making it possible to check briefly out PROFINET Adapter status from the outside. The external look is shown in Fig. 3.1 ①, with functions listed below.

Item	Color	Description	Remark
LED1	Green	ST: Outputs Profinet Card status	
LED2	Green	PWR: Outputs Profinet Card power	
LED3	Red	SF: Outputs System Fault	
LED4	Red	BF: Outputs Bus Fault	

LED Output	Operation	Description
	ST:ON PW:ON SF:OFF BF:OFF	Communication with PLC in normal condition
	ST:ON PW:ON SF:ON BF:OFF	Normal communication with the upper PLC is made but a diagnostic error has occurred.
	ST:ON PW:ON SF:Flashing BF:OFF	IO board in receipt of a command Node Flashing Test
	ST:ON PW:ON SF:OFF BF:ON	Communication cables not connected in normal manner. Full duplex transmission remains inactivated.
	ST:ON PW:ON SF:OFF BF: Flashing	The set IP and a Device Name are not consistent. A delay takes place in response monitoring. Parameter set values are not consistent.
	ST:OFF PW:ON SF:OFF BF: OFF	CPU on IO board in abnormal condition
	ST: Flashing PW:ON SF: ON BF: ON	Communication module(NETX) on IO board in abnormal condition

Table 3.2 Definition of LED Function

ch.4. Installation and Operation Setting

4.1 How to Install Hardware

Take the following procedure to be able to use PROFINET Option Board on a RCS controller.

1) Turn power OFF.
2) Remove the cover from RCS Controller and attach the PROFINET Board.

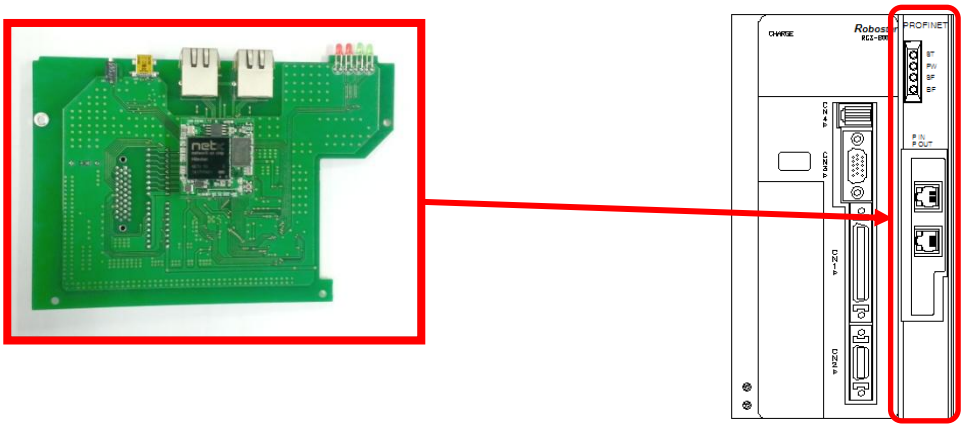
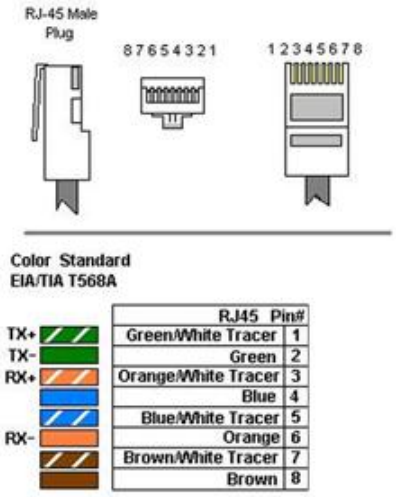


Fig. 4.1 How to Install an Option Board

3) Turn power ON.

4.2 How to Make Cable-Connector Connection and Pinmap

The connector connected to RCS PROFINET Option Module is a RJ-45 Type.
For how to connect cables, follow standard PROFINET cable connections.

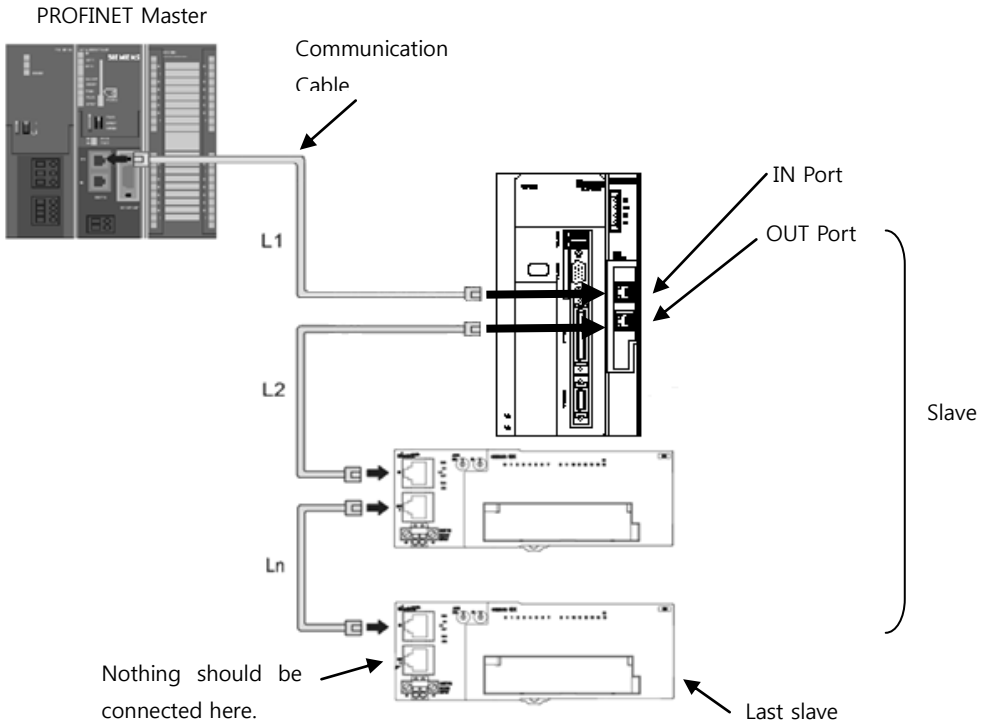


Cable Type	Application Type A	Application Type B	Application Type C
Design	Data Cable	Data Cable	Data Cable
Cable Installation Type	Stationary, no movement after installation	Flexible, occasional movement or vibration	Special Applications (e.g. highly flexible, permanent movement, vibration or torsion)
System Concept:			
Cable Marking (at least)	PROFINET Type A	PROFINET Type B	PROFINET Type C
Core Cross Section	AWG 22/1	AWG 22/7	AWG 22/..
Outer Cable Diameter	5,5 - 8,0 mm		Application
Core Diameter	1,5 +/- 0,1 mm		Application
Colour (Outer Sheath)	Green RAL6018		Application
Core Identification (colours) star quad 2 pair	white, yellow, blue, orange Pair 1: white (RXD+), blue (RXD-) Pair 2: yellow(TXD+), orange(TXT-)		
Number of Cores	4		
Cable Design	2 pairs or 1 star quad		

4.3 Communication Cable Connection

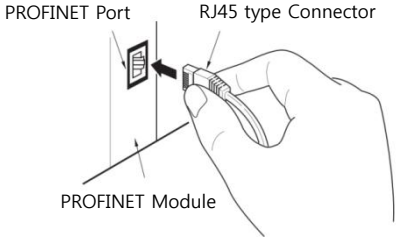
PROFINET network is enabled to be freely connected regardless of a connection type. Connect the communication cable from the PROFINET master to an IN port and the communication cable for next slave to an OUT port, respectively.

Besides, nothing should be connected to the OUT port in the last network slave.



Keep the cables between slaves within 100m long (Fig. L1,L2...Ln), respectively. Make a firm connection until the connector on the communication cable snaps into place.

Turn OFF power to the controller before connecting to or removing from PROFINET communication cables. Arrange a space with room to secure the bend radius of PROFINET communication cable. Space needed varies depending on communication cables or a connector in use, therefore, make enquiries to each maker or place of purchase.



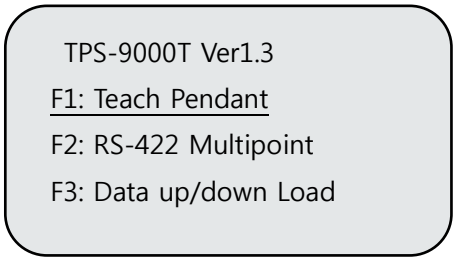
4.4 Controller Setting

To use a PROFINET in a RCS series controller, set the Controller FIELD BUS to PROFINET Mode.

4.4.1 FIELD BUS(PROFINET) Setting

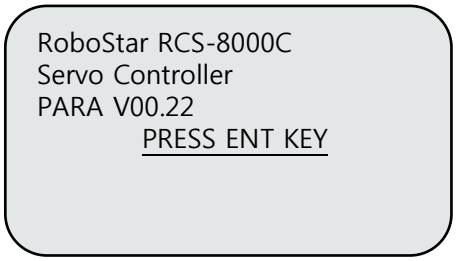
1. Setting Step

Step 1. **Shift to MAIN screen**



F1

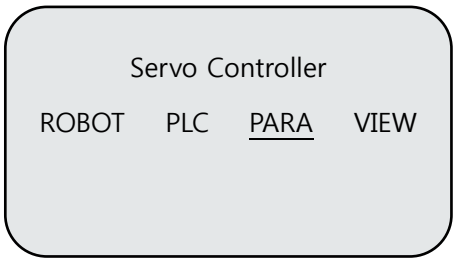
Turn ON power to controller and select Teach Pendant.



ENT

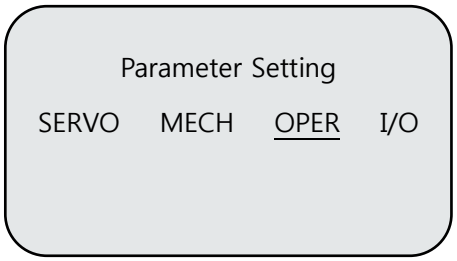
Press ENT.

Step 2. **How to shift to the parameter screen**



F3

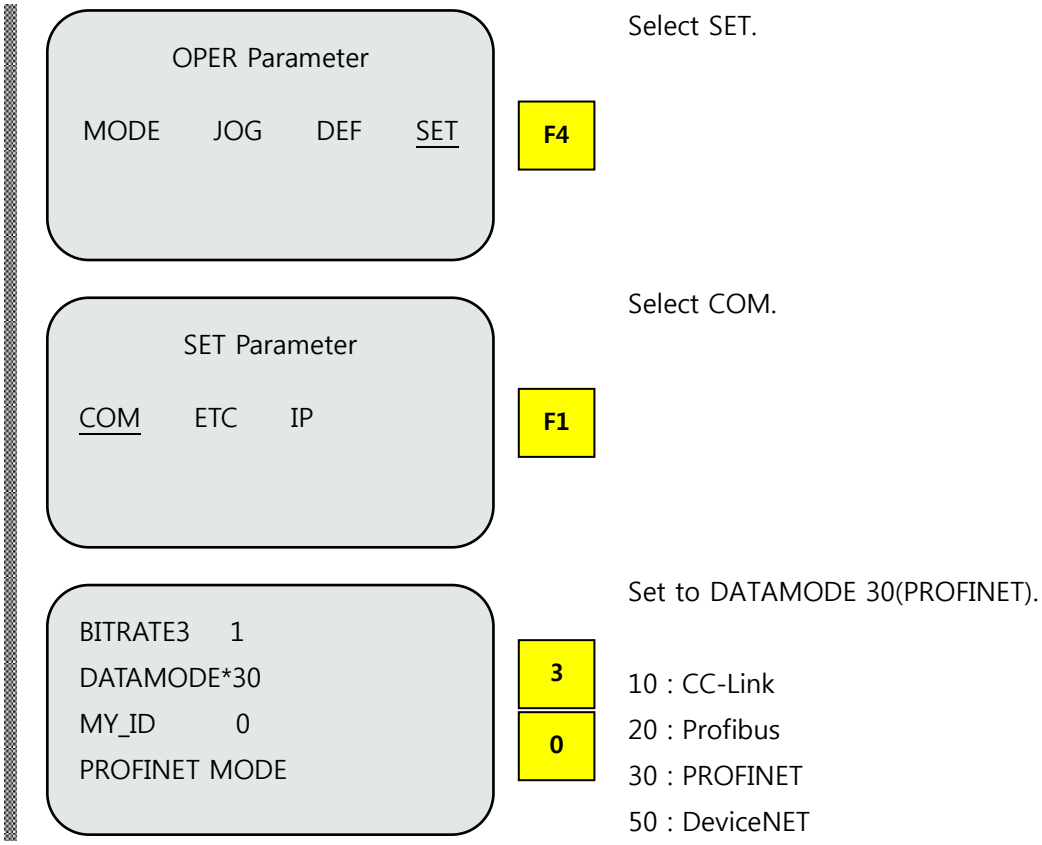
Select PARA.



F3

Select OPER.

Step 2.

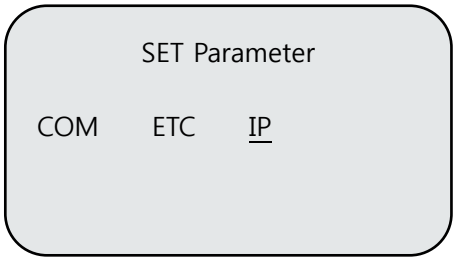


CAUTION

- **When DATAMODE 30(PROFINET) is set and OPTION board is not fastened in normal condition, alarm E15.02 "Not find Fieldbus" sounds.**

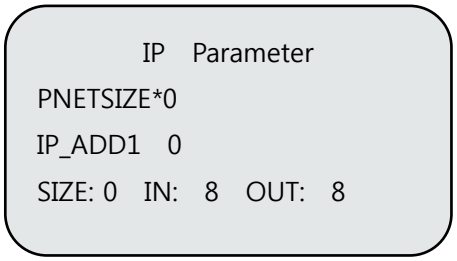
4.4.2 MAP Size Setting and IP Setting

Step 1. **Shift to SET Parameter screen**



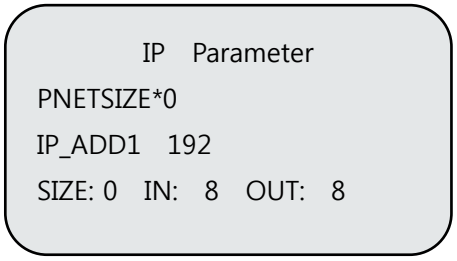
Select IP.

Step 2-1. **Change PROFINET MAP Size**

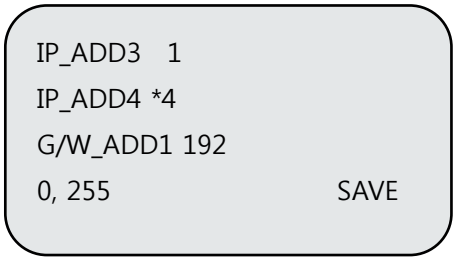


Size varies according to PNETSIZE value.
0 : IN 8, OUT 8
1 : IN 32, OUT 32

Step 2-2. **Change PROFINET IP and Gateway**



2 : Select Down.
Display IP address from IP_ADD1 to IP_ADD4
(IP_ADD1. IP_ADD2. IP_ADD3. IP_ADD4)

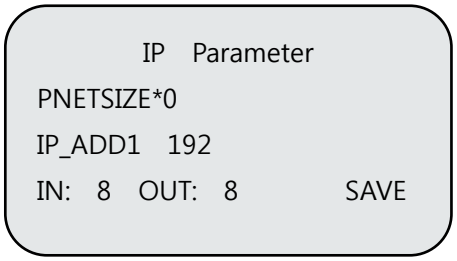


2 : Select Down.
Display Gateway address from G/W_ADD1 to G/W_ADD4 (
G/W_ADD1. G/W_ADD2. G/W_ADD3. G/W_ADD4)

CAUTION

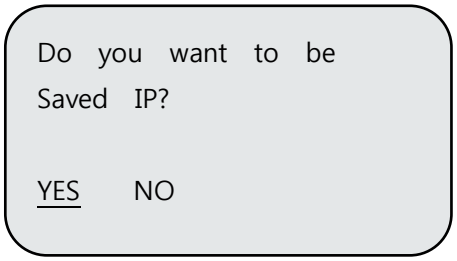
- **Turn On/Off the controller when changing MAP Size, IP, and Gateway.**
- **When the address value is saved to the control board and not saved to Option B/D, select F4: SAVE and turn ON/OFF the controller.**
- **IP and Gateway values saved to Option board are not consistent with the control board, alarm E15.03 "Net Addr IP mismatch" sounds.**
- **When MAP size saved to Option board is not consistent with the control board, alarm E15.04 "Net MAP mismatch" sounds.**

Step 3-2. **Save PROFINET MAP Size, PROFINET IP and Gateway (When a value changes)**



ESC

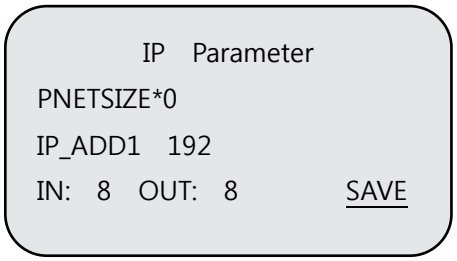
Change the value and select ESC.



F1

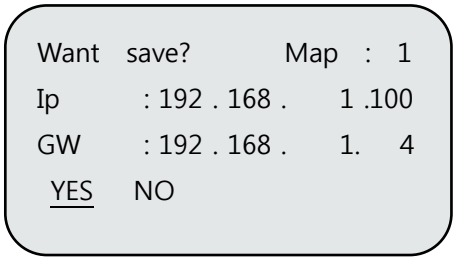
Save by selecting F1.

Step 3-2. **Save PROFINET MAP Size, PROFINET IP and Gateway (When value change is not made)**



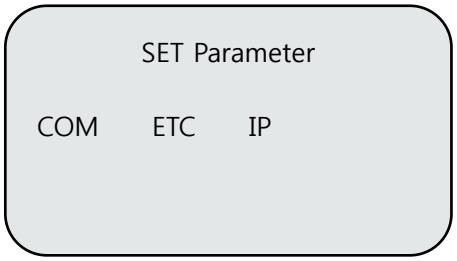
F4

Save by selecting F4.



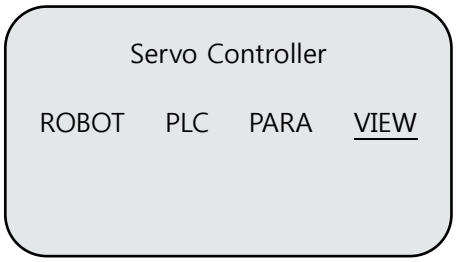
F1

Views the currently set value.
Select F1.

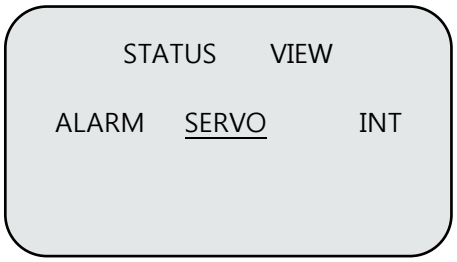


4.4.3 Checking Value Set to Option Card

Step 1. **Shift to SET Parameter screen**

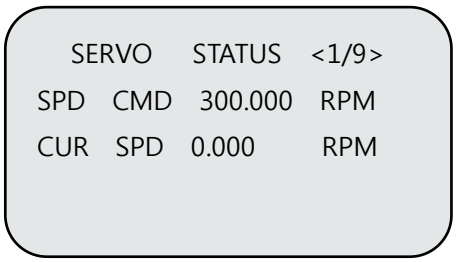


Select VIEW.

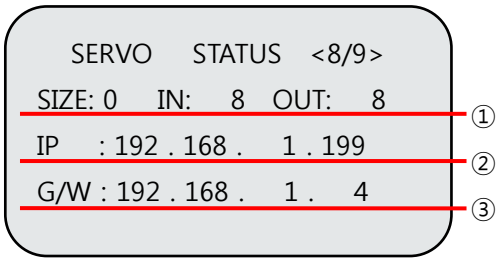


Select SERVO.

Step 2. **Check MAP SIZE, PROFINET IP, Gateway**



Press Down button 7.



① MAP SIZE 0,
INPUT : 8bytes, OUTPUT : 8 bytes,
② IP address: 192.168.1.199
③ Gateway: 192.168.1.4

ch.5. Examples of PROFINET Setting

Step1.

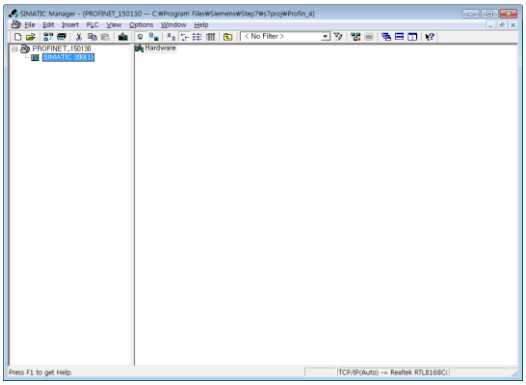


Fig. 5.1 SIMENS PLC

Run SIMATIC Manager to click Hardware (Station configuration) as shown in the figure below.

Step2.

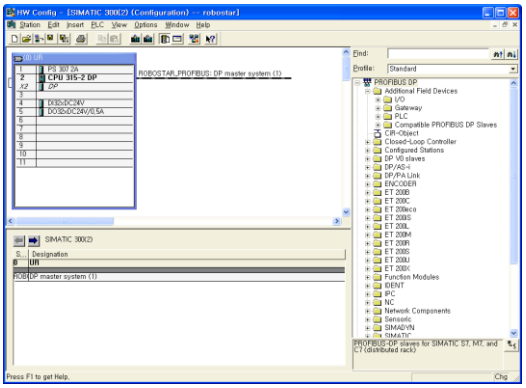


Fig. 5.2 SIMENS PLC

Run HW Config program to add PROFINET Slave.

.

Step3.

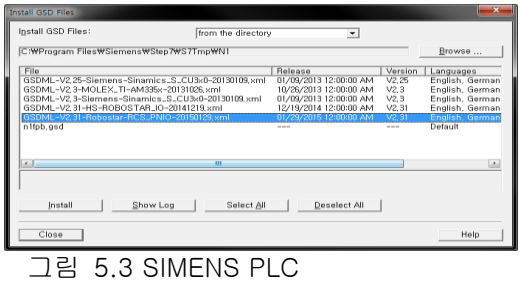


그림 5.3 SIMENS PLC

Select Options/Install New GSD menu to select the file provided as shown below.

Step4.

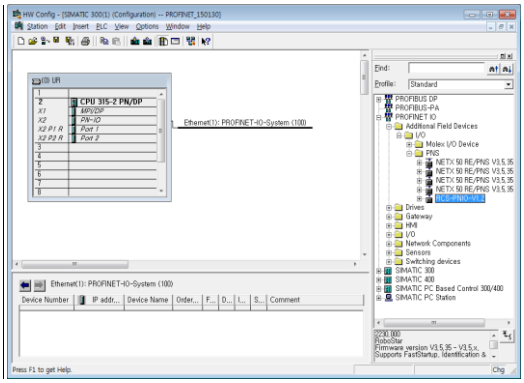


Fig. 5.4 SIMENS PLC

Fig. 5.4 shows ROBOSTAR RCS Device is registered to PROFINET.

Step5.

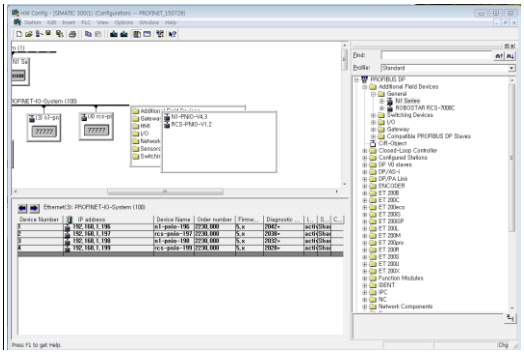


Fig. 5.5 SIMENS PLC

Press the right mouse button on PN-IO connecting line to select Insert Object, then select RCS-PNIO-Vx.x.

Step6.

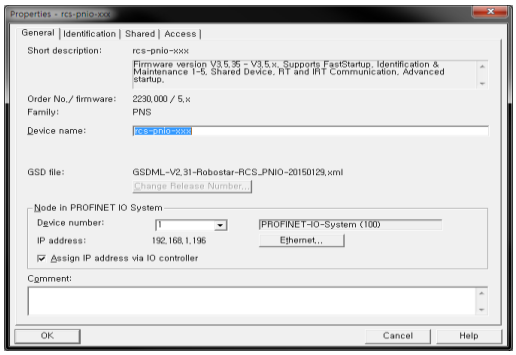


Fig. 5.6 SIMENS PLC

Once registered, the property window is displayed. Change Device name and Ethernet IP. At this time, the Device name should be set to RCS-PNIO-(IP number).

Step7.

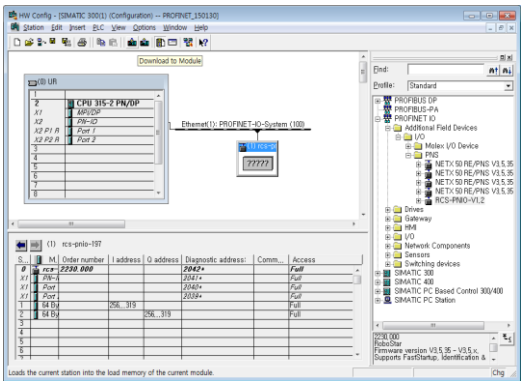


Fig. 5.7 SIMENS PLC

Select ROBOSTAR RCS object and register Input/Output Address as shown in Fig. 5.9, Fig. 5.10.

Select Insert Object from Drop menu on right mouse.

* Basic IO Size is 32Byte.

Step8.

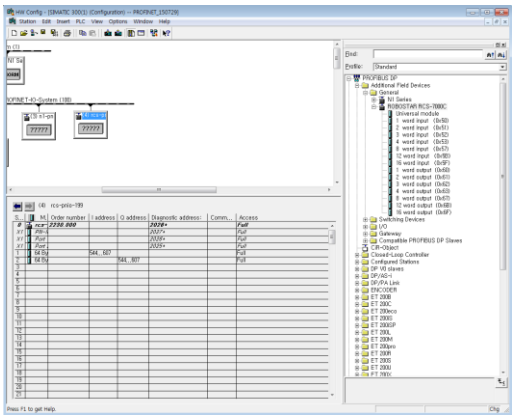


Fig. 5.8 SIMENS PLC

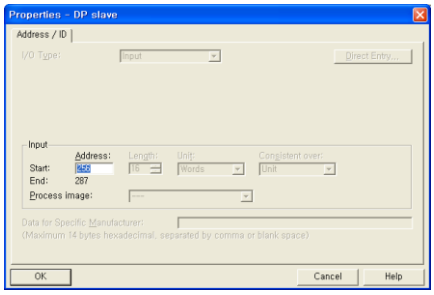


Fig. 5.9 SIMENS PLC

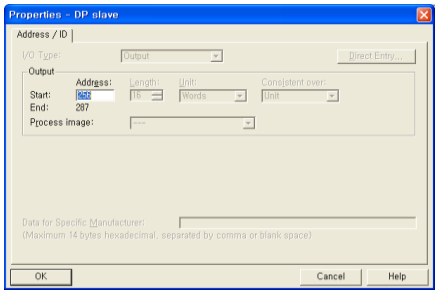


Fig. 5.10 SIMENS PLC

ch.6. Memory Mapping

Input	Definition	Input	Definition
Ry0	B100 ~ B107	Rx0	-
Ry1	B110 ~ B117	Rx1	Error code value
Ry2	B120 ~ B127	Rx2	B180 ~ B187
Ry3	B130 ~ B137	Rx3	B190 ~ B197
Ry4	-	Rx4	B200 ~ B207
Ry5	-	Rx5	B210 ~ B217
Ry6	-	Rx6	-
Ry7	-	Rx7	-
Ry8	-	Rx8	-
Ry9	-	Rx9	-
Ry10	Position variable number	Rx10	Current position value
Ry11		Rx11	
Ry12	INT12	Rx12	
Ry13		Rx13	
Ry14	INT11	Rx14	-
Ry15		Rx15	-
Ry16	-	Rx16	-
Ry17	-	Rx17	-
Ry18	-	Rx18	-
Ry19	-	Rx19	-
Ry20	Position variable	Rx20	-
Ry21		Ry21	-
Ry22		Rx22	-
Ry23		Rx23	-
Ry24	-	Rx24	-
Ry25	-	Rx25	-
Ry26	-	Rx26	-
Ry27	-	Rx27	-
Ry28	-	Rx28	-
Ry29	-	Ry29	-
Ry30	-	Rx30	-
Ry31	-	Rx31	-

ch.7. Appendix – How to Use B/D Debugging Program

Step1.

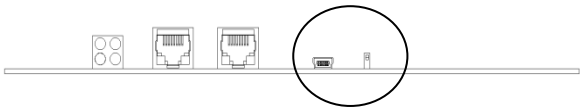


Fig. 7.1 PROFINET B/D

When the front cover of PROFINET Board is removed, a Service USB Port and Switch exist.

When the corresponding Switch is switched to ON (Board direction), it boots in Service Mode at time of feeding power.

Step2.

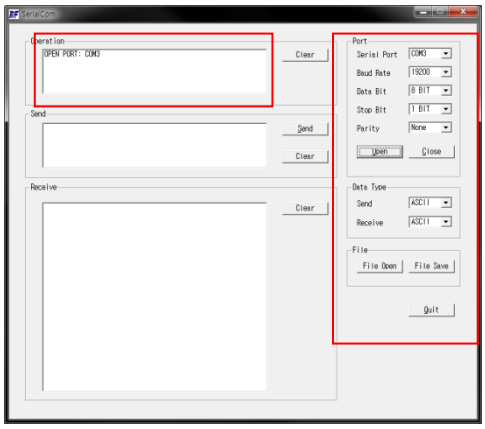


Fig. 7.2 SerialCom

Run SerialCom program to set Serial Port. (COM 1~10)
Baud Rate is 19200bps.
Set Data Type to ASCII and click Open.
When displayed as OPEN PORT : COMx on Operation, connection is made normally.

Step3.

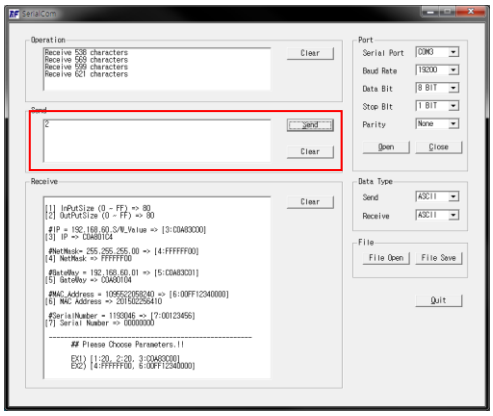


Fig. 7.3 SerialCom

Enter "1" on Send window and click Send button, then currently-set I/O Size and IP information are displayed.

Step4.

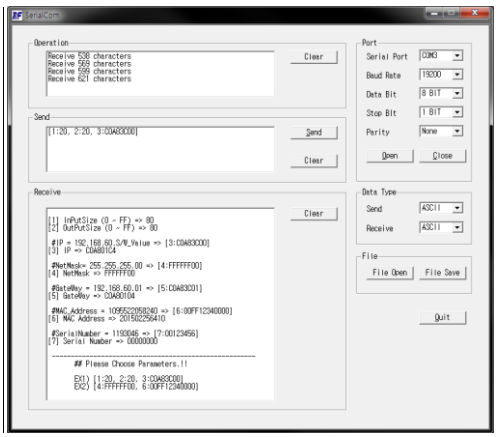


Fig. 7.4 SIMENS PLC

Enter an item to set on Send window and click Send button.

Ex1> When changing only one item,

[1:20]

Ex2> When changing several items simultaneously

[1:20, 2:20, 3:C0A83C00]

Step5.

Turn OFF Service Switch on PROFINET Board and feed power supply again.

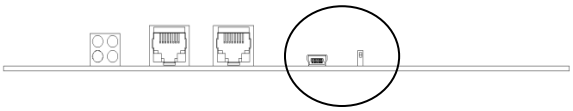


Fig. 7.5 PROFINET B/D

CAUTION

- **A voluntary change to set values in Service Mode may result in abnormal operation of PROFINET Module. The corresponding operation should be done after contacting the customer support team for information.**

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