

**LG Programmable Logic Controller
Profibus-DP Module**

*GLOFA
MASTER-K*

**G3L-PUEA
G3L-PUEB
G4L-PUEA
G4L-PUEB
G6L-PUEA
G6L-PUEB
G7L-PBEA**

Before using, please read 'Notices for the safety' thoroughly.

Please keep this user's manual in the place where the user can find easily.



LG산전

Notices for the Safety

‘Notices for the Safety’ should be complied by the user to use the product safely and correctly to prevent the occurrence of any accident or danger.

‘Notices for the Safety’ is divided by “Danger”, “Warning” and “Caution” and each meaning is as follows :



Danger

In case of violating the instructions, it may cause the significant injury or death immediately.



Warning

In case of violating the instructions, it may cause the significant injury or death.



Caution

In case of violating the instructions, it may cause the slight injury or product damage.

■ The meaning of symbols used in the product and user’s manual is as follows :



This symbol is to take care for the items or operation that may occur the danger.

When you find this symbol, you should read the instructions carefully to avoid the danger occurrence.



This symbol is to take care as the electric shock may occur under the specific condition.

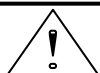
■ Notices in Design



Caution

- ▶ I/O Signal/Communication cables shall be designed apart at least 100mm from high voltage cable or power cable to avoid the influence caused by the noise or the change of magnetic field. It may cause the malfunction by the noise.
- ▶ In case that installation environment has lots of vibration, cares should be taken not to apply the vibration to the product directly.
- ▶ The inflow of metal particle is not permitted as it may cause the malfunction of the product.

■ Notices in Installation



Caution

- ▶ PLC should be used in the environment condition described in the general standard.
- ▶ If used out of general standard, it may cause the electric shock, fire, malfunction, damage of product or furious flames etc.
- ▶ Make sure that the module is fixed correctly.
- ▶ If not installed the module correctly, it may cause the malfunction, failure or falling.

■ Notices in Wiring



Caution

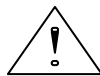
- ▶ For the grounding of FG terminal, you should use the 3rd class grounding only for PLC.
If not grounding, it may cause the malfunction.
- ▶ The wiring in PLC should be connected after checking the rating voltage of the product and terminal layout.
- ▶ If connected to the different power from the rating or wrong wiring, it may cause the fire or failure.
- ▶ In case of wiring, the screw of terminal should be tightened by standard torque.
If the screw of terminal is loosened, it may cause the cutoff or malfunction.
- ▶ Cares should be taken to avoid the inflow of foreign materials such as wiring dregs inside the module.

■ Notices in Startup and Maintenance



Warning

- ▶ Do not touch the terminal in the state that the power is applied. It may cause the malfunction or electric shock.



Caution

- ▶ Do not remove PCB from the module case or remodel the module. It may cause the failure, malfunction, damage of the product or fire. The installation and removal of the module should be done after POWER OFF.
- ▶ The change of battery should be done in the state of POWER ON.
In case of changing in the state 'OFF', the program may be damaged.

■ Notices in Disposal



Caution

- ▶ When the product is disposed, this should be treated as industry waste.

REVISION HISTORY

Issue Date	Manual No.	Revised Content
'04.4	10310000334	First edition issued.

※User's Manual no. is marked on the right bottom side of the back cover.

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CHAPTER 1 OVERVIEW

This user's manual describes GLOFA-GM/MASTER-K Profibus (hereinafter referred as 'Pnet') which is Profibus module among network modules of PLC system technically in detail.

Please refer to the following user's manuals to prepare the program.

- GLOFA-GM PLC Command collection
- GLOFA-GM PLC GMWIN User's manual
- MASTER-K PLC Command collection
- MASTER-K PLC KGLWIN User's manual

For Pnet system configuration, cares should be taken to the followings

- GLOFA-GM PLC GMWIN Program Tool: more than Ver 3.4
- GLOFA GM1/2 CPU : more than Ver 3.2
- GLOFA GM3 CPU : more than Ver 2.4
- GLOFA GM4 CPUA/CPUB/CPUC : Ver 2.5/ Ver 2.5/ more than Ver 2.0
- GLOFA GM6 CPUA/CPUB/CPUC : Ver 1.8/ Ver 1.8/ more than Ver 1.8
- GLOFA GM7 CPU : more than Ver 1.5
- MASTER-K PLC KGLWIN Program Tool: more than Ver 3.2
- MASTER-K 1000S CPU : more than Ver 3.0
- MASTER-K 300S CPU : more than Ver 3.0
- MASTER-K 200S CPU : more than Ver 2.5
- MASTER-K 120S CPU : more than Ver 1.1
- MASTER-K 80S CPU : more than Ver 1.5

The features of GLOFA Pnet are as follows :

- International standard : EN 50170
- Device type : Profibus DP Master/ Slave
- Auto Baud Rate Detect : support
- Sync mode : support
- Freeze mode : support
- Max. input data : 64 byte/Slave
- Max. output data : 64 byte/Slave
- Max. data size : 128 byte/Slave, (1kbytes or 7kbytes)/Master
- Communication speed : 9.6K, 19.2K, 93.75K, 187.5K, 500K, 1.5M, 3M, 6M, 12M
- Modular Station : support

CHAPTER 1 OVERVIEW

1.1 Notices in using

When you install this device, cares should be taken to the following items for the reliability and safety of system.

Items	Classification	Description
Temperature	Condition	<ul style="list-style-type: none">• When installing this device, the use temperature should be 0 ~ 55℃ for the part elements.• Direct exposure to the direct ray of light is not allowed.
	Action	<ul style="list-style-type: none">• If the temperature is high, the fan or air conditioner is required while you should maintain the proper temperature if the temperature is low.
Dew condensation	Condition	<ul style="list-style-type: none">• No dew by a sudden change of temperature.• Install inside the control panel available for water-proof or vibration resistance.
	Action	<ul style="list-style-type: none">• The temperature change due to frequent power On/Off may cause the dew condensation. In this case, keep the power ON even in the night time.
Impact	Condition	<ul style="list-style-type: none">• Install in the place free from impact or vibration.
	Action	<ul style="list-style-type: none">• In case of serious impact or vibration, use the vibration-resistant rubber to prevent from applying the impact or vibration to the device.
Gas	Condition	<ul style="list-style-type: none">• Install in the place having no corrosive gas.
	Action	<ul style="list-style-type: none">• In case of inflow of the corrosive gas from outside, it is required to take measures for air conditioning of the control panel where installed the device.
EMC environment	Condition	<ul style="list-style-type: none">• Install in the proper place for the electric magnetic field.
	Action	<ul style="list-style-type: none">• Select the correct path of the cables in case of wiring.• Check if the sheltering of the control panel is done properly.• For the lighting inside the control panel, use the incandescent lamp instead fluorescent lamp.• Power module should be grounded on the standard electric potential.

CHAPTER 2 TERMINOLOGY

Profibus

Profibus is a protocol designated as German standard DIN 19245, developed by Bosch, Siemens, Klockener-Moeller in Germany and also a network designated as European standard EN50170 together with WorldFIP, P-NET.

Profibus is used for the real time communication between field equipments in the area of production automation, processing control, building automation etc. and the product group is divided into Profibus-FMS (Fieldbus Message Specification), Profibus-DP (Decentralized Periphery), Profibus-PA(Process Automation).

Profibus-FMS

This is a solution for the general purpose providing the communication function on the cell level. The services provided include program file to run the field equipment, the function to send the data related to the program file, the function to control the program remotely through network, and the function to manage various accidents that may occur while operating the control or automation system.

Profibus-DP

This is a communication system to send the real time data between field equipments within the short time and replace the existing communication system using an analog signal of 24V and 4-20mA with a high speed digital communication mode. The examples for application are the communication between field equipments such as various kinds of sensor or actuator installed in PLC or in the field.

Profibus-PA

This is designed especially for the processing automation and enables to connect the sensor and actuator by one common bus line with the embedded safety device, and supply the power to the data communication on bus by using 2-wire technology in accordance with international standard IEC 1158-2.

Sycon

This is a Profibus Network Configuration Tool. When using a master module (G3/4/6L-PUEA/PUEB) of LGIS, it is required to configure Pnet by using Sycon and download the information to the relevant master module.

GSD file

This is an electronic device data sheet that includes manufacturer, device name, hardware/ software sales, support transmitting rate, master related specification (max. number of connectable slave, upload/download option etc.) and slave related specification (number and type of I/O channels, diagnosis text specification and module information available with modular device).

EDD (Electronic Device Description)

This describes the registration information of Profibus field device generally and allows to explain the complicated automation system as well as simple field device (sensor and/or actuator) regardless of manufacturer. The device description is provided in electronic format made by the manufacturer per device. EDD file should be read by engineering tool and enables to simplify the Profibus system setting. This file describes the variables and the function of the device and contains the elements for operation and visualization.

Broadcast Communication

This is to send the message not recognized by Operation Station to all station (Master, Slave).

Multicast Communication

This is to send the not recognized message to the pre-fixed Station group (Master, Slave) by Operation Station.

CHAPTER 3 GENERAL SPECIFICATION

CHAPTER 3 GENERAL SPECIFICATION

3.1 General Specification

The General Specification for the communication module of GLOFA series and MASTER-K series is as follows:

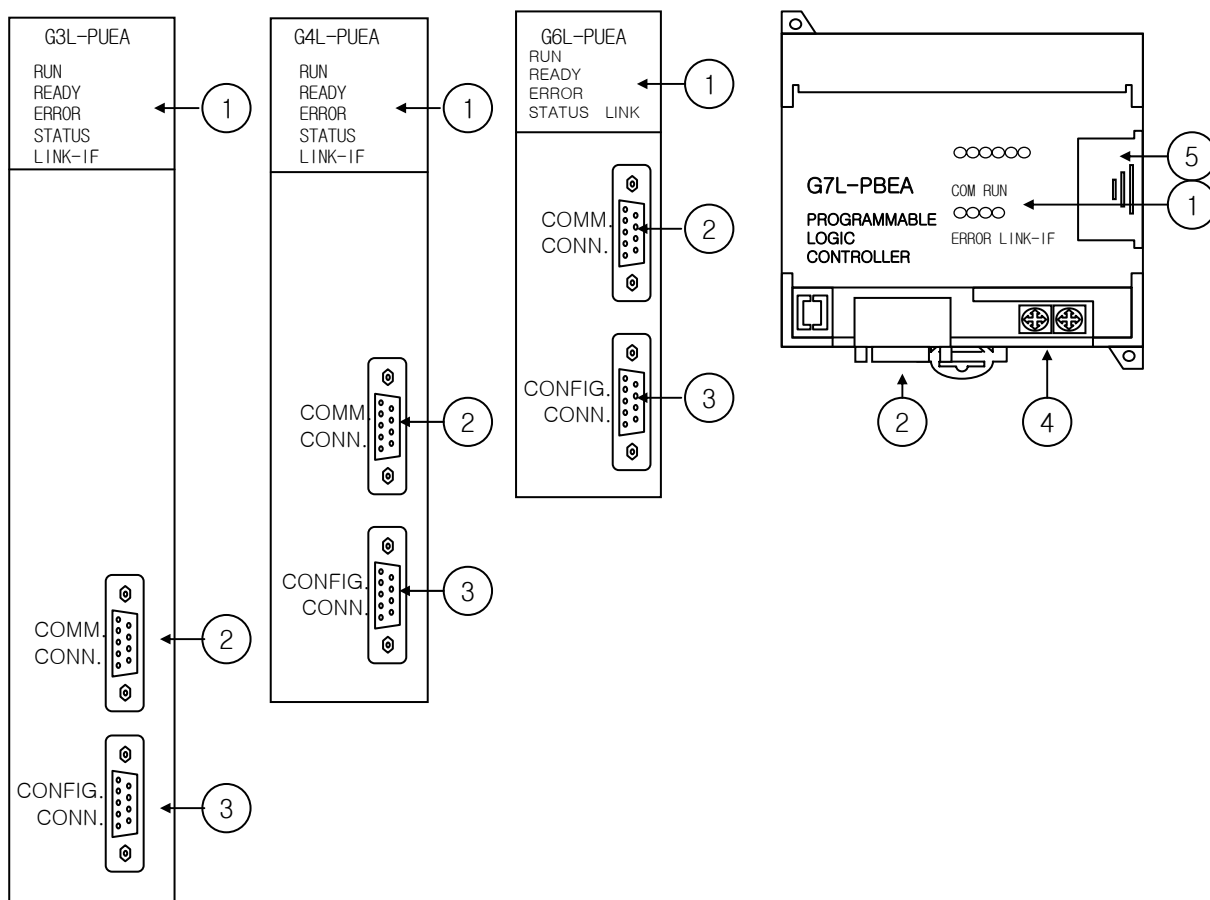
No.	Items	Specification					Reference
1	Use Temperature	0 ~ 55 °C					
2	Storage Temp.	−25°C ~ +70 °C					
3	Use humidity	5 ~ 95%RH, no dew					
4	Storage humidity	5 ~ 95%RH, no dew					
5	Vibration-resistant	In case of Intermittent vibration				-	IEC61131-2
		Frequency	Acceleration	Amplitude	Times		
		10 ≤f<57Hz	—	0.075mm	X, Y, Z 10 times each direction		
		57 ≤f≤150Hz	9.8m/s ² {1G}	—			
		In case of Continuous vibration					
		Frequency	Acceleration	Amplitude			
		10 ≤f<57Hz	—	0.035mm			
		57 ≤f≤150Hz	4.9m/s ² {0.5G}	—			
6	Impact-proof	● Max. impact acceleration : 147 m/s ² {15G} ● Application time : 11ms ● Pulse wave type : semi-sine wave pulse (3 times each direction X,Y,Z)					IEC61131-2
7	Noise-resistant	Square wave impulse noise	± 1,500 V				LGIS internal test standard
		Electrostatic discharge	Voltage : 4kV (Touch discharge)				IEC61131-2 IEC1000-4-2
		Radiant electromagnetic field noise	27 ~ 500 MHz, 10 V/m				IEC1131-2, IEC1000-4-3
		Fast transient / Bust noise	Classi- fication	Power modul e	Digital I/O (more than 24V)	Digital I/O (less than 24V) Analog I/O Communication interface	IEC1131-2 IEC1000-4-4
			Voltage	2kV	1kV	0.25kV	
8	Surrounding environment	No corrosive gas, no dust					
9	Use altitude	Less than 2,000m					
10	Pollution	Less than 2					
11	Cooling method	Natural air-conditioning					

Table 3.1 General Specification

Note

- 1) IEC(International Electrotechnical Commission) : International civil community that promotes international cooperation for standardization of electric/electro technology, publishes international standard and operates suitability assessment system related to the above.
- 2) Pollution Degree : An index to indicates the pollution degree of used environment that determines the insulation performance of the device. For example, pollution degree 2 means the state to occur the pollution of non-electric conductivity generally, but the state to occur temporary electric conduction according to the formation of dew.

3.2 Pnet I/F Module Configuration



No.	Names	Description
①	LED indicator	Refer to LED display contents.
②	Profibus-DP connector	Connector for Profibus network (D-SUB 9 pin connector, female type)
③	Configuration connector	Connector to download the layout diagram of the prepared Profibus network, by using configuration tool.(D-SUB 9 pin connector, female type, refer to cable connection drawing.)
④	Station no. switch	Station no. switch of slave module (1~126 stations setting)
⑤	Extension connector	Connector to connect the extension module.

Table 3.2 Module Configurations

*G3L-PUEB, G4L-PUEB, G6L-PUEB are the same configuration.

CHAPTER 4 PERFORMANCE SPECIFICATION

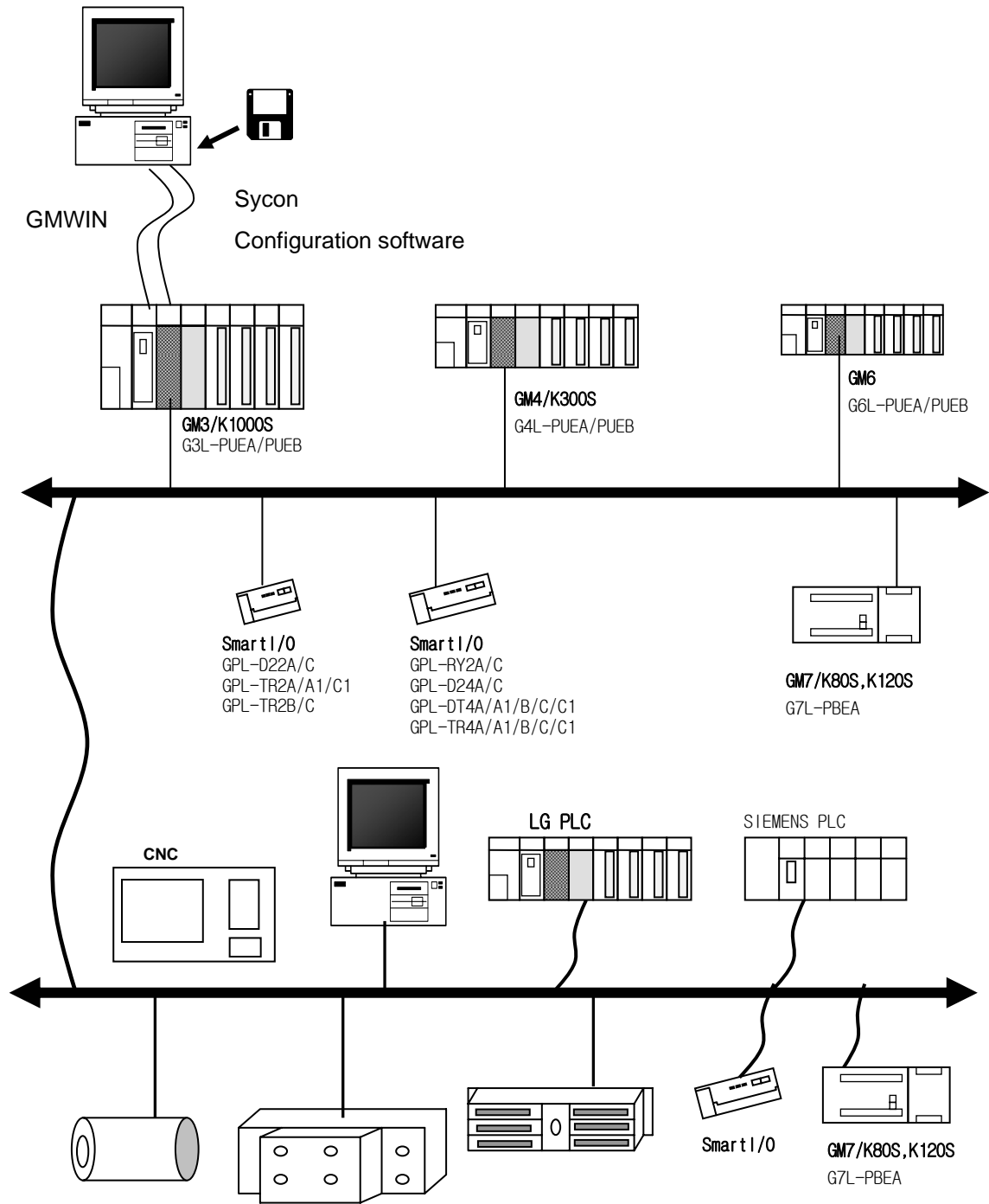
4.1 Communication Specification

Items \ Type	G3/4/6L-PUEA	G3/4/6L-PUEB	G7L-PBEA
Module type	Master		Slave
Network type	Profibus-DP		
Standard	EN50170/DIN19245		
Interface	RS-485(electric power)		
Transmission mode	Bus mode		
Modulation mode	NRZ		
MAC	Local token ring		Poll
Total extension length & speed	1000m(9.6k~187kbps) 400m(500kbps) 200m(1.5Mbps) 100m(3M~12Mbps)		
Max. no. of connection per network	126 stations		
Max. no. of connection per segment	32 stations		
Use cable	Electric : twisted pair cable		
Max. communication point	1kbyte	7kbytes	64byte / slave
Communication parameter setting	Configuration tool only for GMWIN/KGLWIN high speed link parameter		GMWIN communication parameter (in case of using GM7 basic module) KGLWIN communication parameter (in case of using K80S basic module)
Internal consumption current (mA)	542/544/505	594/656/682	337
Weight (g)	373/230/135	373/230/135	204

Table 4.1 Communication specifications

CHAPTER 5 SYSTEM CONFIGURATION

5.1 Profibus-DP System



CHAPTER 6 COMMUNICATION FUNCTION

- Supports only the high speed link communication.
- Parameter setting and configuration in SyCon and GMWIN/KGLWIN.
- Sets only sending/receiving area in GMWIN high speed link parameter setting.
- The sending/receiving data shall be saved and sent continuously from the setting area. (e.g. similar to the continued MAP of MASTER-K.)
- The number of sending/receiving and slave area per slave station shall be set using a SyCon and downloaded by master module using a Configuration port.
- The number of sending/receiving is available up to 512byte/3584byte respectively according to the dot board type.
- The number of sending/receiving per slave station shall be set by byte (set in SyCon).
- The communication starts through GMWIN/KGLWIN high speed link allowable setting function.

6.1 High Speed Link

6.1.1 Overview

High speed link is a communication method between GLOFA-GM/MASTER-K PLC communication modules that enables to receive the data by high speed link parameter setting, and a high speed data transmitting service that the user can set the sending/receiving data size, sending/receiving period, sending/receiving area or saving area in the parameter and exchange the data by using GMWIN/KGLWIN. The functions are shown as below :

- High speed link block setting : Available to set the sending/receiving area of 64byte per slave.
- Sending/receiving area setting : Available to set the sending/receiving area per data block according to I/O MAP of the user.
- High speed link information provided : provides the user with high speed link information as GMWIN/KGLWIN user keyword to build the reliable communication system.

Table 6.1 shows the high speed link score per communication device model.

Classification	G3/4/6L-PUEA	G3/4/6L-PUEB	G7L-PBEA
Max. I/O data	1kbytes	7kbytes	64 byte/ slave

Table 6.1 Max. communication score per device model

6.1.2 Operation procedure by high speed link

- If master module is a product of LGIS (G3/4/6L-PUEA, G3/4/6L-PUEB), make a configuration of Pnet by using SyCon.
- Download the Pnet Configuration by master module.
- Set and download the high speed link parameter of master module in GMWIN/KGLWIN.
- Set 'high speed link allowable'.
- If the product of other manufacturer is used as master, make a configuration of Pnet by using a Configuration Tool of the relevant product.
- Set and download the high speed link parameter of slave module in GMWIN/KGLWIN.
- Convert the operation mode to RUN.

6.1.3 SyCon

If you use the master module of LGIS (G3/4/6L-PUEA, G3/4/6L-PUEB), it is required to make a configuration of Pnet by using a SyCon and download that information to the relevant master module. As Pnet Configuration Tool is different per master module, if you use the master module of LGIS (G3/4/6L-PUEA, G3/4/6L-PUEB), you should use a SyCon.

Execute a SyCon as shown on Figure 6.1.



Figure 6.1 Execution of SyCon

If there is no project used before, the screen like Figure 6.2 will appear. If you have been using the project already, the latest used project will appear.

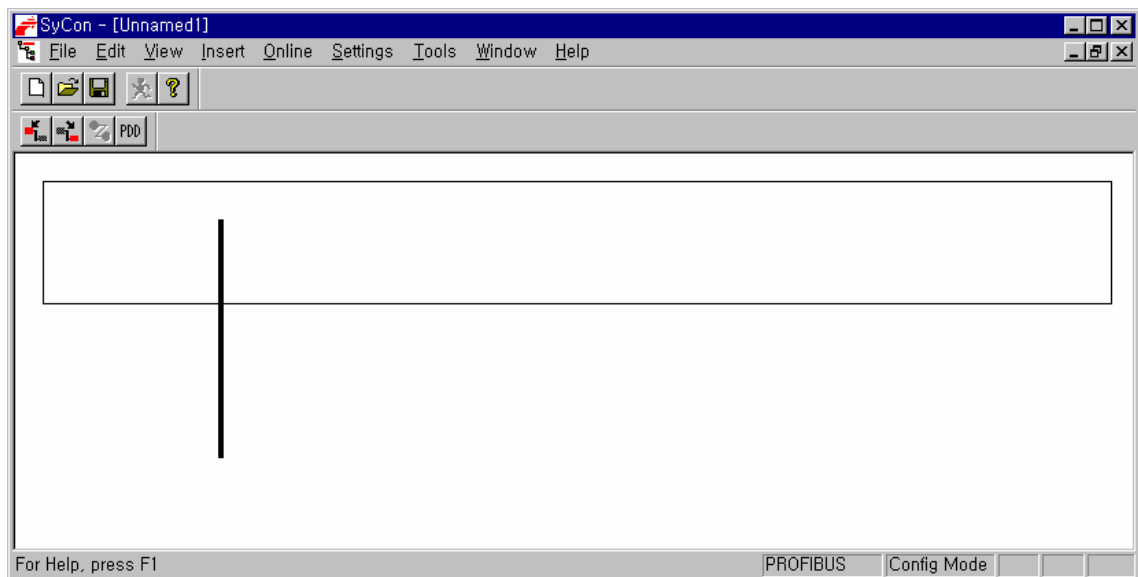


Figure 6.2 Initial Screen

Insert Master module


Select  from the tool bar on the left upper side and click the proper position on the left upper side from the below windows.



Figure 6.3 Tool bar

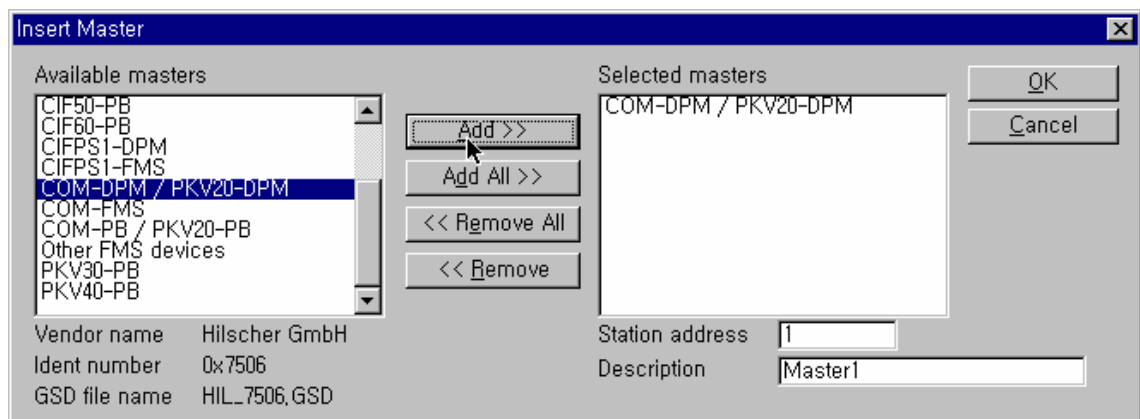
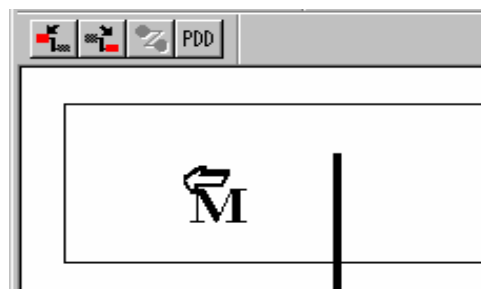


Figure 6.4 Insert Master

If the using master module is G3/4/6L-PUEA, select COM-DPM/PKV20-DPM from Figure 6.4 and click 'Add ' button in the middle. If the using master module is G3/4/6L-PUEB, select COM-PB/PKV20-PB and click 'Add' button in the middle part. Check the Station address and if necessary, you can change the description. Press [OK] button to insert the master module.

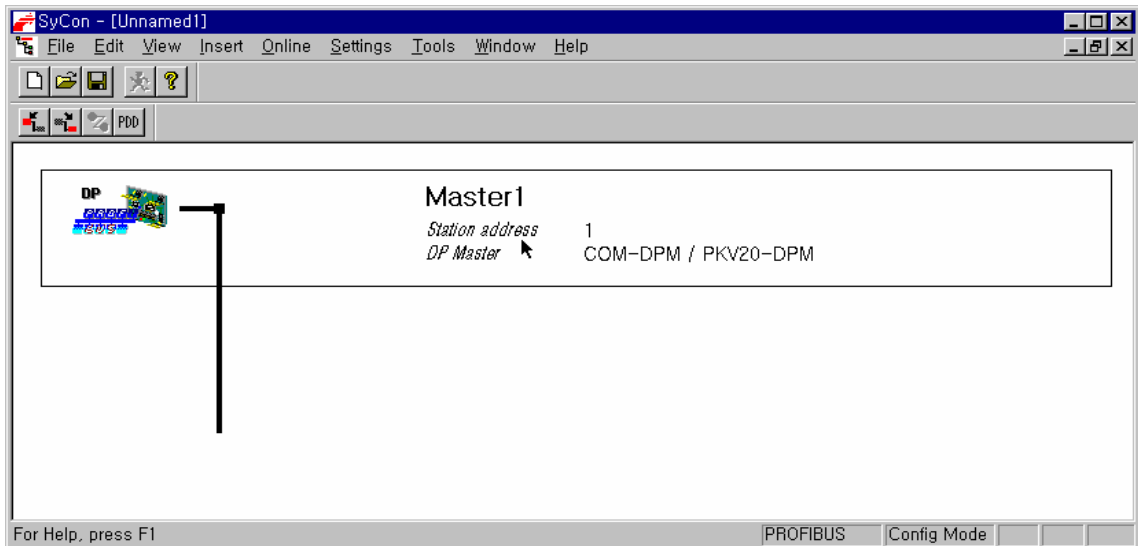


Figure 6.5 Inserted master module

Master Module Setting

If you click the right button of the mouse on the inserted master module and select "Master Settings..." from the popup window, the window appears as like Figure 6.6.

From "Parameter to user interface", select "Controlled release of the communication by the application program", from "Storage format (Word module)", select "Little Endian (LSB-MSB)", and from "Handshake of the process data", select "Buffered, host controlled", in order.

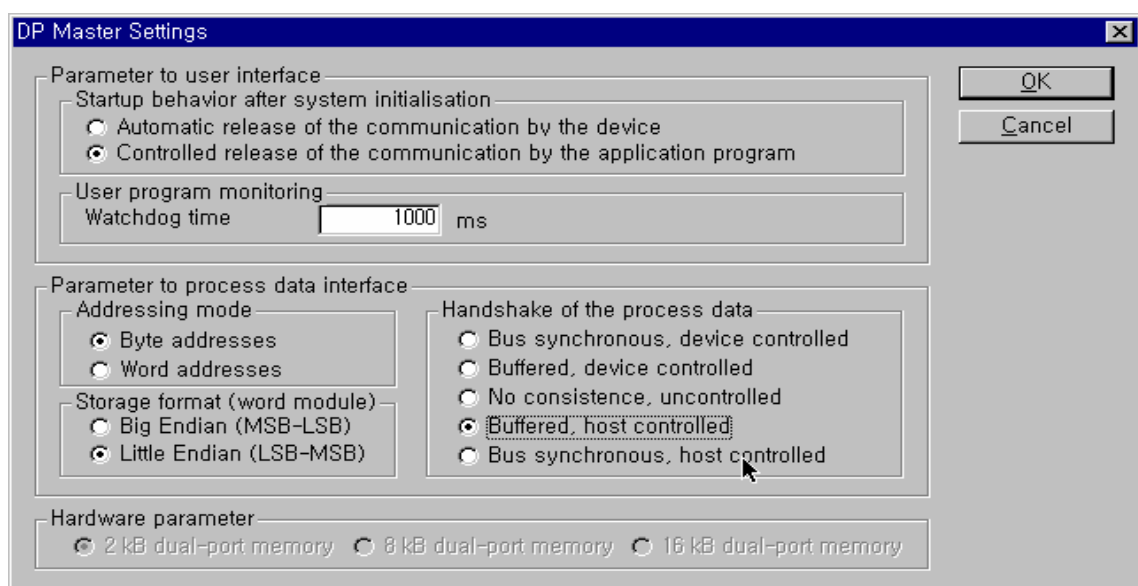



Figure 6.6 Master module setting

Insert slave

Similar to master module, select  from the tool bar on the left upper side and click under the master, 'Insert Slave' window will appear as shown on Figure 6.7.

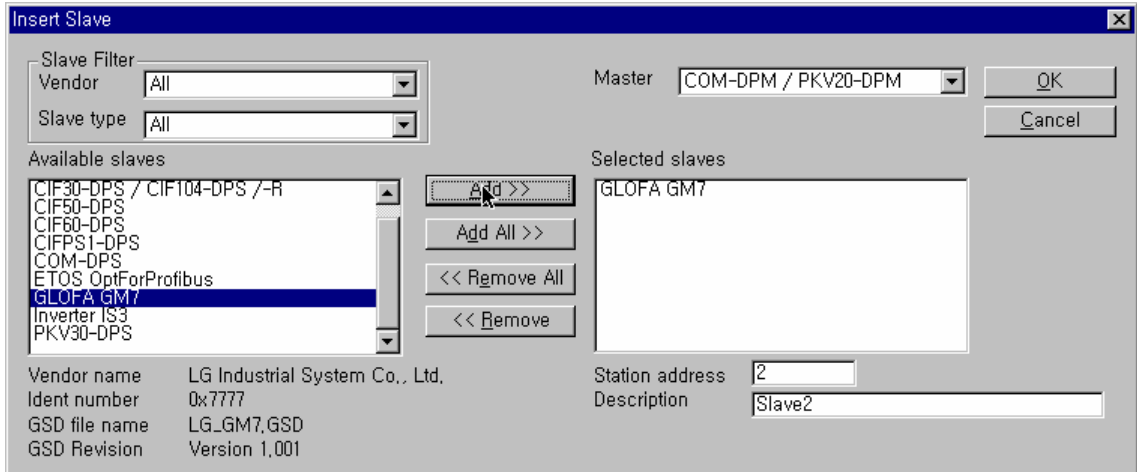
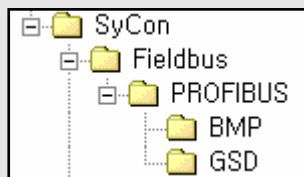


Figure 6.7 Insert Slave

In case of using G7L-PBEA, select “GLOFA GM7” from “Available Slaves” and click “Add” button in the middle part. If there are several masters, select one from “Master” on the right upper side and verify “Station address” and “Description” and then click “OK” button.

Point

- 1) If there is no slave to be used in “Available Slaves” column of insert slave window, it is recommended to copy “GSD file”, an original self information provided by the module manufacturer in the below directory and execute SyCon again to insert the slave.



Slave Configuration

Click the inserted slave by the right button of mouse and select “Slave Configuration” from the pop-up window.

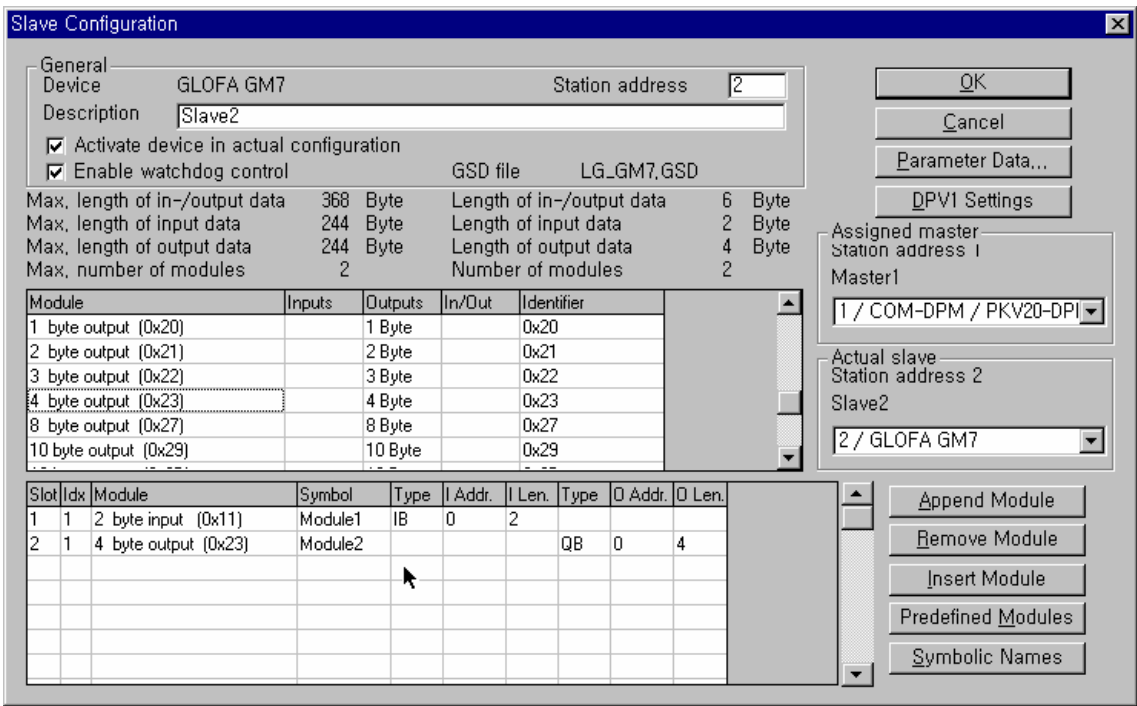


Figure 6.8 Slave Configuration

The list box shown in the middle shows all available modules. If you select the module with necessary scores from those and click “Append Module” button on the right bottom side, it will be inserted in the list box below. In this case, input module should be inserted in advance and output module should be inserted in the below. The number of available module is 2.

Bus Parameter Setting

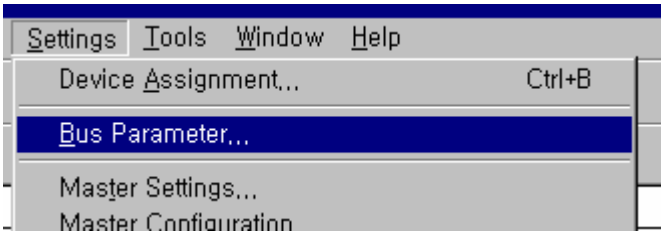


Figure 6.9 Bus Parameter Settings

Select “Settings/Bus Parameter...”from the menu. In the field of ‘Optimize’, there are “Standard” and “User definition” settings, and Baud rate contains 9.6kbps ~ 12Mbps settings. Basically, **Baud rate is set as 1.5Mbps and Optimize as standard.**

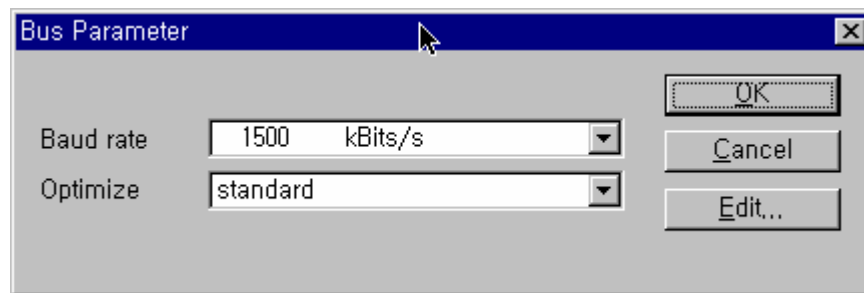


Figure 6.10 Bus Parameter

Point

- 1) Communication speed has a correlation with transmission distance.
- 2) For 12Mbps, use the dedicated connector and cable for 12Mbps.
- 3) For 12Mbps, minimum distance between stations should be more than 1m.
- 4) If communication is stopped in case of using 12Mbps (especially, the station located far from the master), it is required to seek the proper vertical resistance value and set it temporarily.

Verify the cable type and transmission distance and select the proper "Baud rate".

Device Assignment

Click the master module by the left button of mouse and select the master module. Select "Setting/Device Assignment..." from the menu.

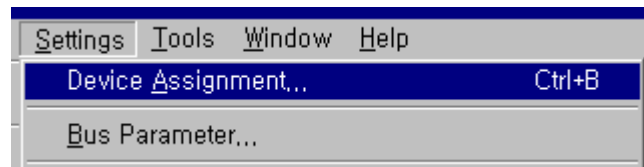


Figure 6.11 Device Assignment

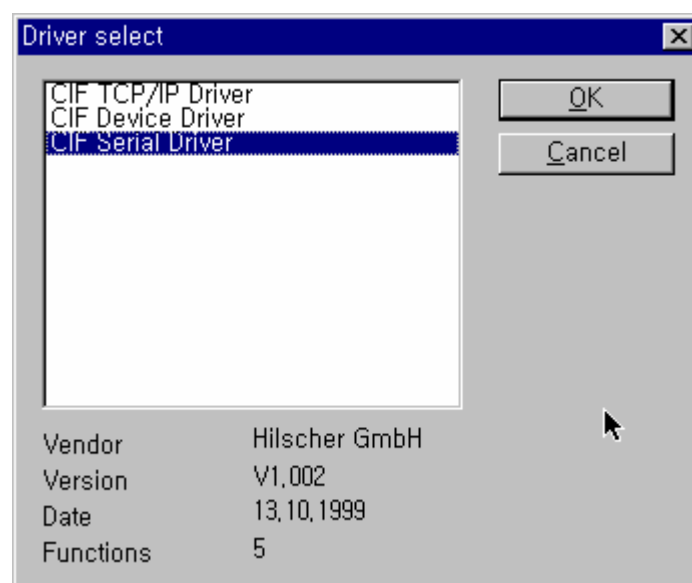


Figure 6.12 Driver select

Select "CIF Serial Driver" from Figure 6.12.

Point

- 1) The only driver provided by G3/4/6-PUEA/B type master module is RS-232C port. Therefore, "CIF TCP/IP Driver", "CIF Device Driver" can not be used.

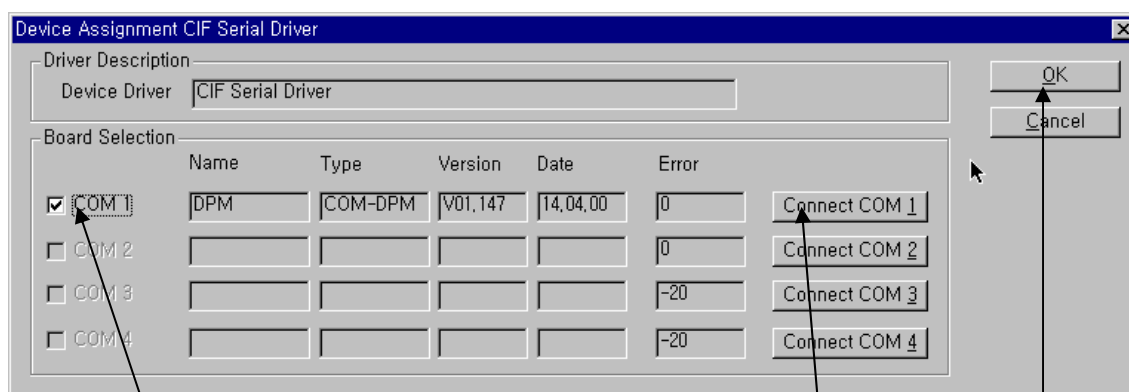


Figure 6.13 Device Assignment CIF Serial Driver

② If the relevant module information is displayed, check "COM1" check box.

① Press "Connect COM1" button to verify if the relevant module information is displayed.

③ If all is finished normally without error, press "OK" button.

Connect the serial port of PC and the Configuration port of Pnet master module and apply the power of master module. According to the serial port of the connected PC, press "Connect COM1" or other button to check if the relevant module is selected without error. In Figure 6.13, "version" and "Date" may have different value. If no error, check the check box on the left side and click "OK" button.

Point

- 1) In case of pressing "Connect COM1" button, if the module information is not displayed normally and the error occurs, check the connection of cable for configuration and the cable condition at first.
- 2) If the cable is normal, it means that the cable is poor. Please contact to the Customer Service center.

Configuration Download

If you select "Online/Download" from the menu, the warning window "if the download is done during the bus operation, the communication between master and slave is stopped. " appears as like Figure 6.15. After checking if the communication disconnection causes the problem, click "Yes(Y)" button. Downloading will be proceeded as like Figure 6.16. In this case, all LED is OFF and only "READY" LED blinks. After downloading, all LED shows its original function.

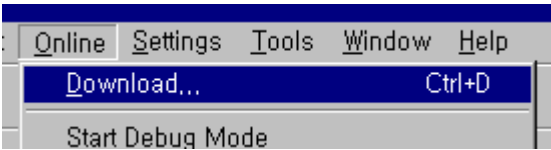


Figure 6.14 Configuration Download

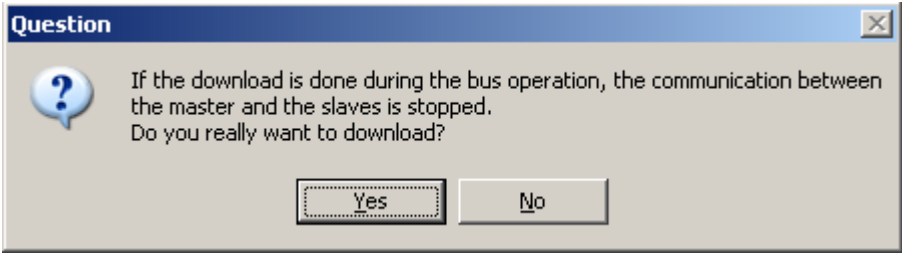


Figure 6.15 Warning Message

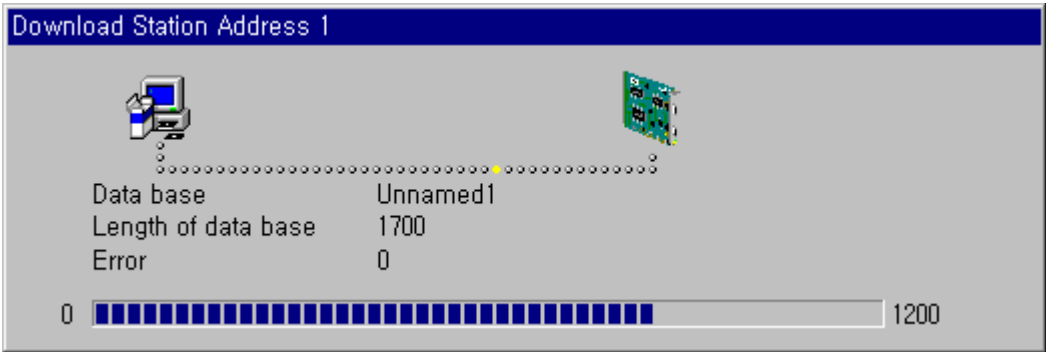


Figure 6.16 Downloading

6.1.4 High speed link parameter settings in GMWIN

High speed link parameter selects the link parameter from the GMWIN project screen and sets the relevant items. The setting procedure and the function per item are as follows :

1) High speed link parameter setting in GMWIN

If you select 'high speed link parameter' from the basic screen of the project in Figure 6.17, you are led to the basic screen of high speed link parameter of Figure 6.18 and able to select the relevant items.

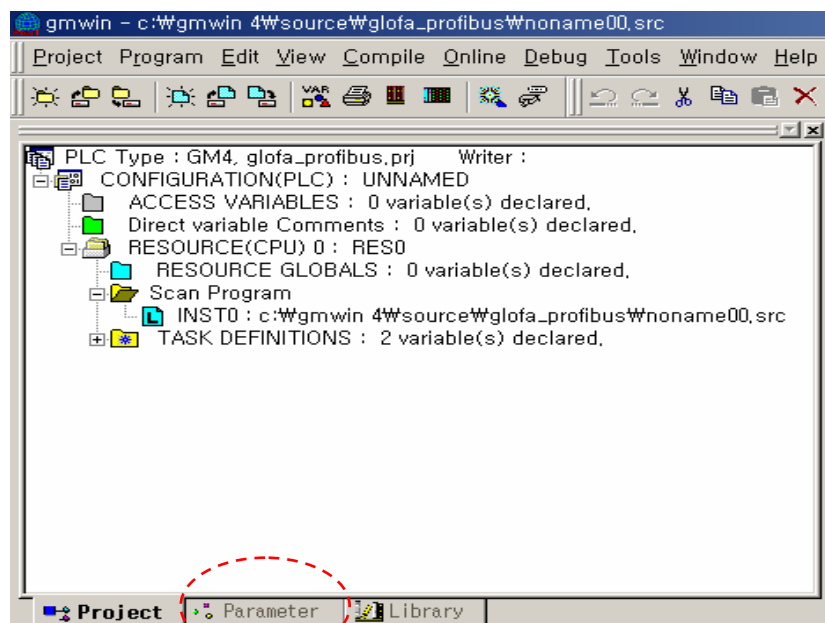


Figure 6.17 GMWIN Project Basic Screen

2) High speed link parameter selection

A) Setting method

Select the relevant parameter from the basic screen of Figure 6.18 and enter into the parameter setting.

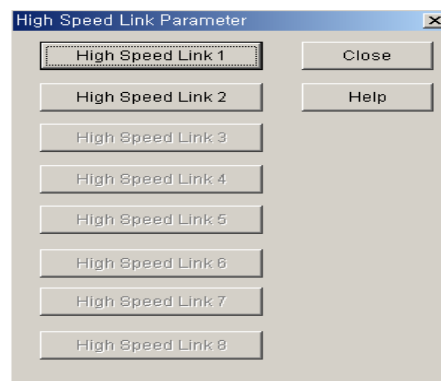


Figure 6.18 Basic Screen of High speed link parameter

B) Setting function

The items of high speed link from Figure 6.18 means max. number of communication module installation according to PLC CPU type. For example, GLOFA-GM1/GM2/GM3 CPU is available to install max. 4 communication modules that enables to set in high speed link 1~4. For GLOFA-GM4 CPU, it is available to install max. 2 communication module that only high speed link 1, 2 button is displayed and the remaining is not possible to set. In this case, high speed link no. is not related to the installed slot no. and the slot no. should be set in the individual parameter setting screen and it is available to set only one high speed link parameter for one communication module.

Table 6.2 shows the communication model available to install per GLOFA CPU type and max. number of installation.

Classification	Available communication module	Max. number of installation	Remarks
GLOFA-GM1	G3L-PUEA, G3L-PUEB	4EA	Available to install by combining with other communication module.
GLOFA-GM2			
GLOFA-GM3			
GLOFA-GM4	G4L-PUEA, G4L-PUEB	2EA/4EA	
GLOFA-GM6	G6L-PUEA, G6L-PUEB	2EA	
GLOFA-GM7	G7L-PBEA	1EA	

Table 6.2 Communication module installation relation per CPU model

3) Link parameter setting

If you select the relevant parameter in the 'parameter setting' basic screen of Figure 6.18, the initial screen of high speed link parameter setting will appear as like Figure 6.19.

Figure 6.19 Parameter setting initial screen

The initial screen for parameter setting is composed of 2 items : link setting and registration list, and the setting method per item and its function is as follows:

A) High speed link setting

High speed link setting is the item to set the basic elements of communication module desired to set in the parameter setting. You can select 'modify' button of link setting in Figure 6.19 and set the module type, slot no. self station no. in 'high speed link setting' screen of Figure 6.20.

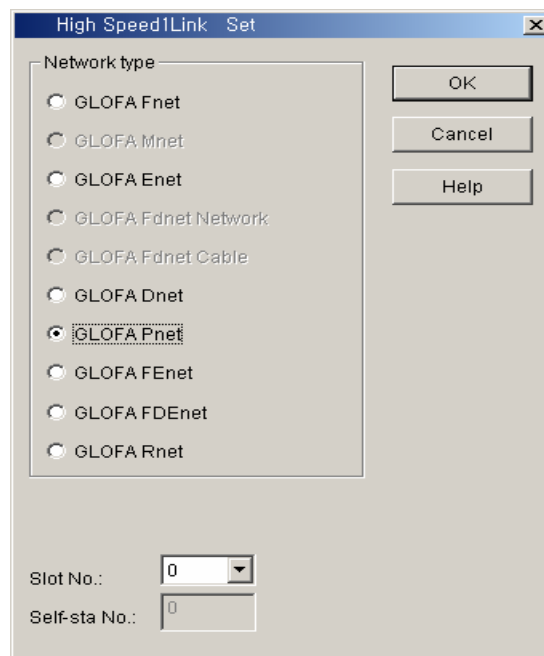


Figure 6.20 High speed link setting screen

Network type : to set the type of the installed communication module and GLOFA Pnet should be set.

Slot no. : to set the position that the communication module desired to set is installed. (0 ~ 7 slot).

Self station no. : Master module shall be set in Sycon and slave module shall be set by rotary switch. Not available to modify here.

B) Registration list setting

Registration list is the area to register the sending/receiving information of the actual data. After completing the link setting, you should set the registration no.'0' in the registration list area and the major setting items are shown on the upper side of registration list menu. If you select (click twice) the relevant list in Figure 6.19, you can set the relevant items in 'high speed link item modify' screen of Figure 6.21. Figure 6.22 shows the screen after setting the sending/receiving parameter. To modify the parameter, click twice the relevant registration no. (Refer to Figure 6.21)

Figure 6.21 High speed link item modify screen

No.	Receive Area	Size	Transmit	Size
0	%MW100	64	%MW200	32

Figure 6.22 Sending/Receiving parameter setting completion screen (Example)

The functions of each registration item in Figure 6.21 are as follows :

- Area : to set the area to read the data to send when sending and to set the area to save the received data when receiving.
- Size : the size of data to send/receive. The unit for sending/receiving is 1byte.

It is available to set 1Kbyte for G3/4/6L-PUEA and 7Kbytes for G3/4/6L-PUEB. G7L-PBEA slave module is available to set 64bytes for sending and 64bytes for receiving, respectively.

Point

- 1) The size of sending/receiving area is total I/O contact number that is created in SyCon.
- 2) G4L-PUEA 1EA and GPL-TR2A(16points), GPL-TR4A(32points), GPL-D22A(16points) are created in order and if setting the sending area with %MW0 and the receiving area with %MW100,
 - * Sending area: %MW0
 - * Receiving area: %MW100
 - * Sending area size: 6 bytes (total output contact number)
 - * Receiving area size: 2 bytes (total input contact number)
 - * %MW0 data -> output by GPL-TR2A
 - * %MW1 ~ %MW2 data -> output by GPL-TR4A
 - * GPL-D22A input -> saved in %MW100
- 3) The created order in SyCon is prior to station no. or cable connection when sending/receiving the data.

6.1.5 High speed link operation in GMWIN

After completing the high speed link parameter setting, download the parameter to PLC CPU and run the high speed link service in order to start the high speed link service. In case that the high speed link parameter is changed, execute 'make' from the GMWIN compile menu and download the parameter before starting the high speed link.

1)Parameter Download

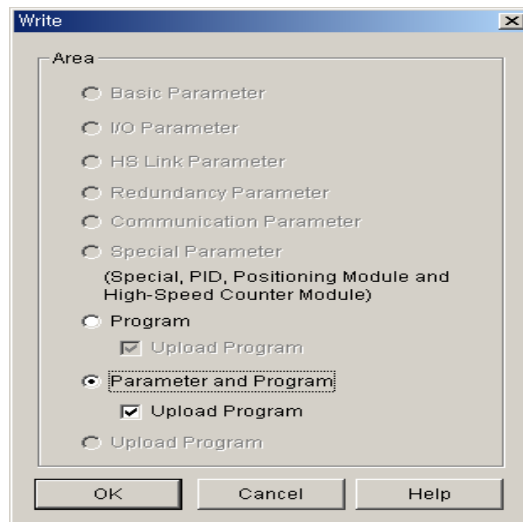


Figure 6.23 Parameter download screen

The high speed link parameter prepared by the user should be saved in GMWIN project file and if you select 'write' after connecting PLC through 'online connect' of GMWIN menu, the window 'write' appears as like Figure 6.23. If you select 'high speed link parameter' or 'parameter and program' in the Figure and download the parameter, only parameter or with program will be downloaded. In this case, the high speed link start information 'LINK Enable' shall be OFF. Therefore, after downloading the program, the relevant parameter item should be ON in 'LINK Enable' setting.

2)High speed link start

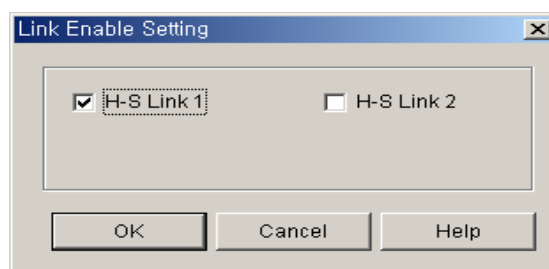


Figure 6.24 Link Enable setting

After downloading the parameter, if you set 'LINK Enable' of GMWIN online menu, the 'LINK Enable' command is delivered to PLC and becomes the high speed link operation state.

'LINK Enable' setting is available when PLC is in STOP mode. If the high speed link starts after setting 'LINK Enable', it carries out the high speed link regardless of PLC action mode and the 'parameter' and 'Link Enable' information shall be battery backup in PLC CPU and the data shall be preserved even in case of power off.

Table 6.3 describes the action relation of PLC mode and high speed link.

Classification	Parameter download	Link enable setting	High speed link action	Remarks
PLC Run	X	X	O	Run when high speed link is enabled.
PLC Stop	O	O	O	
PLC Pause	X	X	O	
PLC Debug	X	X	O	

Table 6.3 The relation of PLC mode and high speed link

6.1.6 High speed link information in GMWIN

1) High speed link information function

As high speed link service carries out the data exchange between more than 2 communication stations, it provides the user how to verify the high speed link service status to verify the reliability of the data got from opposite station, as high speed link information. That is, the communication module provides the user the high speed link information every regular time whether the high speed link is run by the user setting parameter, by collecting the data received till that time and the high speed link information includes the whole information of RUN-LINK (_PHSxRLINK) and LINK-TROUBLE (_PHSxLTRBL) that enables to know the whole information of communication network, and the individual information of _PHSxSTATE that enables to know the communication state per slave station. The user can use the above information in the keyword format when preparing the program, and monitor the high speed link status by using the high speed link information monitor function. When operating several PLC by using the high speed line, it is required to verify the reliability of the sending/receiving data by using the high speed link information such as RUN-LINK or LINK-TROUBLE etc. before using.

A) RUN-LINK (_PHSxRLINK)

This is the whole information that describes whether the high speed link is running normally by the user setting parameter, and a contact point that once it is 'ON', 'ON' is maintained till the 'LINK Enable'. If the following conditions are given, 'ON' shall be maintained :

- ① when 'LINK Enable' is ON'
- ② when the parameter registration list setting is all set normally
- ③ when all data related to the registration list is sending/receiving well according to the setting period
- ④ when all opposite stations set in the parameter are RUN and having no error at the same time.

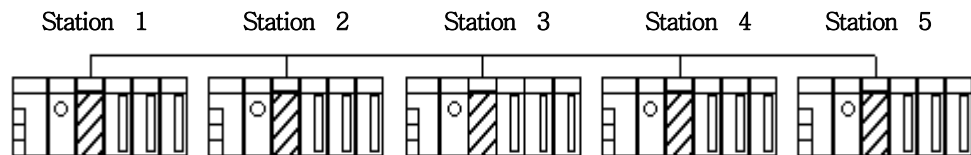


Figure 6.25 High speed link system configuration

Station 1	Station 2	Station 3	Station 4	Station 5
Sending:2words Receiving:2words (station 2) Receiving:2words (station 3)	Sending:2words Receiving:2words (station 1) Receiving:2words (station 4)	Sending:2words Receiving:2word (station 1) Receiving:2words (station 5)	Sending: 2words	Sending: 2words

Table 6.4 High speed link parameter setting at each station (example)

Figure 6.25 and Table 6.4 shows the example of the high speed link system configuration to describe the condition that RUN-LINK is 'ON'. In case that 5 communication modules are linked to the network as like Figure 6.25 and are high speed linked by the parameter as shown on Table 6.4, the condition to be RUN-LINK 'ON' in Station 1 is as follows :

- ① when Link-Enable is ON in the self station (station 1),
- ② when self station (station 1) is RUN mode,
- ③ when self station (station 1) is not in error,
- ④ when the sending parameter data set in the self station (station 1) is sending normally,
- ⑤ when the data receiving from Station 2&3 is receiving normally,
- ⑥ when the action mode of the opposite station (Station 2, Station 3) sending the data to the self station (Station 1) is RUN and having no error and communicating normally,
- ⑦ when the action mode of another opposite station (station 4 & 5) set in the parameter of the opposite station (station 2&3) of the self station (station 1) is RUN and not in error and communicating normally.

If 7 items on the above are all satisfied, RUN-LINK of station 1 shall be 'ON'. If using the RUN-LINK contact with the program in the system that PLC of several stations is interlocking through high speed link, it is available to carry out the sending/receiving data monitoring and reliable communication. But as once RUN-LINK contact is 'ON', it is maintained 'ON' till LINK-Enable is 'OFF', it is required to use the Link-Trouble information contact of the following items when monitoring the abnormal state such as communication error etc.

B) LINK-TROUBLE (`_PHSxLTRBL` x=high speed link no.(1~2))

This is the whole information describing whether the high speed link is running normally by the user setting parameter. If the case to violate the condition that RUN-LINK is ON may occur in the state RUN-LINK is ON, this will be ON and when recovered, it will be OFF.

C) High speed link state (`_PHSxSTATE[0..127]` x=slave station no.(0~127))

This is the individual information describing the action mode of slave station and displays the high speed link state of max. 127 stations same as max. number of slave station. That is, in case that the sending/receiving of the relevant list is normal and the action mode is RUN and having no error, this will be ON and in case of violating the above items, it will be OFF.

2) High speed link information monitoring

It is available to monitor High speed link information by using the monitoring function after GMWIN online connection and there are 2 ways of monitoring : one is to select the variable monitor from the monitor menu and another one is by link parameter monitor.

A) Variable monitor

Variable monitor is the function to select the necessary items for monitoring by using GMWIN flag monitor function. If you select the variable monitor from online monitor items and Figure 6.26 variable registration screen appears, select the flag and select high speed link information flag one by one from 'variable, flag list' screen to register. In this case, as `_PHSxSTATE[n]` is Array type flag, the user should select the array no. directly and the array no. means station no. of slave. 'x' means high speed link no. and it has 1~4 range in GM1/2/3 PLC CPU and 1~2 range in GM4 PLC CPU, and 1 range effective in GM6 PLC CPU. If you register the variable in Figure 6.26 and select 'close', Figure 6.27 monitor screen will appear. If you press 'Start' from the tool bar on the right side separately, monitoring starts.

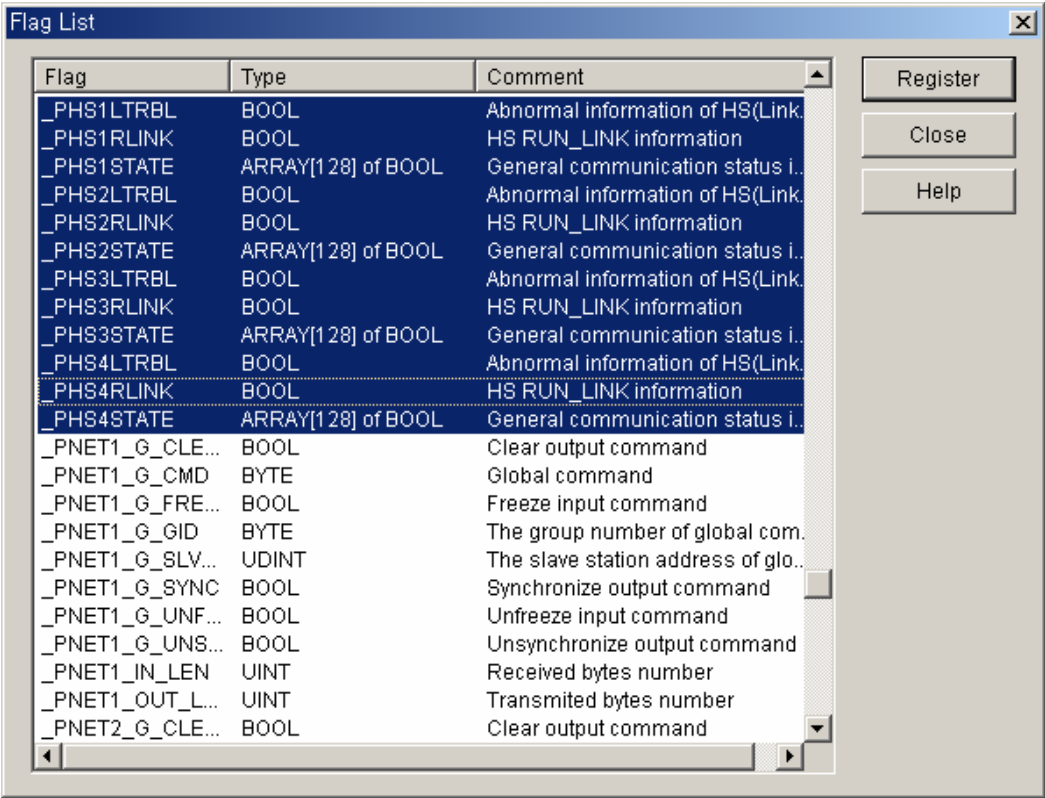


Figure 6.26 High speed link information variable registration screen

Variable	Resource	Instance	Variable name	Variable value
Configuration glob	Flag		_PHS1LTRBL	0
Resource global v	Flag		_PHS1RLINK	0
Instance variable	Flag		_PHS1STATE[0]	0
Direct variable	Flag		_PHS2LTRBL	0
Flag	Flag		_PHS2RLINK	0
	Flag		_PHS2STATE[0]	0
	Flag		_PHS3LTRBL	0
	Flag		_PHS3RLINK	0
	Flag		_PHS3STATE[0]	0
	Flag		_PHS4LTRBL	0
	Flag		_PHS4RLINK	0
	Flag		_PHS4STATE[0]	0

Figure 6.27 High speed link information monitor screen (variable registration)

B) Link parameter monitor

If you select 'link parameter' item from GMWIN online connection monitor menu, link parameter select screen appears as like Figure 6.28. If the user select the desired items from the user setting parameter numbers and verify it, ' Figure 6.29 High speed link parameter monitor' screen appears and the setting registration list is monitored and displayed on the screen.

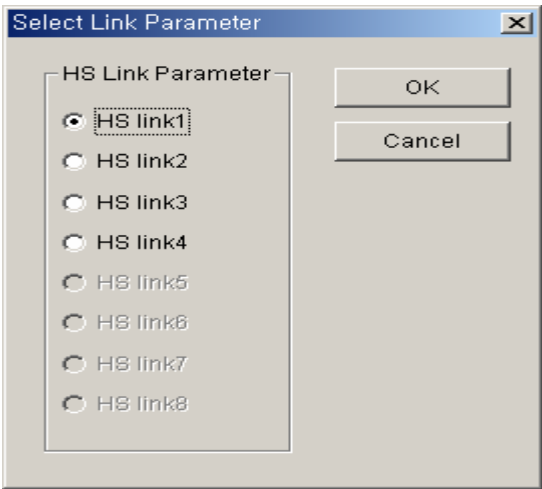


Figure 6.28 Link parameter select screen

The link parameter monitor is displayed as shown on Figure 6.29 that the general information of RUN-LINK and LINK-TROUBLE is displayed on the upper side of the screen and the individual information such as mode (action mode), communication (sending/receiving state), error are displayed as much as setting number together with registration list no.

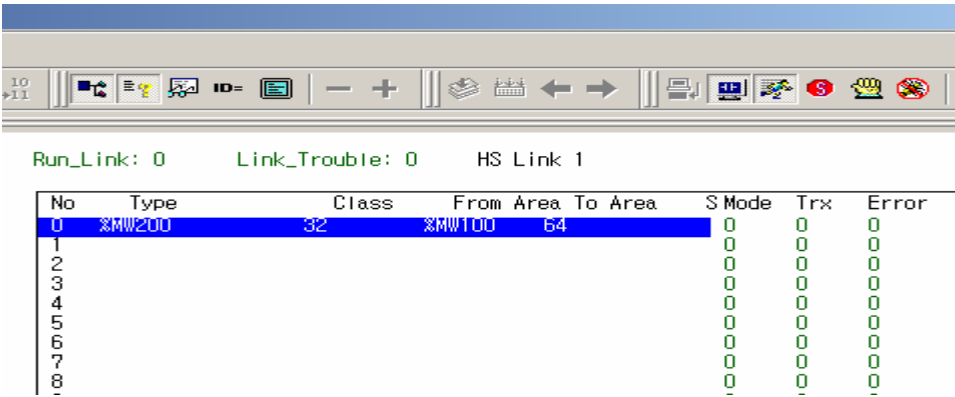


Figure 6.29 High speed link parameter monitor screen

If you select the high speed link information as like Figure 6.29, as the user setting high speed link parameter and information can be monitored together and the individual information setting value is monitored as shown on the Figure, it enables to monitor the high speed link state together with the I/O data.

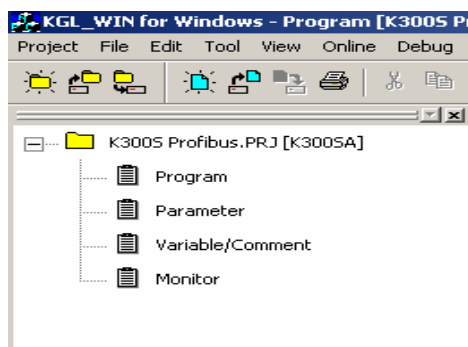
6.1.7 High speed link parameter setting in KGLWIN

Profibus-DP master for MASTER-K also use a SyCon for Configuration setting and the setting method is also same as GLOFA-GM. For MASTER-K, **it is required to set the high speed link parameter after downloading the Configuration to master module** and high speed link parameter selects the parameter from KGLWIN project screen and set the relevant items. The setting procedure and the function of each item are as follows :

1) High speed link parameter setting in KGLWIN

If you select the parameter from the following project basic screen, the high speed link parameter basic screen appears and you can select the relevant items.

KGLWIN Project basic screen

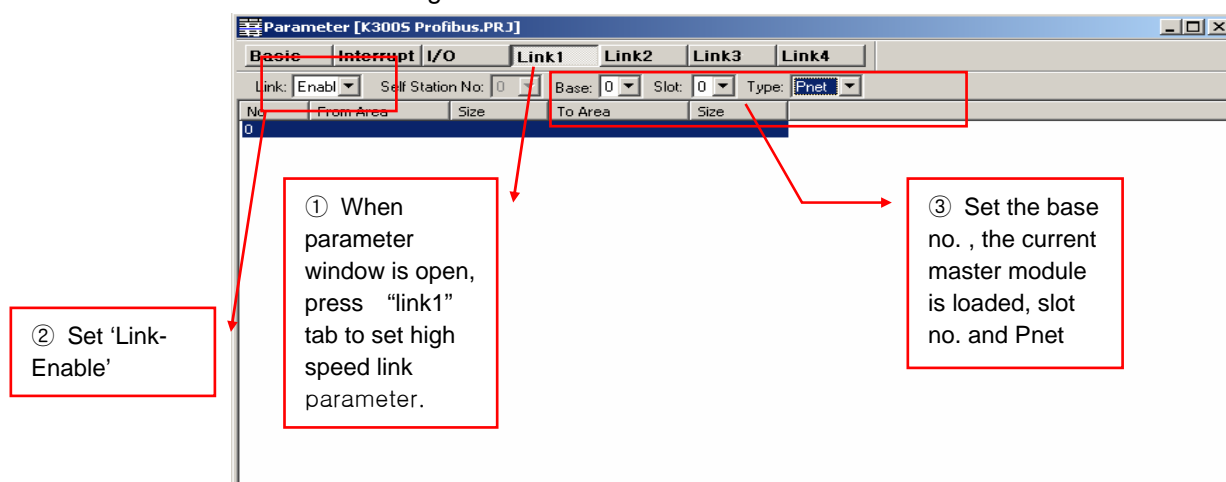


2) High speed link parameter select

A) Setting method

Select the relevant parameter from the basic screen as shown on the figure below and enter into the parameter setting.

Parameter setting basic screen



The items of high speed link from the Figure means max. number of communication module installation according to PLC CPU type. High speed link button of available number of installation is actuated and in this case, high speed link no. is not related to the installed slot no. and the slot no. should be set in the individual parameter setting screen and it is available to set only one high speed link parameter for one communication module.

The following Table shows the communication model available to install per MASTER-K CPU type and max. number of installation.

Max. number of installation per MASTER-K CPU type

Classification	Available communication module	Max. no. of installation	Remarks
K1000S CPU	G3L-PUEA, G3L-PUEB	4EA	
K300S CPU	G4L-PUEA, G4L-PUEB	2EA/4EA (more than Version 3.0)	
K80S, K120S CPU	G7L-PBEA	1EA	

** If you use by combining the communication module using the high speed link, the number of installation is limited.*

- link : the item to allow the high speed link, the initial value is prohibited, and need to set 'Enable' to execute the high speed link.
- self station no. : master module should be set in SyCon and slave module by rotary switch. It is not available to modify here.
- Base : to set the base position where the communication module desired to set is installed.
- Slot : to set the slot position where the communication module desired to set is installed. (0 ~ 7 slot).
- Type : to set the type of the installed communication. Pnet should be set.

3) Parameter setting and modification

If you double click the relevant parameter in the parameter setting basic screen of the Figure, the high speed link parameter setting screen will appear.

parameter setting initial screen

- Area : to set the reading area of the data to send when sending, and the saving area of the received data when receiving.
- Size : the size of data for sending/receiving. The unit is 1byte and it is available to set 1kbyte for total sending/receiving G3/4/6L-PUEA and 7kbytes for G3/4/6L-PUEB.

Point

- 1) The size of sending area and receiving area is total no. of I/O contact that created in SyCon.
- 2) G4L-PUEA 1EA, GPL-TR2A(16points), GPL-TR4A(32points), GPL-D22A(16points) is created in order and when setting the sending area by P000, receiving area by P010,
 - * Sending area : P000
 - * Receiving area : P010
 - * Sending area size : 6 bytes(total output contact number)
 - * Receiving area size : 2 bytes(total input contact number),
 - * P000의 data -> output by GPL-TR2A
 - * P001~P002 data -> output by GPL-TR4A
 - * GPL-D22A input -> saved in P010.
- 3) The created order in SyCon is prior to station no. and cable connection when sending/receiving the data.

6.1.8 High speed link speed calculation

1) Overview

High speed link data transmission speed is determined by a variety of factors because one block data should pass the path as like Figure 6.30 until it can be saved in the receiving area of another station from that of one station.

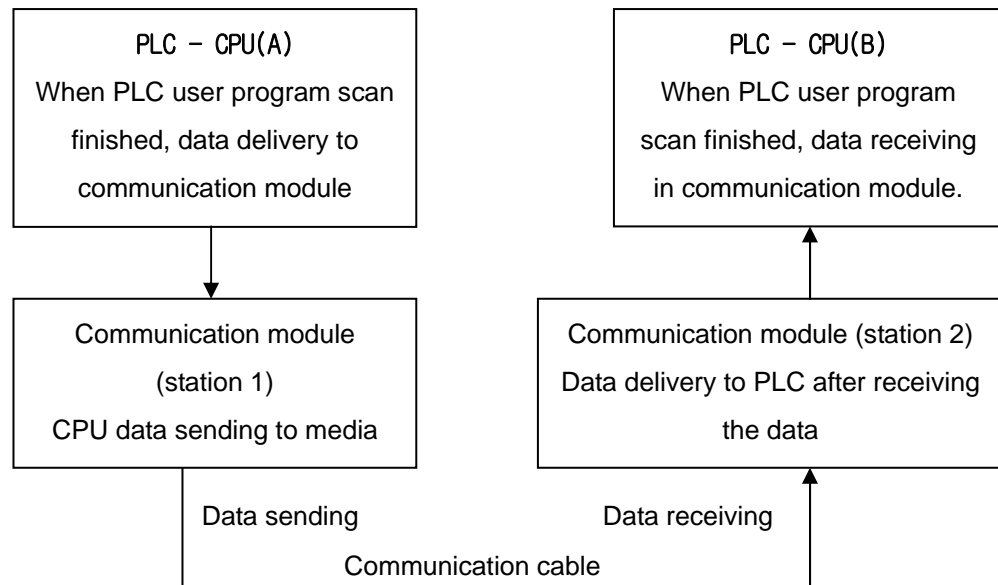


Figure 6.30 Data transmission path through communication module

In order to send the data through communication from one station to another station in Figure 6.30, there are 3 paths to pass and the required time for each path determines the sending time.

Table 6.5 shows the major path of data transmission and the factor that effects to the time for each path.

Items	Path	Factor to effect the Time
1	PLC CPU(A) --> communication module (station 1)	PLC-A program scan time
2	Communication module (station1)-->communication module(station2)	Communication scan time+communication O/S scan time
3	Communication module (station 2) --> PLC CPU(B)	PLC-B program scan time

Table 6.5 Data transmission path and time factor

As the data delivery from(to) PLC CPU to(from) communication module is executed at the point that PLC user program is finished, the PLC user program scan time can be a major factor of data transmission and if you select 'PLC information' from GMWIN online menu, you can find max/min/current program scan time. And for communication module to send the data, it is required to wait the Poll of master module.

Figure 6.31 shows PLC program scan time and the sending point according to communication scan time.

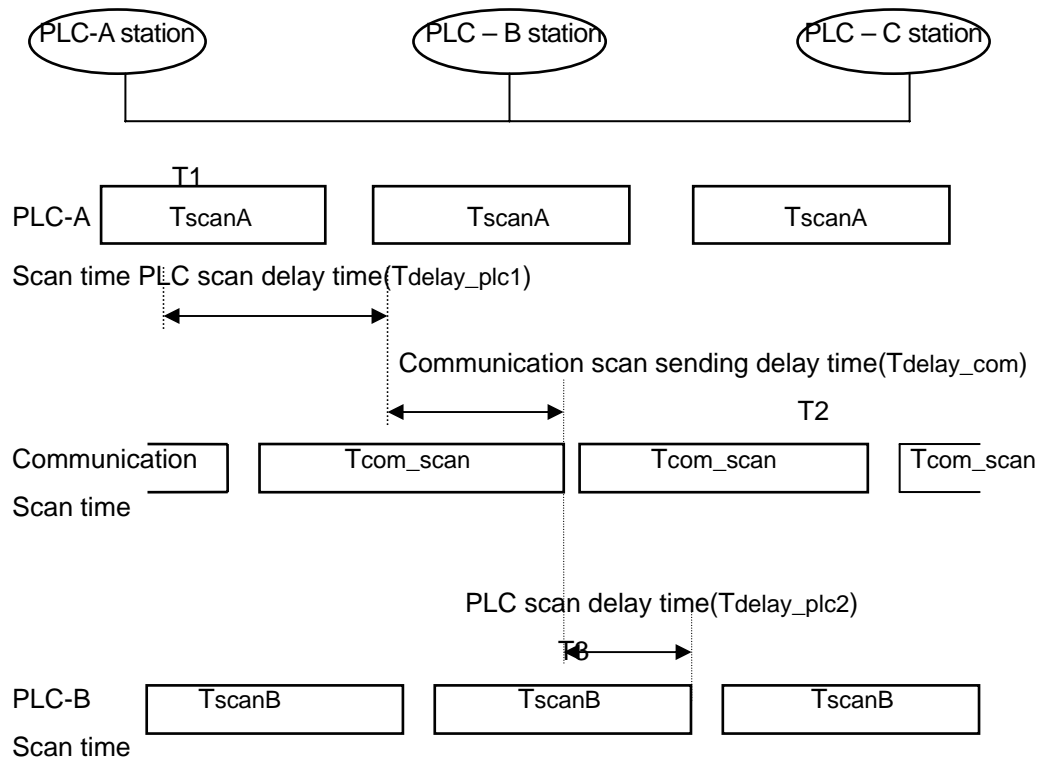


Figure 6.31 Relation of PLC scan time and communication scan time

In Figure 6.31, PLC-A station delivers the sending data by communication module in T1 that is the point that PLC-A station program is finished, therefore, the time delay as much as Tdelay_plc1 may occur. After receiving the data from PLC, communication module can send the data after waiting the communication scan delay time(Tdelay_com) and max.delay time is as much as Tcom_Scan1.

Even for PLC-B, as communication module can send the received data to PLC after waiting for Tdelay_plc2time, max. delay time as much as Tscan2 may occur. As shown Figure 6.30 and Figure 6.31, communication delay time is determined by a variety of variables such as total number of communication station, program size and O/S scan time of communication module. As it is not easy to calculate the value of such variables, here the simple and easy calculation method is provided for the user.

2) High speed link speed calculation method

High speed link speed is defined as max. time required to send one block data from PLC-A to PLC-B as an example of Figure 6.31 and the high speed link speed calculation is divided into 2 ways for: complicated system that total number of sending data to more than 10 communication stations exceeds total 512 bytes and the simple system less than 512 bytes, and the calculation method is as follows :

(A) Simple system

For the system that total communication station is under 10 stations and total size of sending data is less than 512 bytes, it is recommended to calculate high speed link speed by the simple formula as like Formula 1:

Formula 1 $St = P_ScanA + C_Scan + P_ScanB$

(St = high speed link max. transmission time

P_ScanA = plc A max. program scan time

P_ScanB = plc B max. program scan time

C_Scan = max. communication scan time)

In Formula 1, C_Scan can be calculated easily by the following formula.

Formula 2 $C_Scan = Th \times Sn$

(Th = data sending time from media per station)

Sn = Total Station Number : Total communication station number)

(B) Complicated system

For the system that total communication station is more than 10 stations and total size of sending data is more than 512 bytes, it is recommended to calculate high speed link speed by the following formula:

Formula 3 $St = Et \times To \times Ntx + Mf$

Where as { Et = Effective Tx Ratio}

To = Octet time (1 byte sending time)

Ntx = Total Tx number

Mf = Margin Factor }

And each item is determined as follows :

① $Et = St \times Nf$

{St = total communication station number

Nf = Network Factor, a constant value according to communication system characteristic and it is 1.5 in Pnet system}

② $To = \{\text{octet time, a time required to transmit 1 byte data in serial}\}$

- Pnet : 0.8 μs

③ $Ntx = \text{total sending data number, calculated including Variable service number and determined according to the system as follows:}$

- Pnet : total high speed link sending byte number + FB + LGIS service data number $\times 1,024$

④ $Mf = \text{Margin value for the factor not described in the above formula such as O/S scan time of communication module etc. which is determined as follows :}$

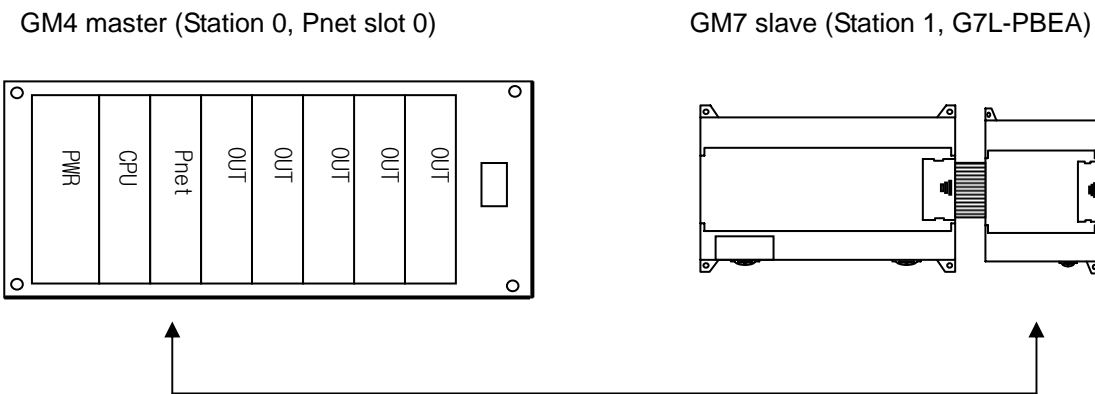
- Pnet : 25 ms

6.2 Example Program

6.2.1 Pnet master slave communication in GMWIN

Example 1

Communication module (Station 0) G4L-PUEA is installed in GM4 base slot 0, communication module G7L-PBEA in GM7. This is the program for sending/receiving the data from station 0(master) to station 1(slave).
(Refer to I/O configuration map.)

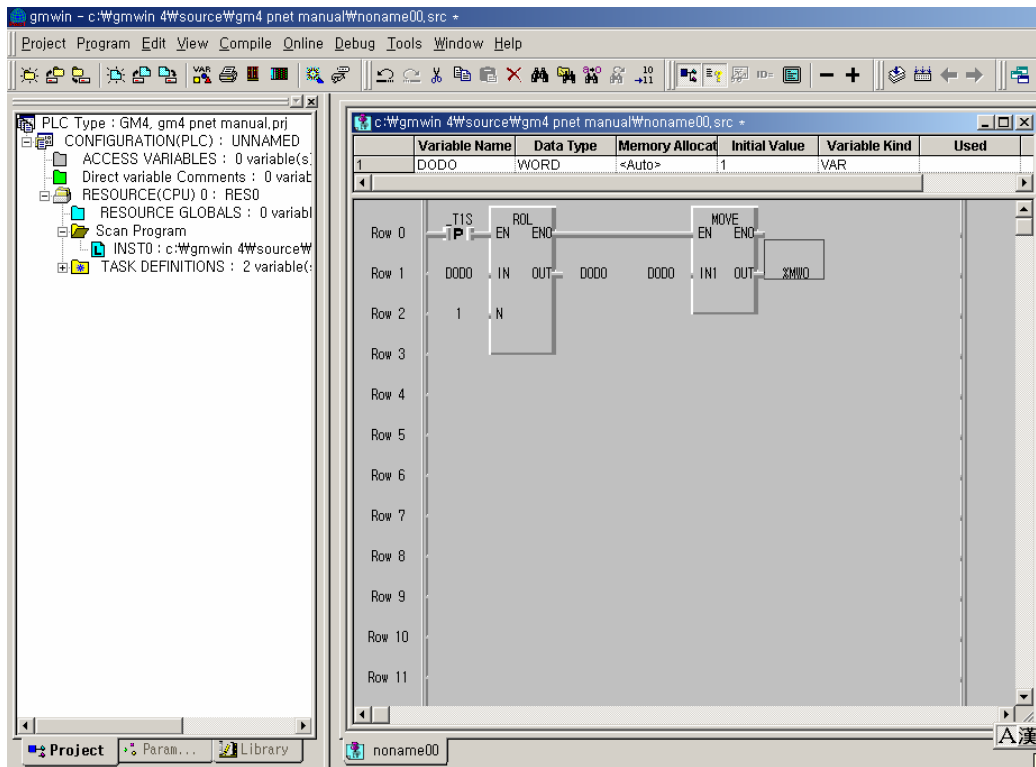


• I/O configuration map

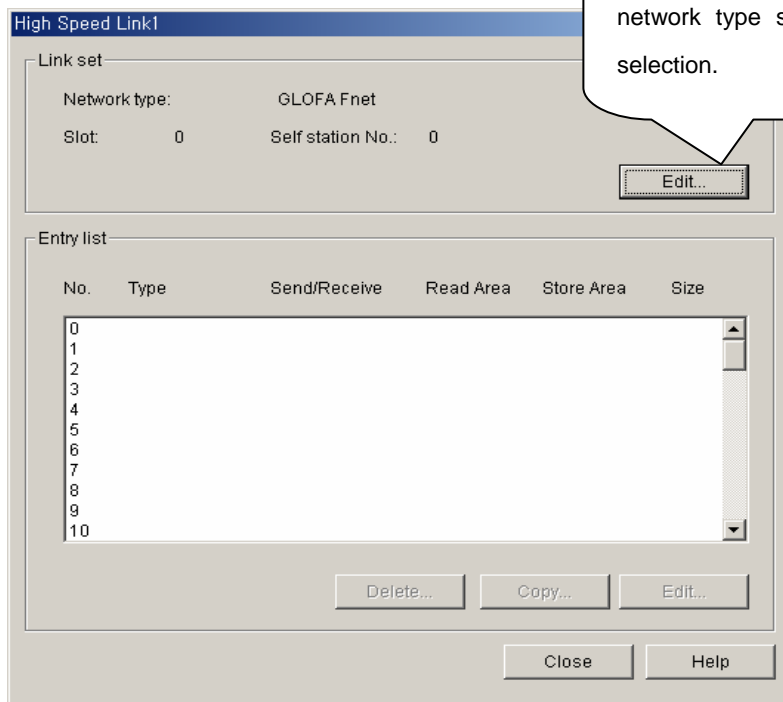
Sending/receiving configuration		Reading area	Saving area	Size(byte)
GM4 (Station 0) (master)	Sending:GM7 Station 1	%MW0	-	64
	Receiving:GM7 Station 1	-	%QW0.1.0	64
GM7 (Station 1) (slave)	Sending:GM4 Station 0	%MW10	-	64
	Receiving:GM4 Station 0	-	%QW0.0.0	64

1) High speed link parameter setting in GM4 (Station 0)

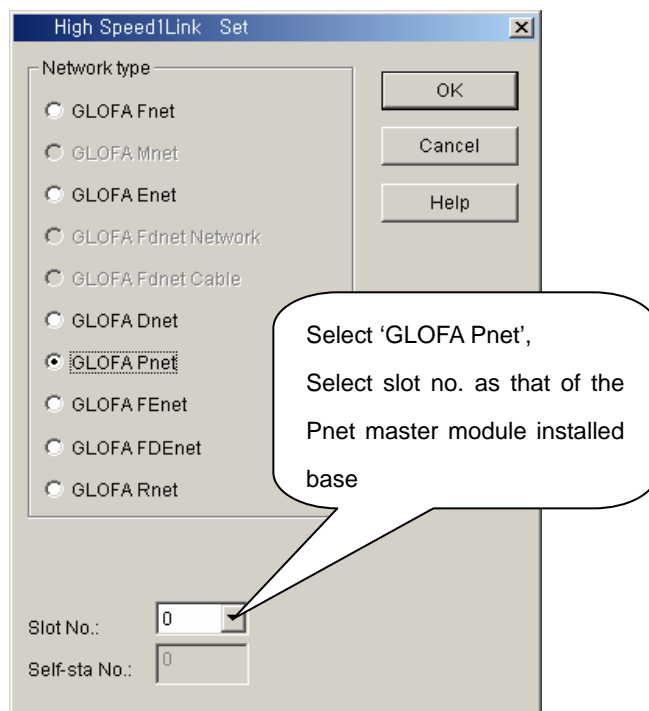
- Master module GMWIN program (GM4)



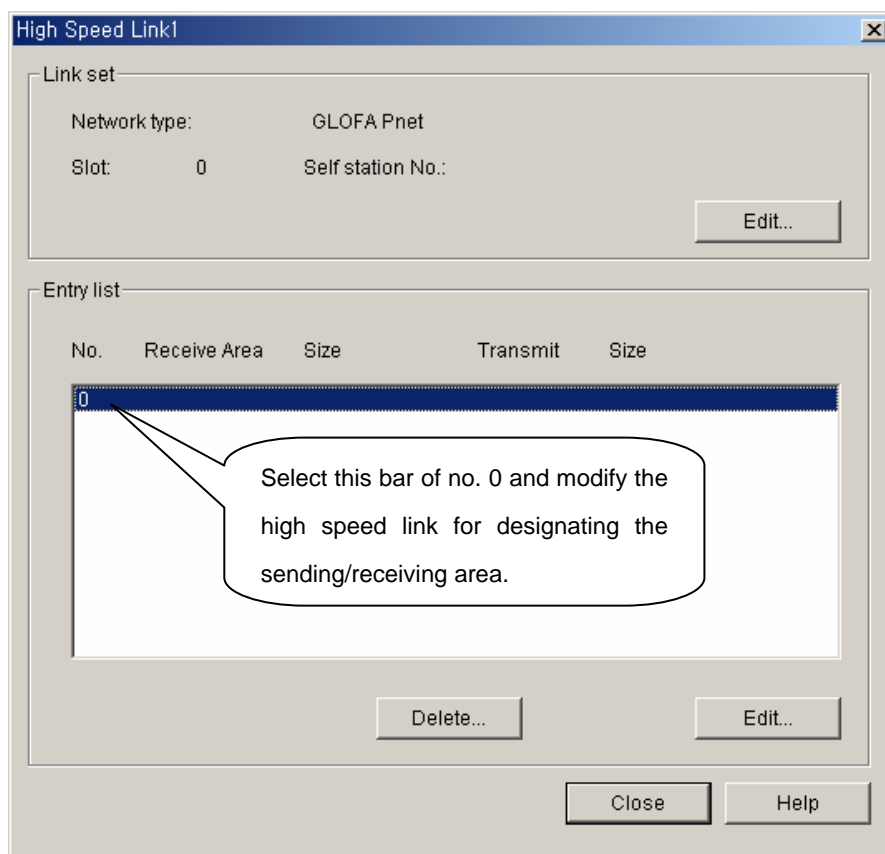
- Master module 'link information' setting



Master module high speed link network type setting. Slot no. selection.



- High speed link network type setting



- GM7 Station 1 sending/receiving parameter set

Receiving area is the area receiving from slave(GM7) area to master(GM4) and, designate the sending area as the area to send from master(GM4) to slave(GM7).

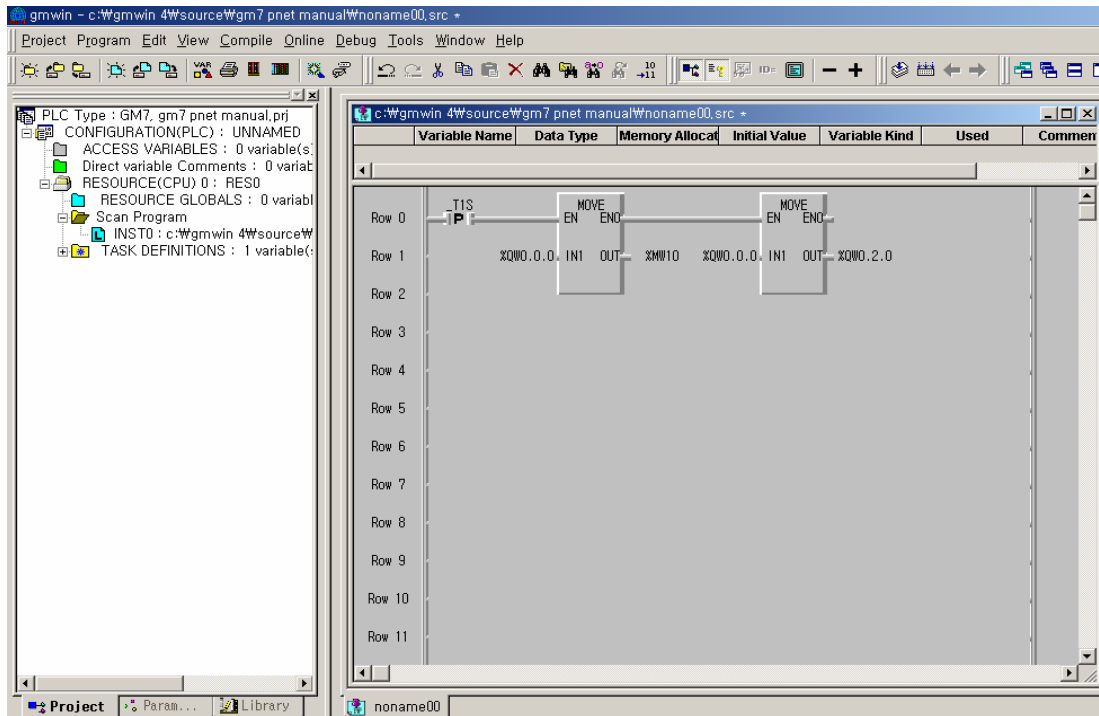
When setting I/O size in SyCon, set the same size as high speed link setting.

- Master module 'high speed link 1' setting completion screen

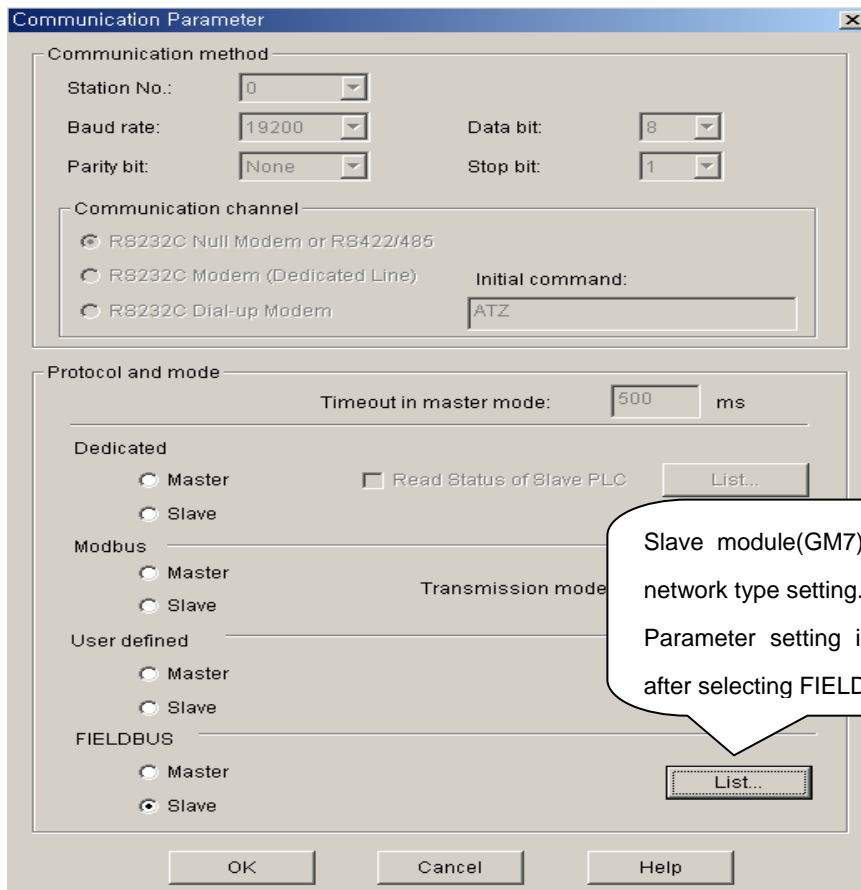
No.	Receive Area	Size	Transmit	Size
0	%QW0.4.0	64	%MW0	64

2) High speed link parameter setting in GM7(Station 1)

- Slave module GMWIN program (GM7)

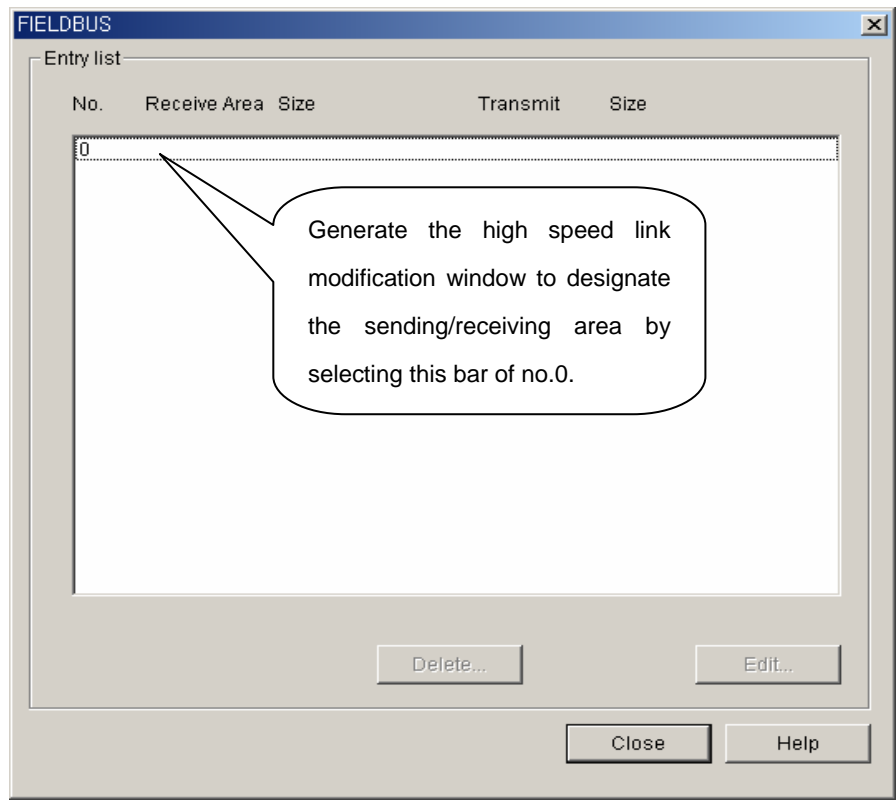


- Slave module 'link information' setting

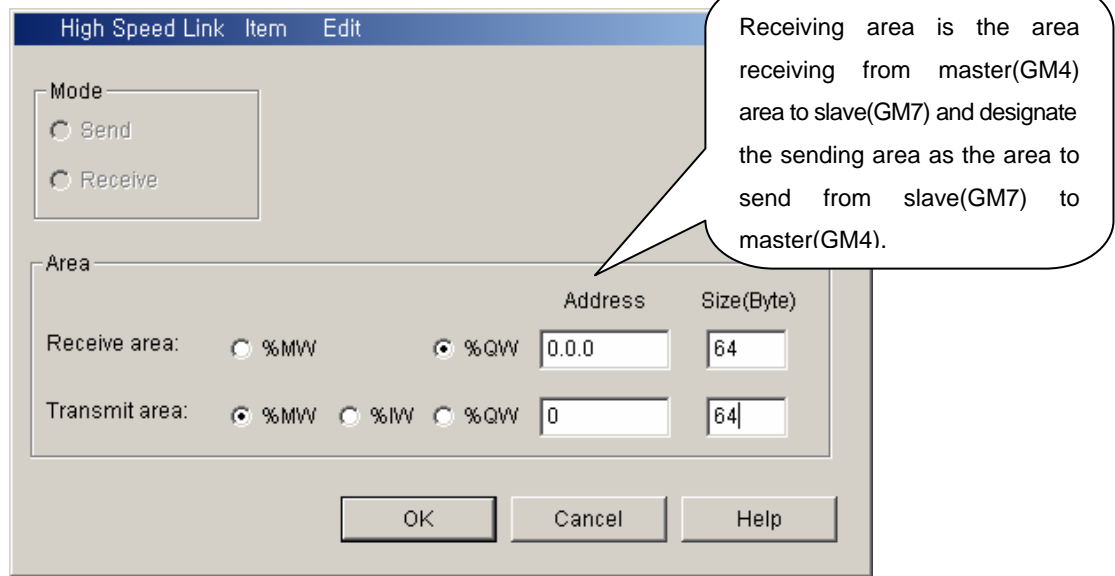


Slave module(GM7) high speed link network type setting.
Parameter setting in registration list after selecting FIELD BUS slave.

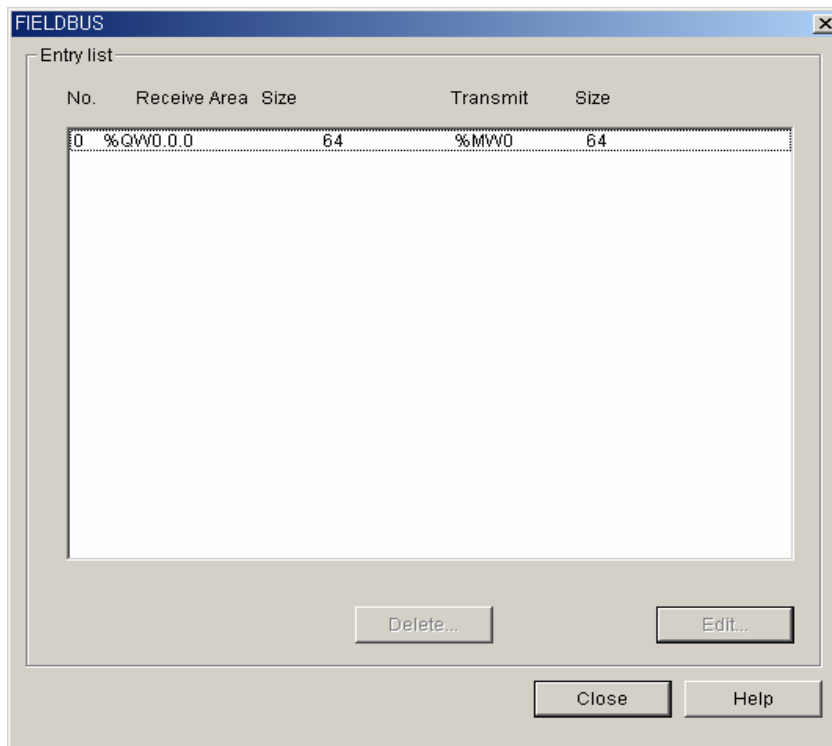
- High speed link parameter setting to GM4 master station



- Sending/receiving parameter setting to GM4 Station 0

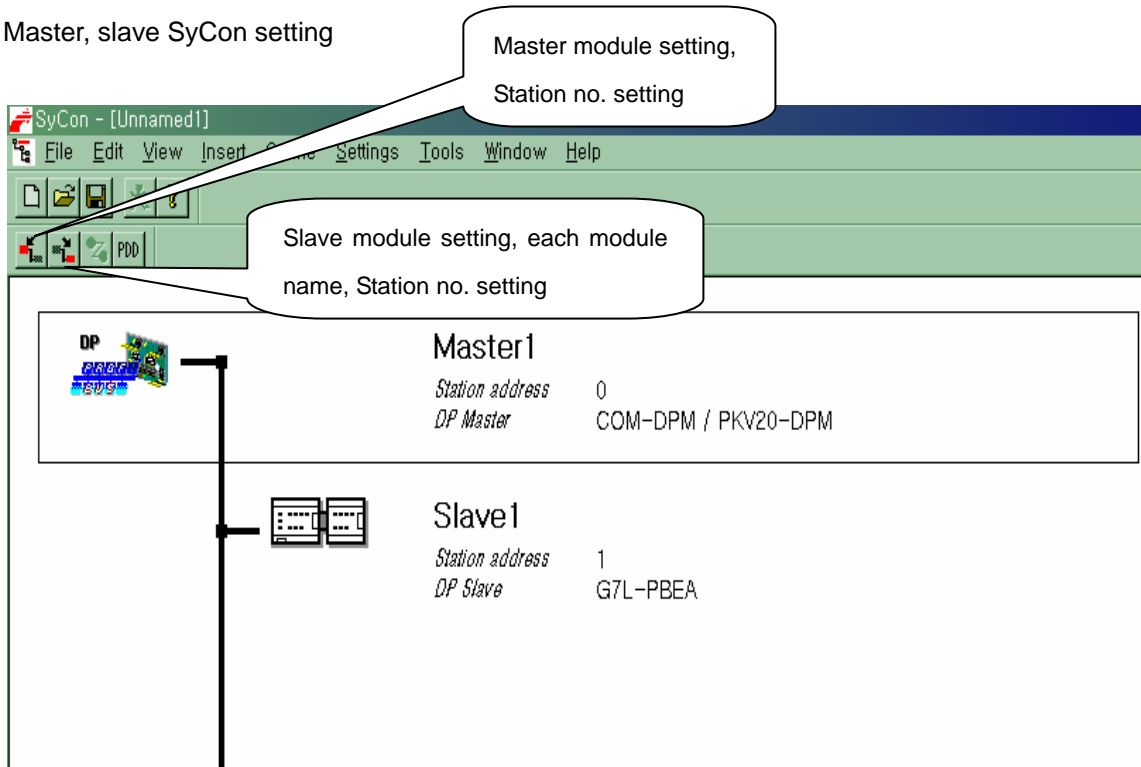


- Slave module 'high speed link' setting completion screen



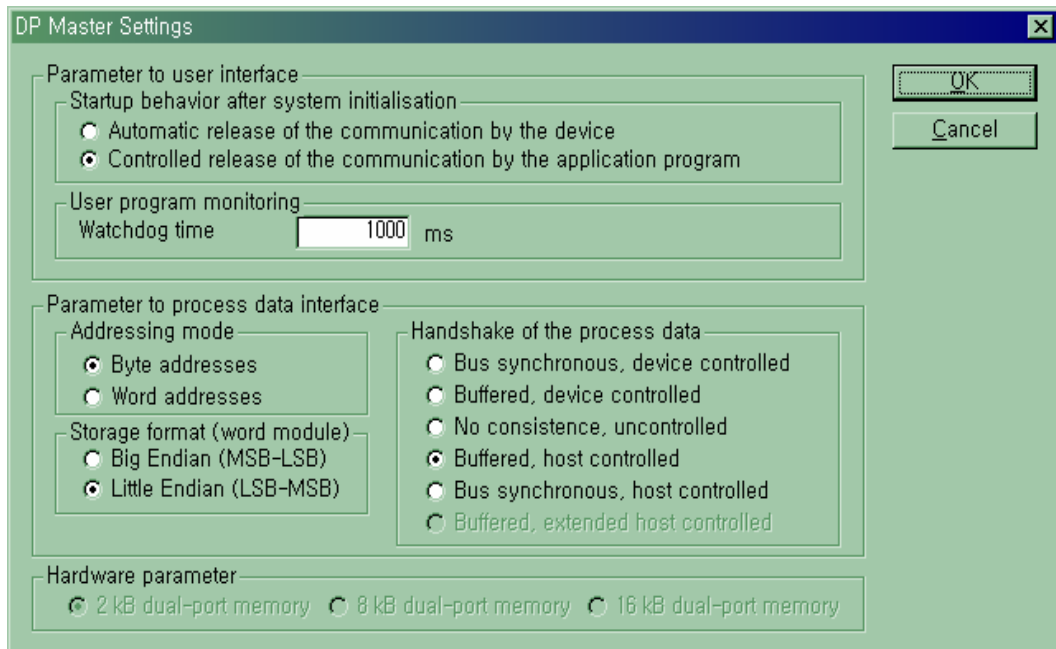
3) SyCon setting for high speed link communication

- Master, slave SyCon setting



- Master Setting

Settings → Master Settings selection (set as basic value in LGIS SyCon.)



DP Master Settings

Parameter to user interface

Startup behavior after system initialisation

- ☐ Automatic release of the communication by the device
- ☒ Controlled release of the communication by the application program

User program monitoring

Watchdog time ms

Parameter to process data interface

Addressing mode

- ☒ Byte addresses
- ☐ Word addresses

Storage format (word module)

- ☐ Big Endian (MSB-LSB)
- ☒ Little Endian (LSB-MSB)

Handshake of the process data

- ☐ Bus synchronous, device controlled
- ☐ Buffered, device controlled
- ☐ No consistence, uncontrolled
- ☒ Buffered, host controlled
- ☐ Bus synchronous, host controlled
- ☐ Buffered, extended host controlled

Hardware parameter

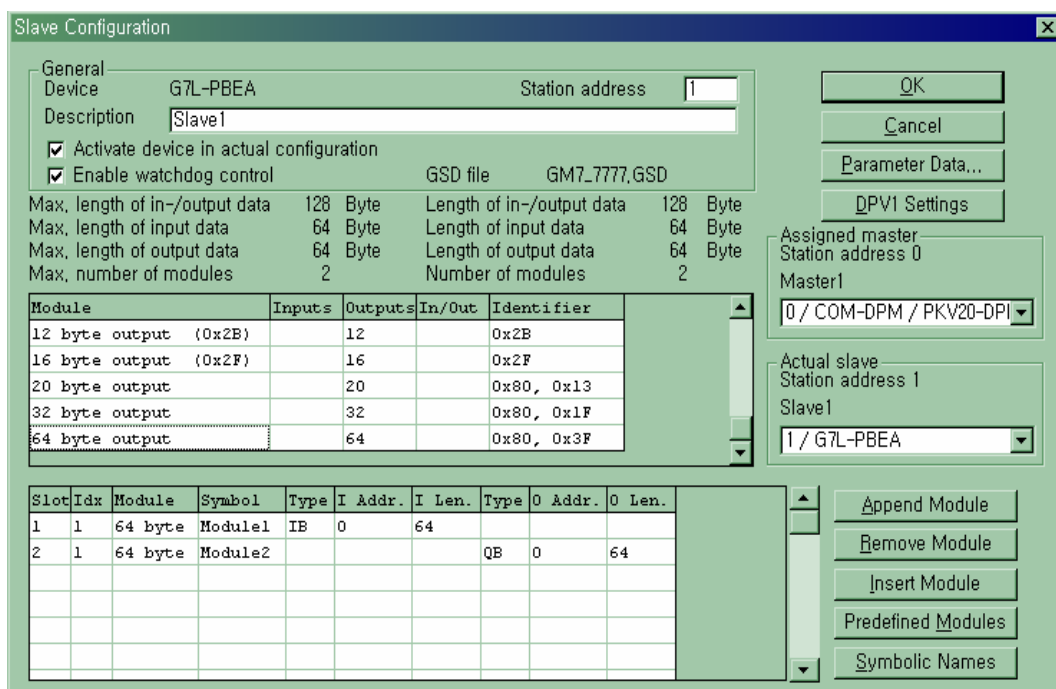
- ☒ 2 kB dual-port memory
- ☐ 8 kB dual-port memory
- ☐ 16 kB dual-port memory

OK Cancel

- Slave Configuration

Settings → Slave Configuration selection (Input 64 byte, Output 64 byte)

I/O size should be the same as high speed link setting size in GMWIN.



Slave Configuration

General

Device Station address

Description

☒ Activate device in actual configuration

☒ Enable watchdog control

GSD file

Max, length of in-/output data 128 Byte Length of in-/output data 128 Byte

Max, length of input data 64 Byte Length of input data 64 Byte

Max, length of output data 64 Byte Length of output data 64 Byte

Max, number of modules 2 Number of modules 2

Module	Inputs	Outputs	In/Out	Identifier
12 byte output (0x2B)		12		0x2B
16 byte output (0x2F)		16		0x2F
20 byte output		20		0x80, 0x13
32 byte output		32		0x80, 0x1F
64 byte output		64		0x80, 0x3F

Assigned master

Station address 0

Master1

Actual slave

Station address 1

Slave1

Slot	Idx	Module	Symbol	Type	I Addr.	I Len.	Type	Q Addr.	Q Len.
1	1	64 byte	Module1	IB	0	64			
2	1	64 byte	Module2				QB	0	64

Append Module

Remove Module

Insert Module

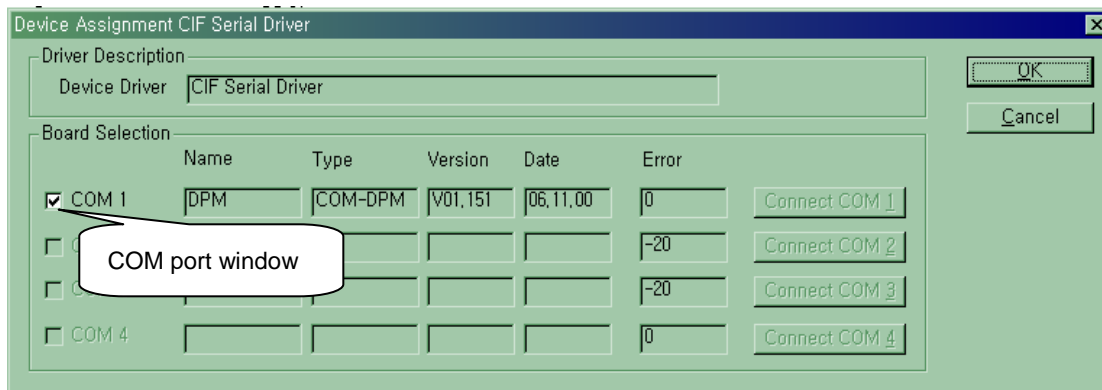
Predefined Modules

Symbolic Names

OK Cancel Parameter Data... DPV1 Settings

- Device Assignment

Settings → Device Assignment → COM port selection → OK

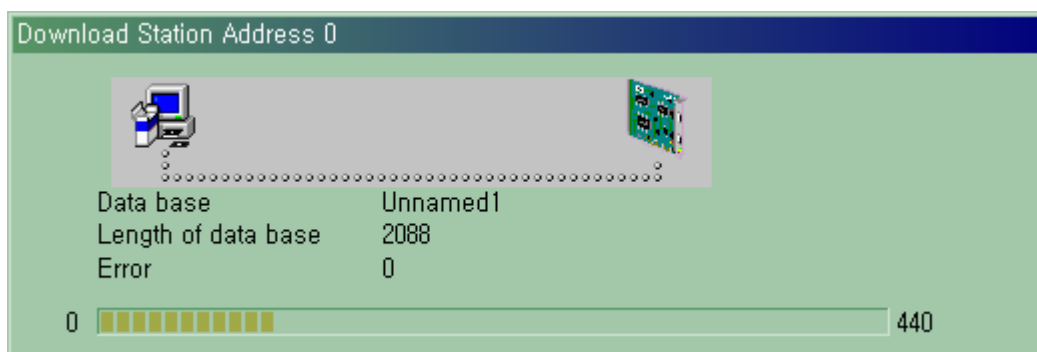


- COM port selection : After selecting Connect COM1 or Connect COM2, if the window appears on the left COM1,COM2, select the window and then select OK.

- Download

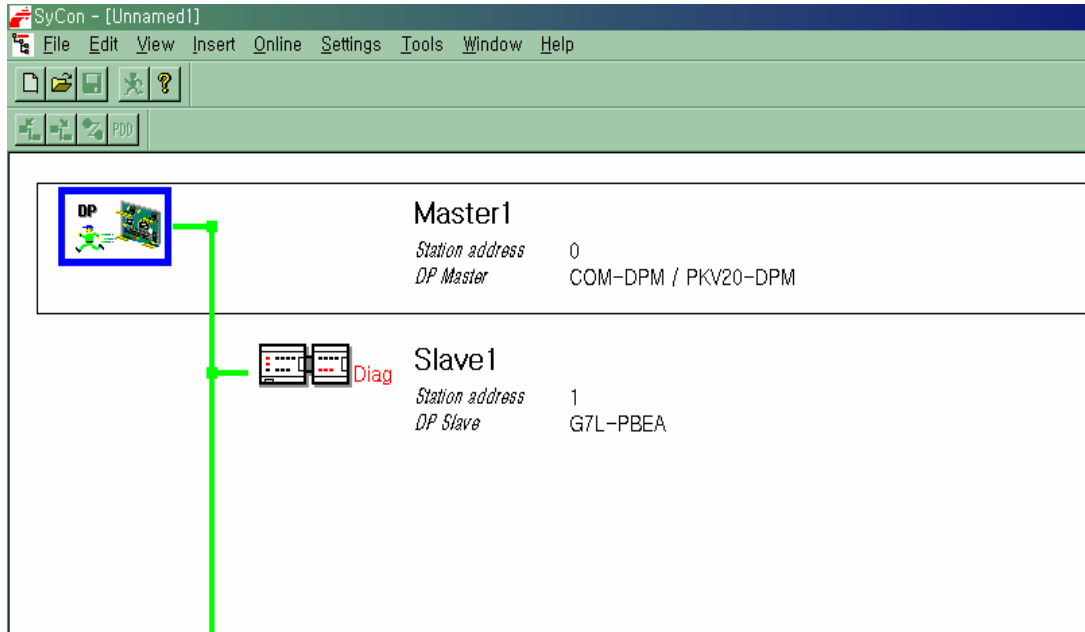
Online → Download

In case of Error, check the Configuration cable and connector.



- Communication opening verification

Online → Start Communication → Start Debug Mode



Point

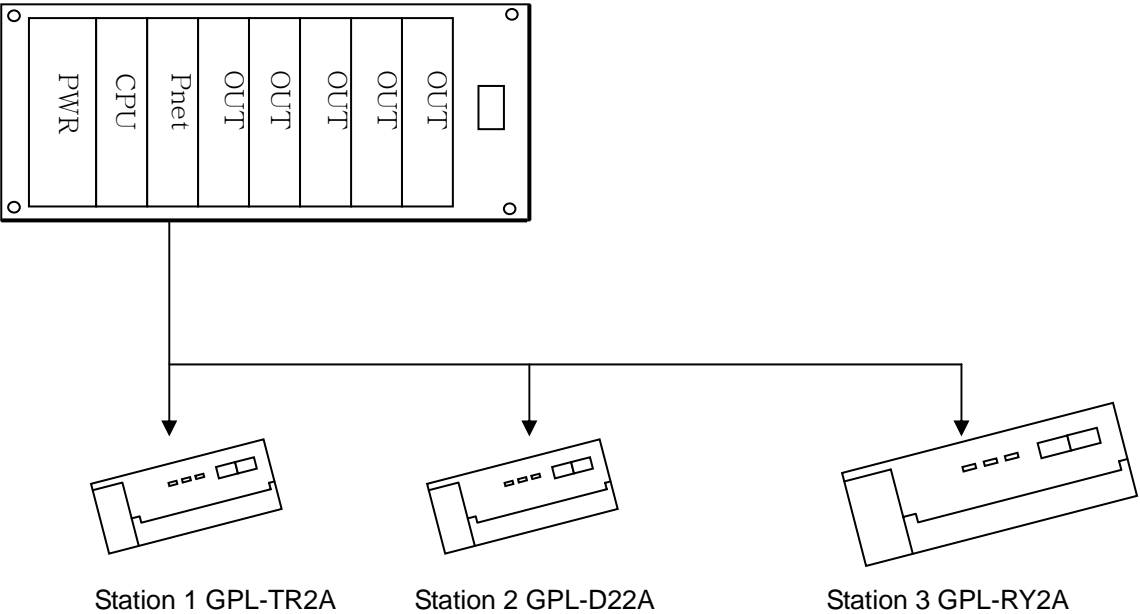
- 1) The size of Sending area and receiving area is total I/O contact number created in GMWIN.
When setting GM7 slave in SyCon, the I/O contact number in slave setting should be the same as high speed link setting size of GMWIN program.
- 2) G4L-PUEA 1EA and GM7-PBEA 1EA are created in order and when setting the sending area of master as %MW0, receiving area as %MW100,
 - * Sending area : %MW0
 - * Receiving area : % QW0.4.0
 - * Sending area size : 64 bytes
 - * Receiving area size : 64 bytes,
 - * %MW0 data -> output to GM7 Slave module
 - * GM7 Slave module input -> saved in % QW0.4.0.
- 3) When using GM7 as slave, set GMWIN program in advance and open the communication by SyCon.

6.2.2 Smart I/O Pnet master slave communication in GMWIN

Example 2

Communication module(Station 0) G4L-PUEA is installed in GM4 base slot and Smart I/O module(GPL-TR2A, GPL-D22A, GPL-RY2A) is installed as slave. This is the program example for sending/receiving the data from Station 0 (master) to Station 1(GPL-TR2A), Station 2(GPL-D22A), Station 3(GPL-RY2A).(Refer to I/O configuration map.)

GM4 master (Station 0, Pnet slot 0)

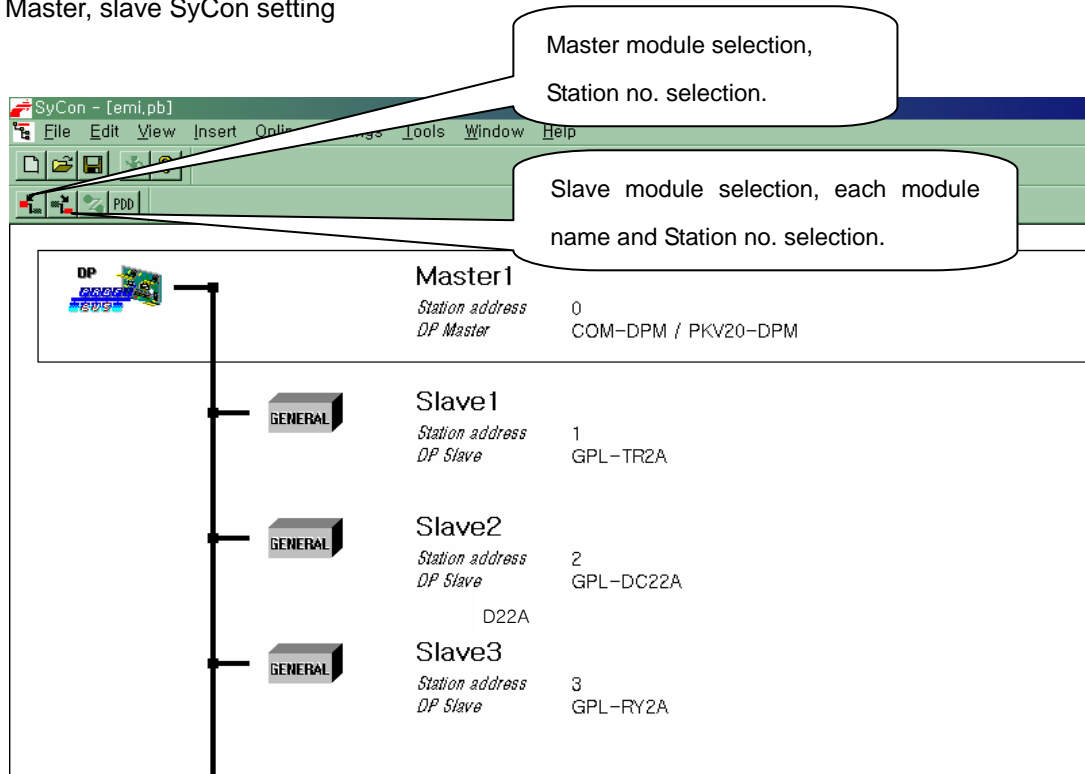


• I/O configuration map

Sending/receiving configuration		Reading area	Saving area	Size(byte)
GM4(Station 0) (master)	Sending: Station 1 & 3	%MW0	-	4
	Receiving: Station 2	-	%QW0.2.0	2
GPL-TR2A (Station 1)	Receiving:GM4 Station 0	%MW0	-	2
GPL-D22A (Station 2)	Sending:GM4 Station 0	-	%QW0.2.0	2
GPL-RY2A (Station 3)	Receiving:GM4 Station 0	%MW1	-	2

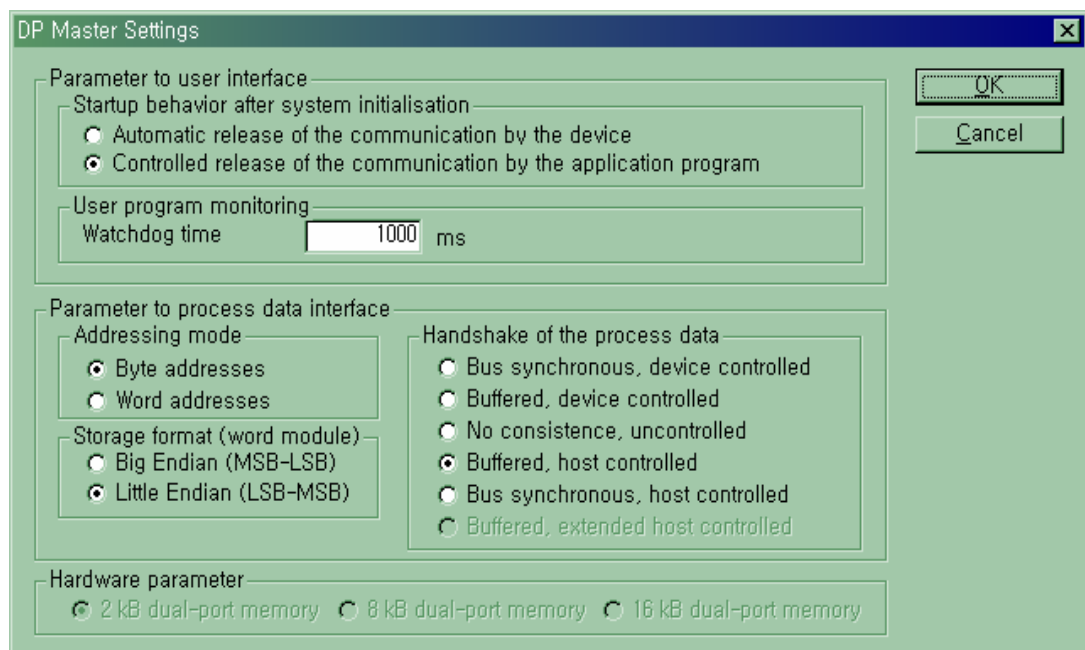
1) SyCon setting for high speed link communication

- Master, slave SyCon setting



- Master Setting

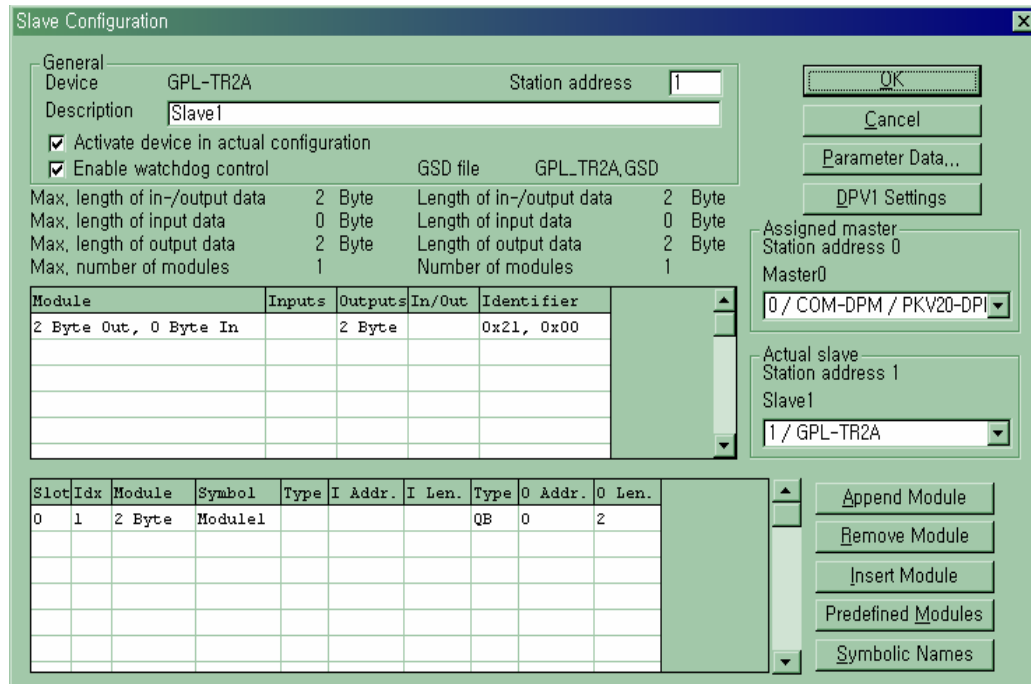
Settings → Master Settings selection (set as basic value in LGIS SyCon.)



- Slave Configuration

Settings → Slave Configuration selection

The basic I/O score is designated in Smart I/O GSD file.



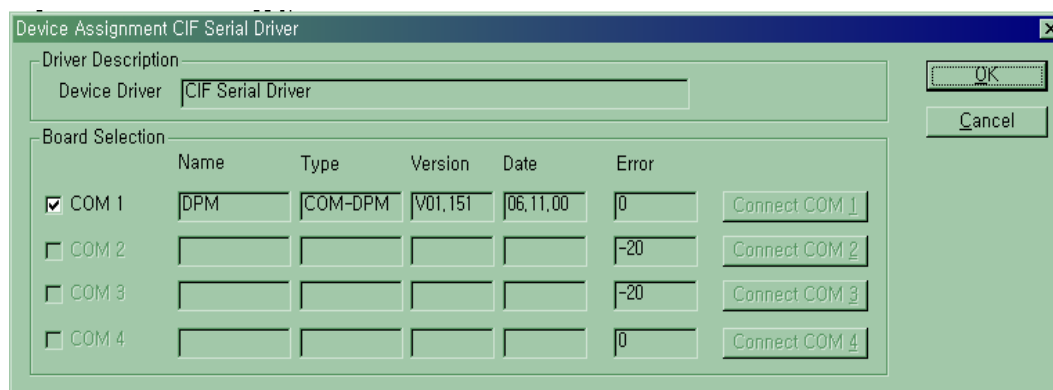
The Slave Configuration dialog box is used to set up a slave device. It includes the following sections:

- General:**
 - Device: GPL-TR2A
 - Station address: 1
 - Description: Slave1
 - ☒ Activate device in actual configuration
 - ☒ Enable watchdog control
 - GSD file: GPL_TR2A.GSD
- Max. length of in-/output data:**
 - Max. length of in-/output data: 2 Byte
 - Max. length of input data: 0 Byte
 - Max. length of output data: 2 Byte
 - Max. number of modules: 1
- Module Table:**

Module	Inputs	Outputs	In/Out	Identifier
2 Byte Out, 0 Byte In		2 Byte		0x21, 0x00
- Assigned master:**
 - Station address 0
 - Master0
 - 0 / COM-DPM / PKV20-DPI
- Actual slave:**
 - Station address 1
 - Slave1
 - 1 / GPL-TR2A
- Buttons:** OK, Cancel, Parameter Data..., DPV1 Settings, Append Module, Remove Module, Insert Module, Predefined Modules, Symbolic Names.

- Device Assignment

Settings → Device Assignment → COM port selection → OK



The Device Assignment CIF Serial Driver dialog box is used to assign a device to a COM port. It includes the following sections:

- Driver Description:**
 - Device Driver: CIF Serial Driver
- Board Selection:**

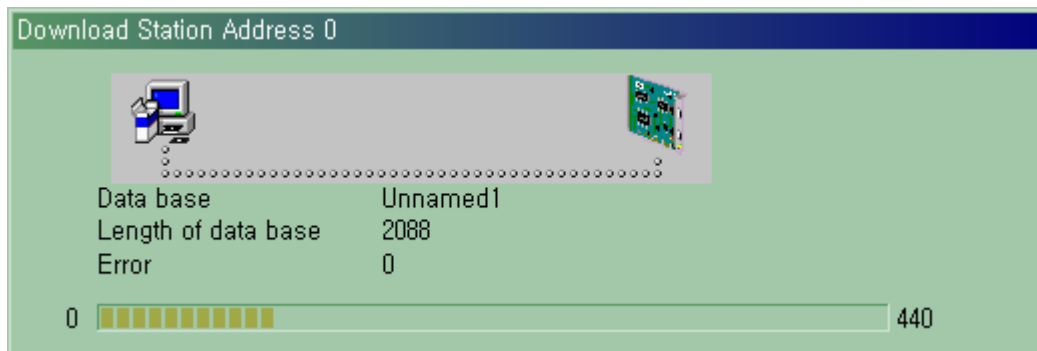
	Name	Type	Version	Date	Error	
<input checked="" type="checkbox"/> COM 1	DPM	COM-DPM	V01.151	06.11.00	0	Connect COM 1
<input type="checkbox"/> COM 2					-20	Connect COM 2
<input type="checkbox"/> COM 3					-20	Connect COM 3
<input type="checkbox"/> COM 4					0	Connect COM 4
- Buttons:** OK, Cancel.

- COM port selection : After selecting Connect COM1 or Connect COM2, if the small window appears on the left COM1,COM2, select the window and then press OK.

- Download

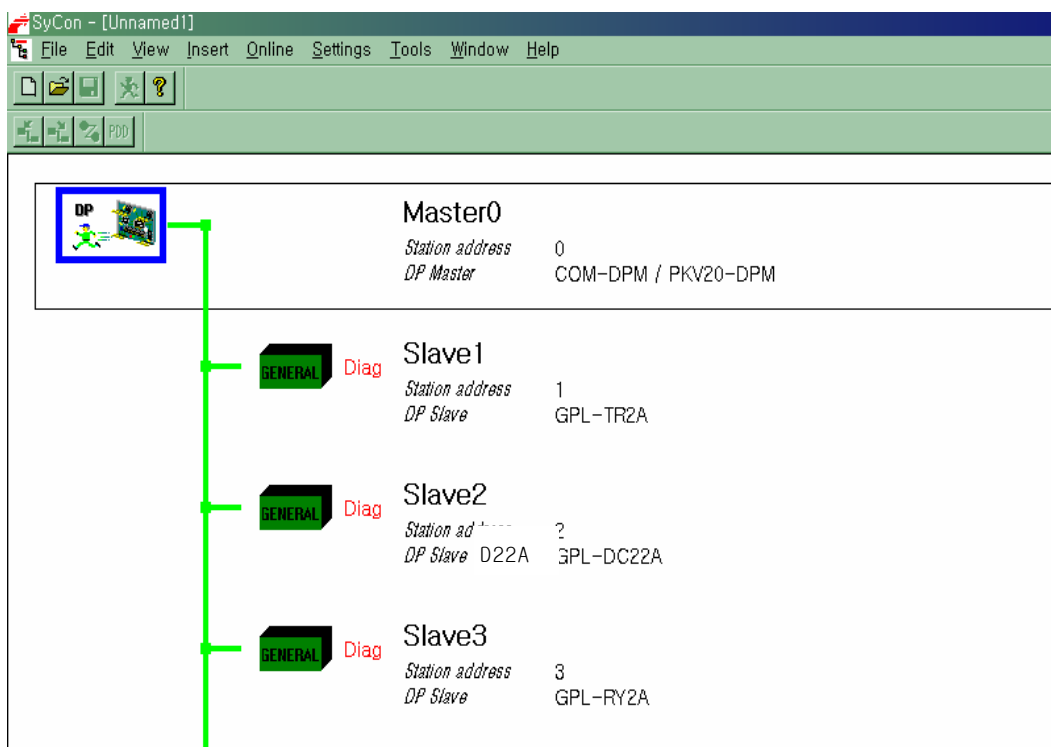
Online ———> Download

In case of Error, check the Configuration cable and connector.



- Communication opening verification

Online ———> Start Communication ———> Start Debug Mode



- If the communication between master and slave is opened normally, the connection line between master and slave is green-colored and if not opened, the line is red-colored.
(If the red colored line is displayed, check the communication cable and connector.)

Point

- 1) The I/O contact size of sending area and receiving area should be set as the same as that of KGLWIN program and SyCon.

When selecting Smart I/O module in SyCon, the sending/receiving area size of each module shall be set automatically.(available to verify in Slave Setting window.)

- 2) G4L-PUEA 1EA and GPL-TR2A(16points), GPL-D22A(16points), GPL-RY2A (16points) are created in order and when setting the sending area as %MW0, receiving area as %MW100,

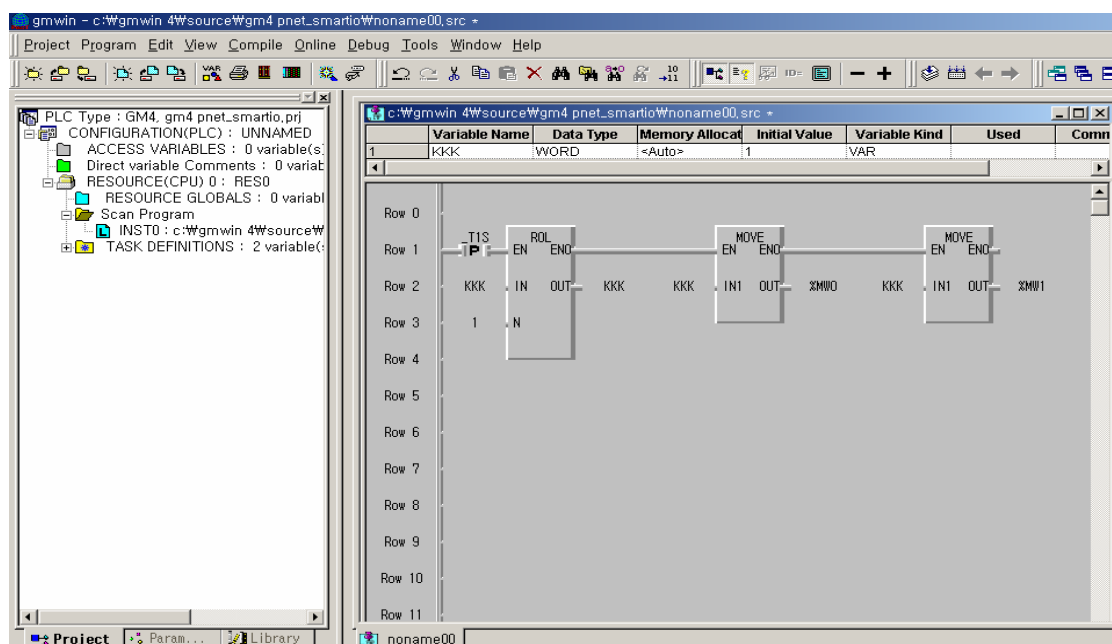
- * Sending area : %MW0
- * Receiving area : %QW0.2.0
- * Sending area size : 4 bytes(total output contact number)
- * Receiving area size : 2 bytes(total input contact number)

- * %MW0 data -> output to GPL-TR2A
- * %MW1 data -> output to GPL-RY2A
- * GPL-D22A input -> saved in %QW0.2.0

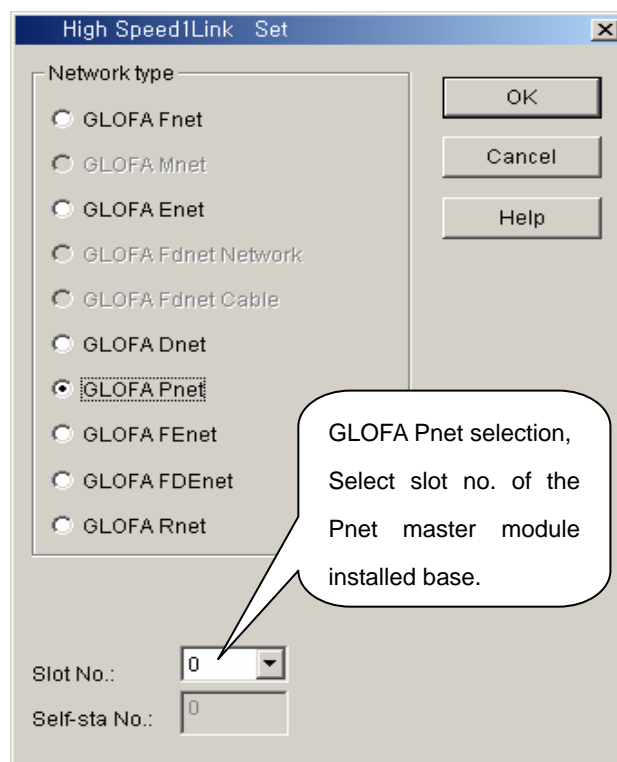
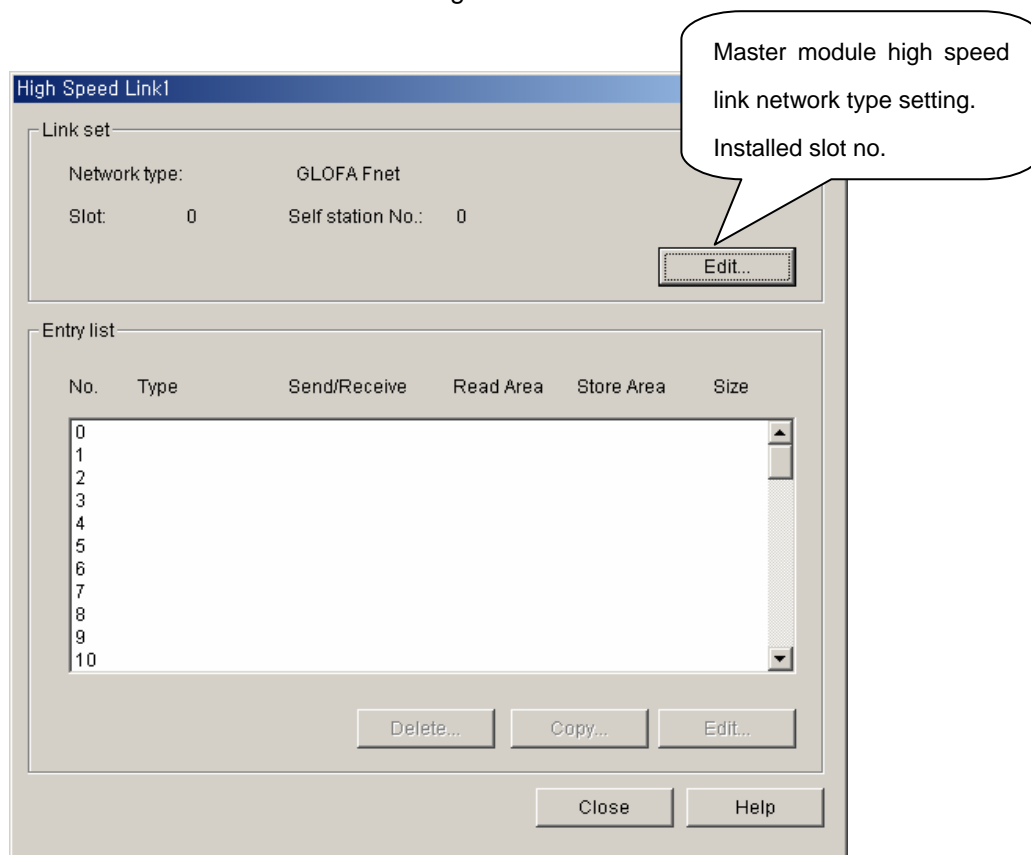
- 3) It doesn't matter which one is set in advance between GMWIN program and SyCon.

2) High speed link parameter setting in GM4(Station 0)

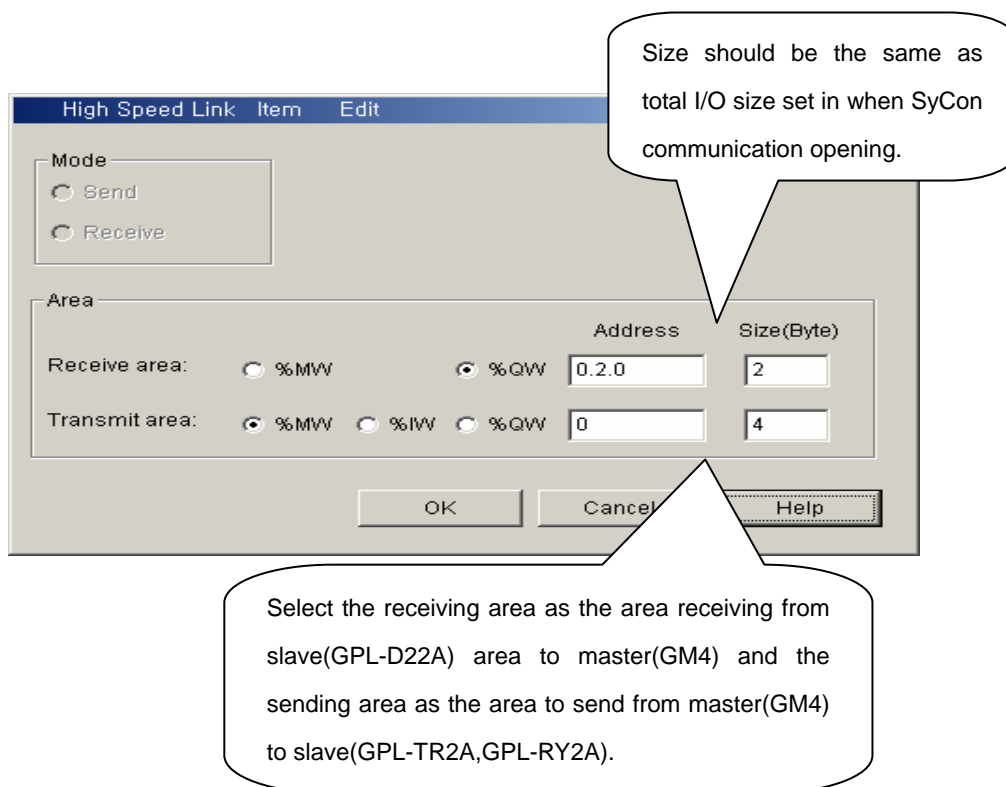
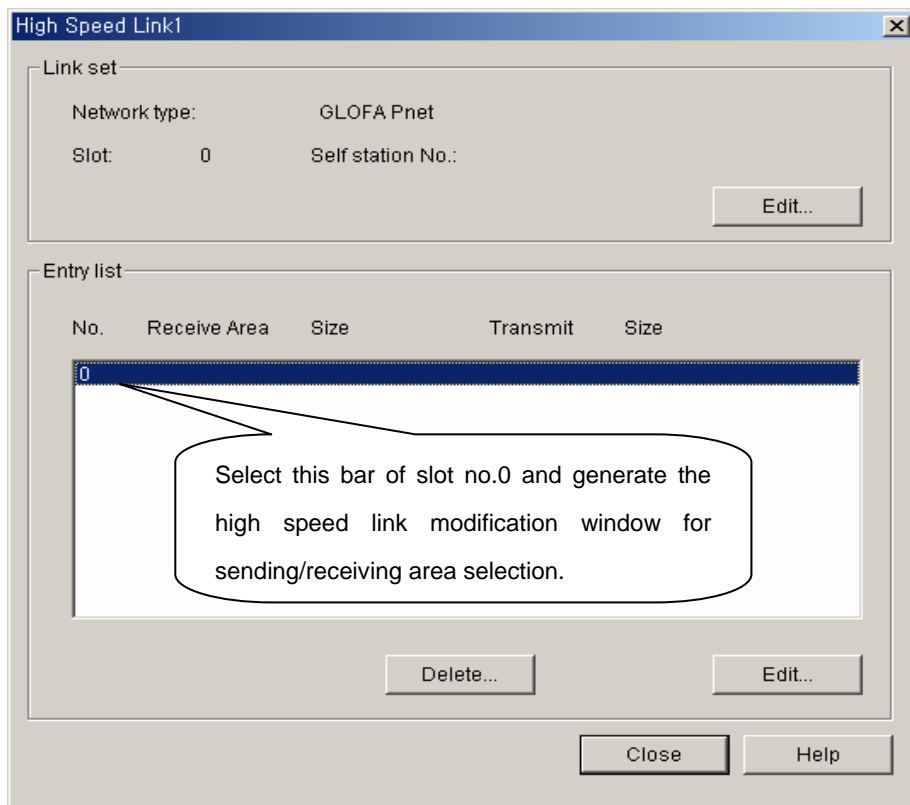
- Master module GMWIN program



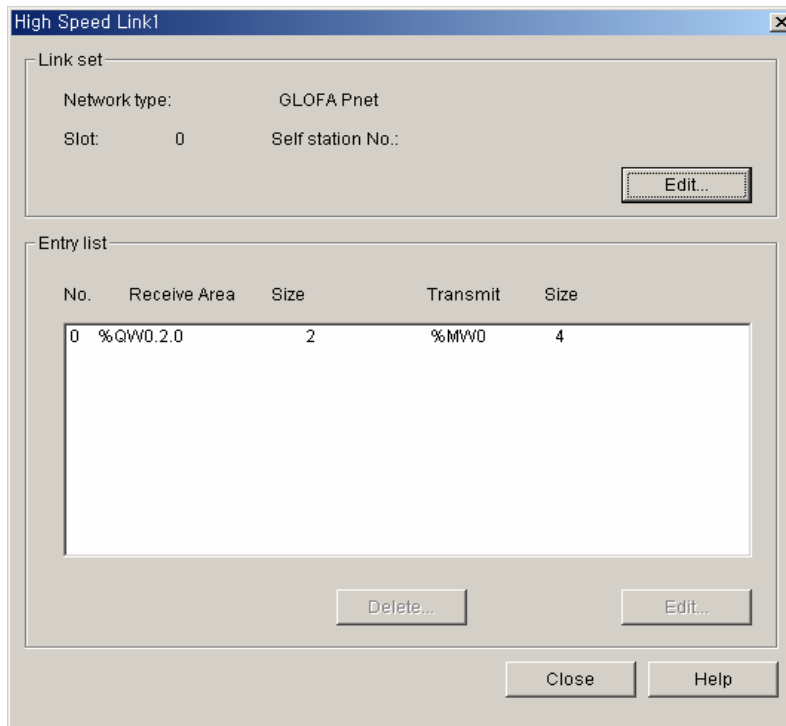
- Master module 'link information' setting



- Sending/receiving parameter setting by SmartI/O (Station 1, 2 & 3) slave



- Master module 'high speed link 1' setting completion screen



The screenshot shows a software window titled "High Speed Link1". It contains two main sections: "Link set" and "Entry list".

Link set

Network type: GLOFA Pnet
Slot: 0 Self station No.:
Edit...

Entry list

No.	Receive Area	Size	Transmit	Size
0	%QV0.2.0	2	%MV0	4

Delete... Edit...

Close Help

Point

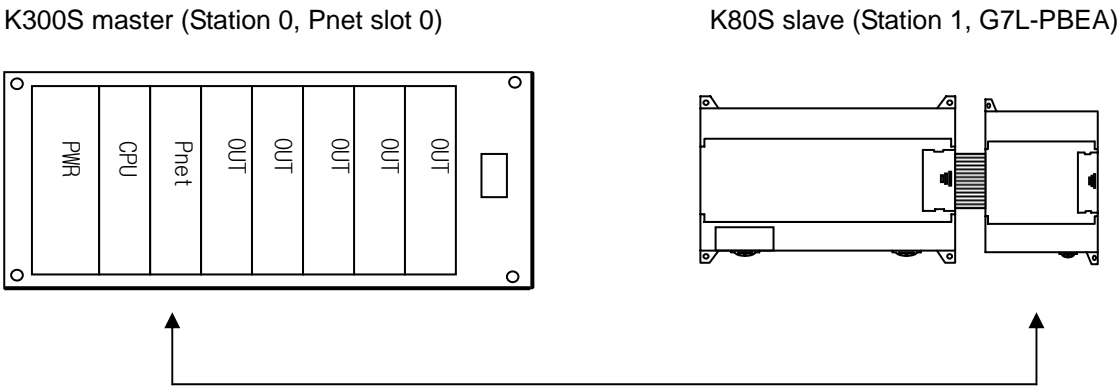
Communication between LGIS Pnet I/F master and other manufacturer's slave

- 1) The basic communication method is the same as the communication example between LGIS and LGIS.
- 2) Select the station of slave module as the external switch of other manufacturer's slave module.
- 3) When preparing GMWIN program, designate the I/O size of other manufacturer's module when setting high speed link parameter.
- 4) When opening the communication in SyCon, seek GSD file of other manufacturer's module and designate it as slave, and match the station number designated by external switch of slave module with slave station number when creating with SyCon.
- 5) The size of I/O score created in SyCon should be matched with GMWIN program high speed link parameter setting and size of GMWIN program.
- 6) When using other manufacturer's remote module, it is required to carry out by the same mode as the communication example between LGIS and LGIS, apply GSD file of the module used when created with SyCon, and designate the same I/O contact size of the used module for SyCon and GMWIN program.

6.2.3 Pnet master slave communication in KGLWIN

Example 3

Communication module (Station 0) G4L-PU EA is installed in K300S base slot 0, communication module G7L-PBEA in K80S, respectively. This is the program for sending/receiving the data from Station 0(master) to Station 1(slave).
(Refer to I/O configuration map.)

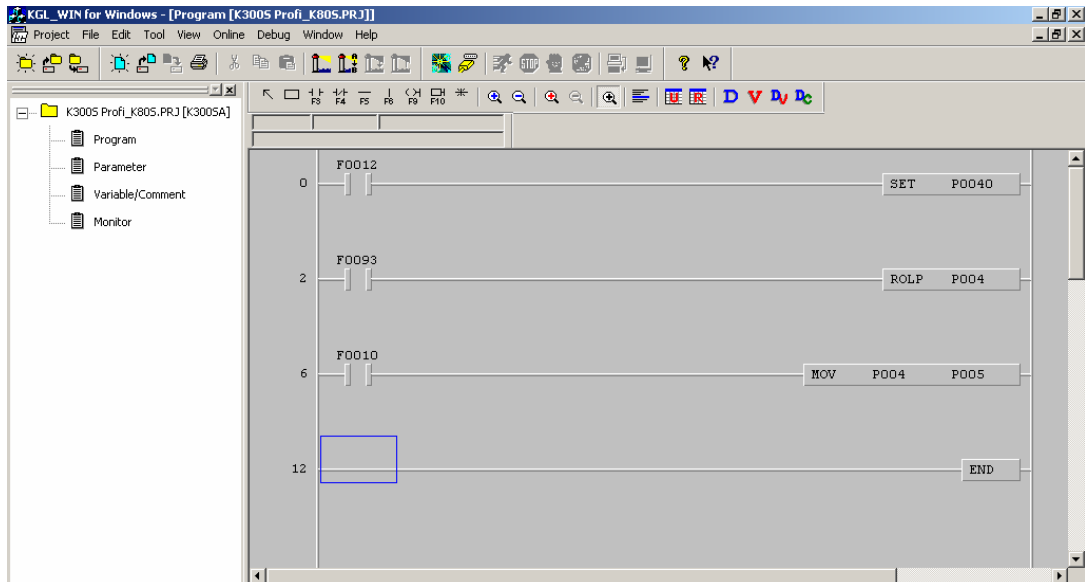


• I/O configuration map

Sending/receiving configuration		Reading area	Saving area	Size(byte)
K300S(Station 0) (master)	Sending:K80S Station 1	P004	-	2
	Receiving:K80S Station 1	-	P002	2
K80S(Station 1) (slave)	Sending:K300S Station 0	P009	-	2
	Receiving:K300S Station 0	-	P004	2

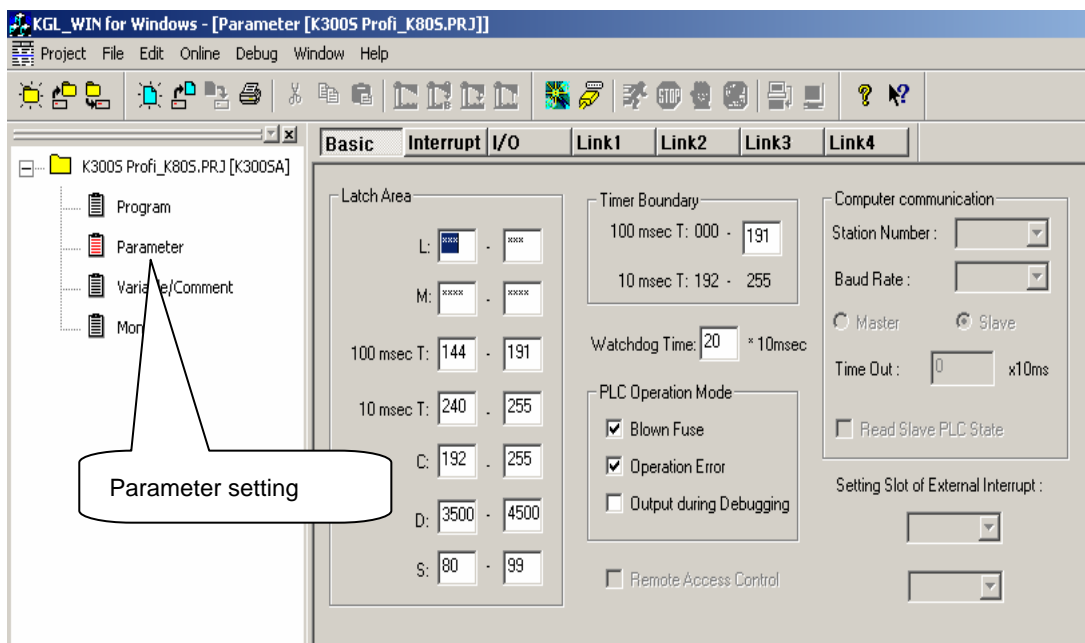
1) High speed link parameter setting in K300S (Station 0)

- Master module KGLWIN program (K300S)

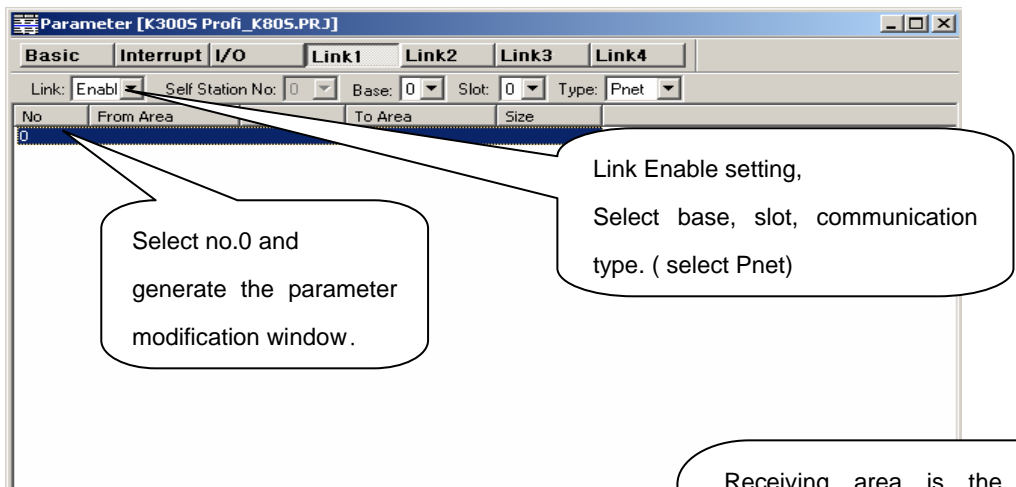


- Master module 'link information' setting

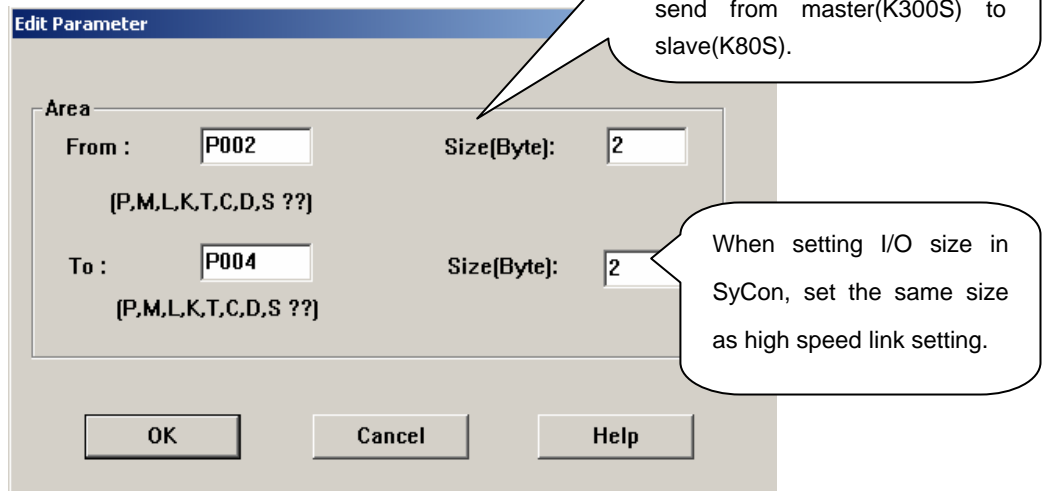
Parameter → link selection (select one from 4 links)



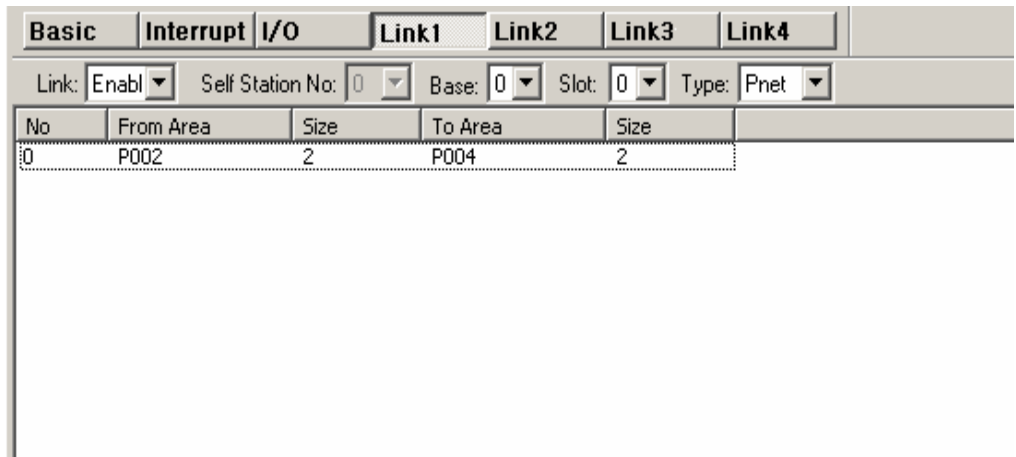
• High speed link network type setting



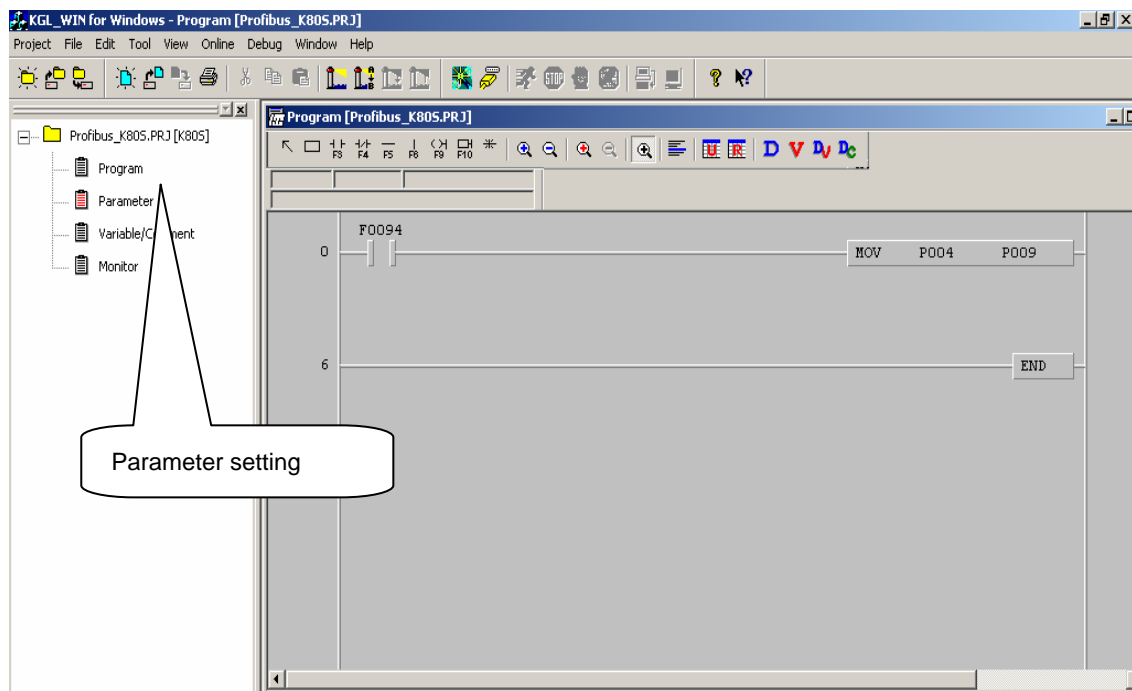
• Sending/receiving parameter setting to K80S Station 1



• Master module 'high speed link1' setting completion screen

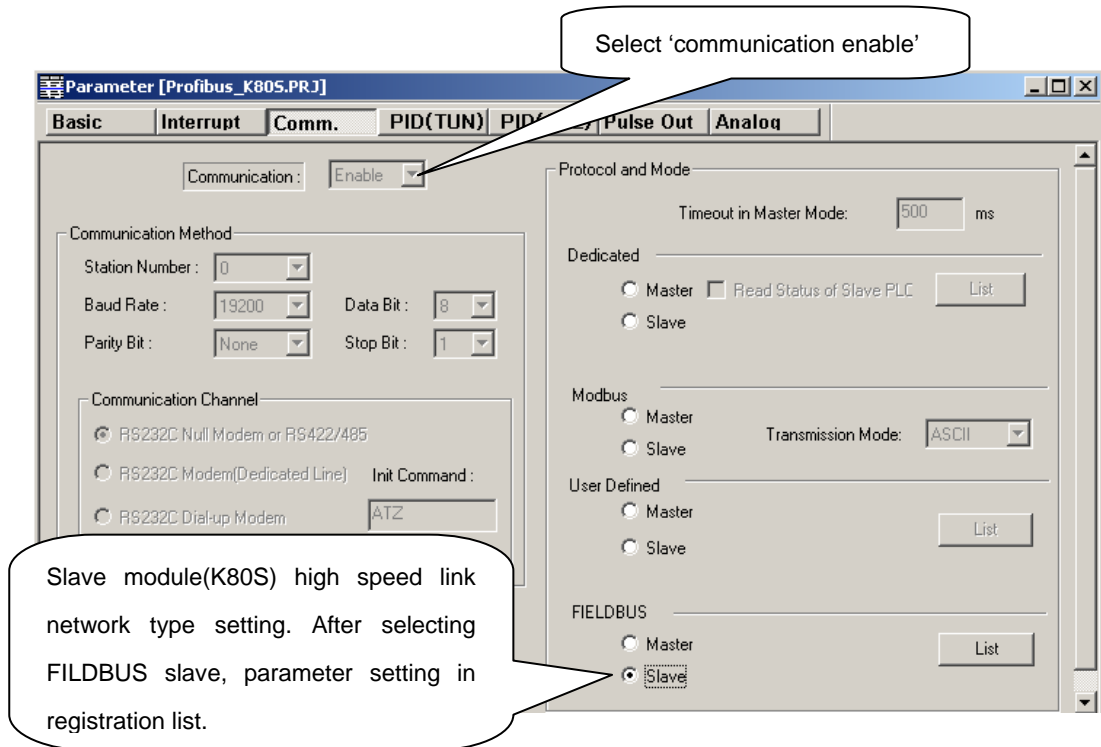


2) High speed link parameter setting in K80S (Station 1)

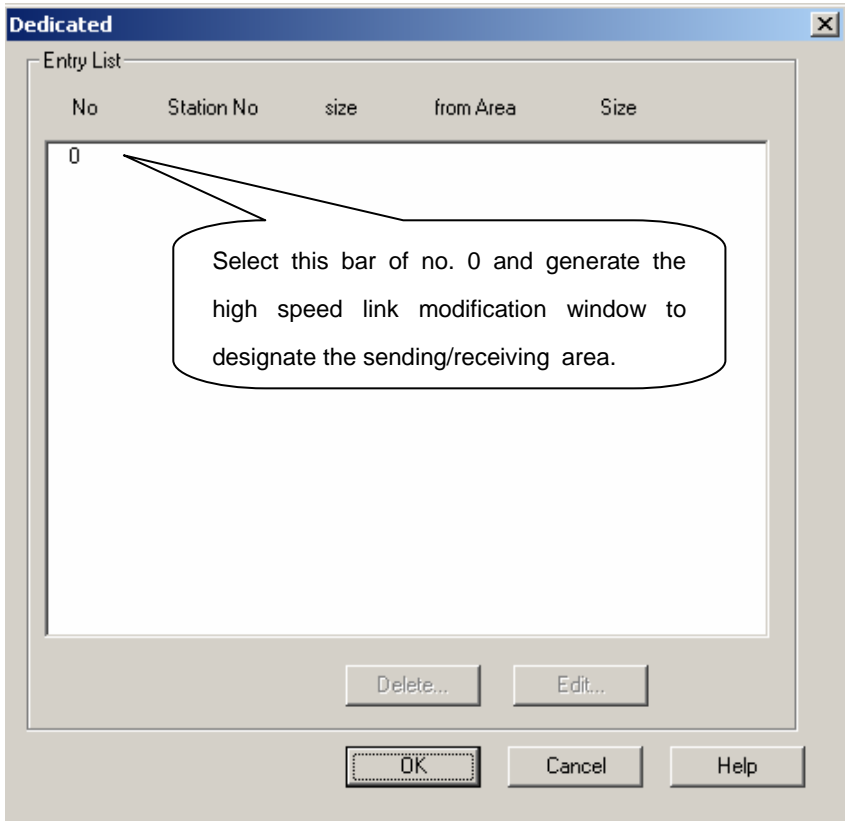


• Slave module 'link information' setting

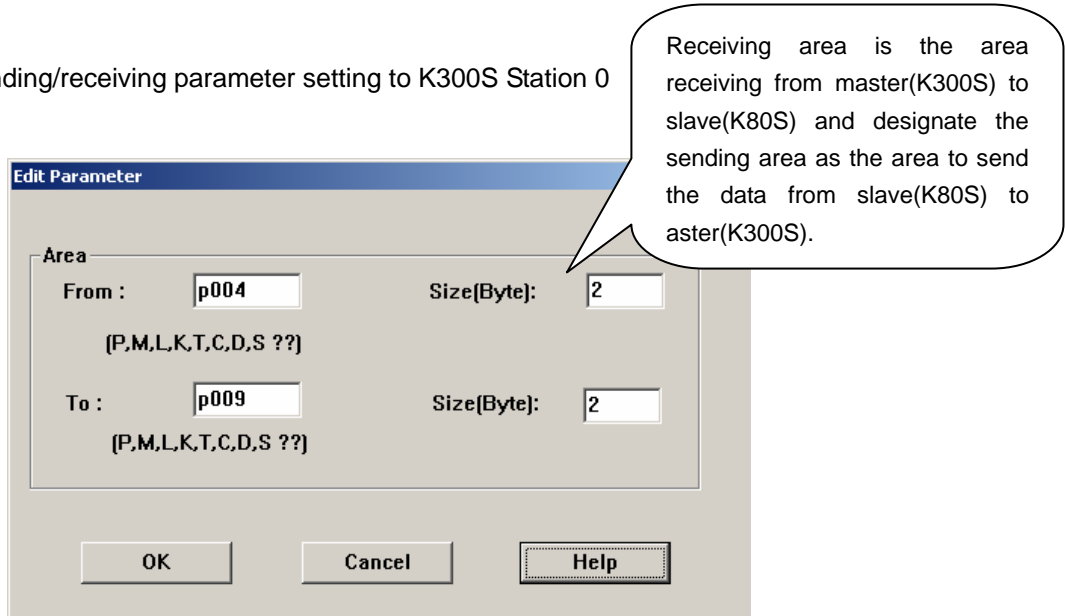
Parameter → communication selection



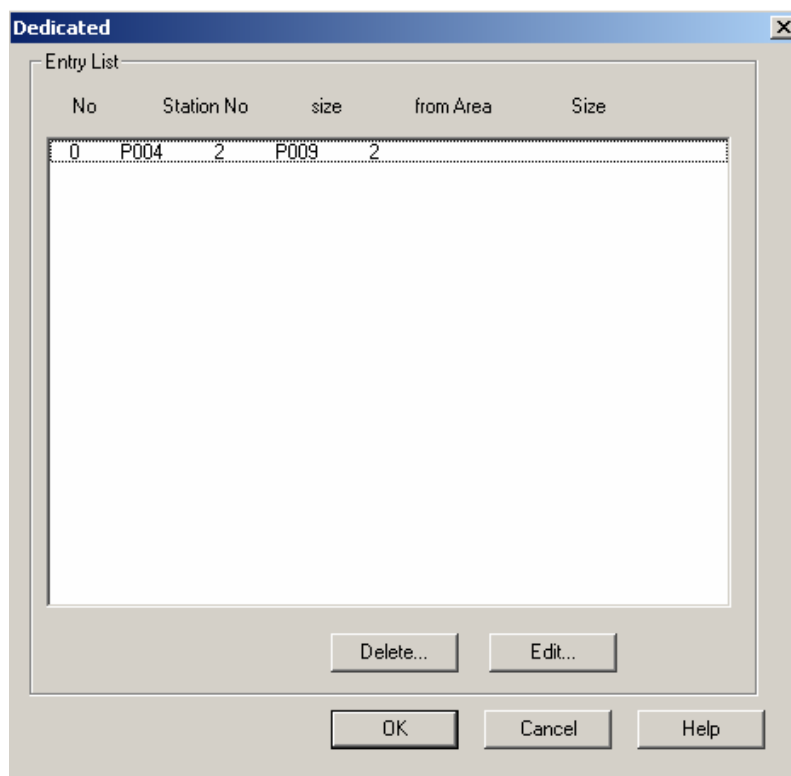
- High speed link parameter setting to K300S master station



- Sending/receiving parameter setting to K300S Station 0

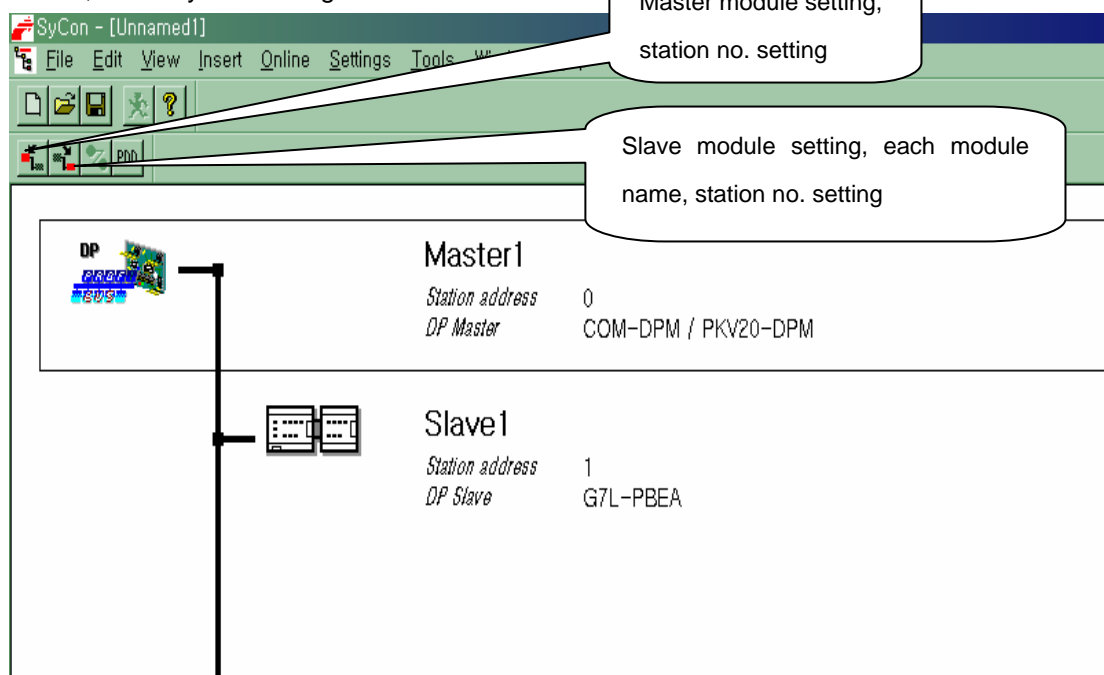


- Slave module 'high speed link' setting completion screen



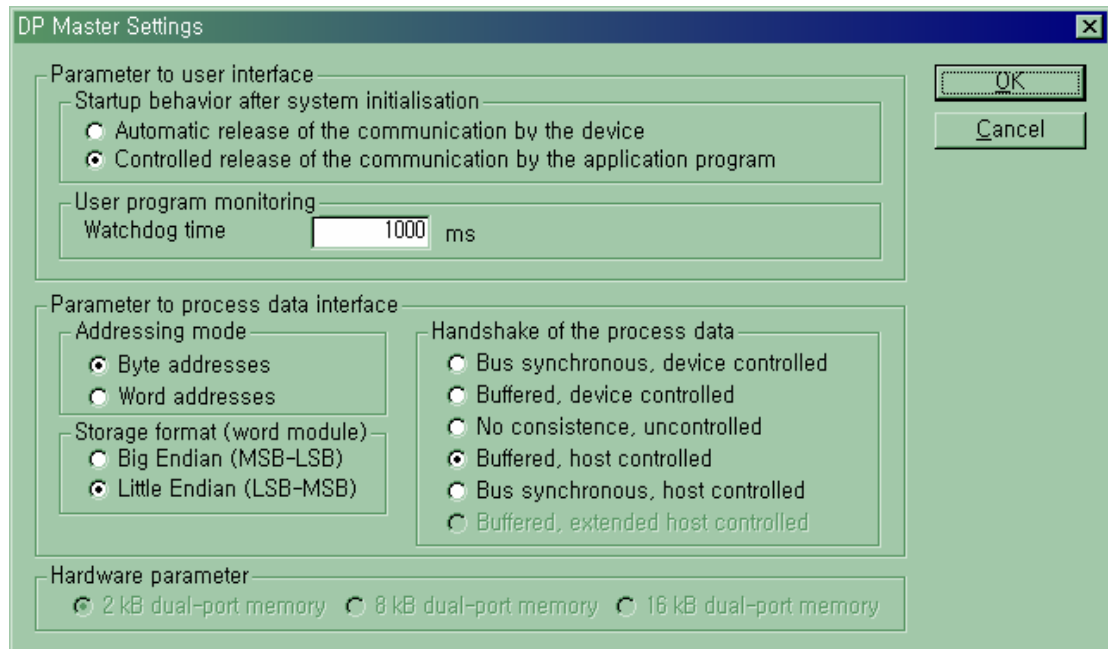
3) SyCon setting for high speed link communication

- Master, slave SyCon setting



• Master Setting

Settings → Master Settings selection (set as basic value in LGIS SyCon.)



The DP Master Settings dialog box is divided into several sections:

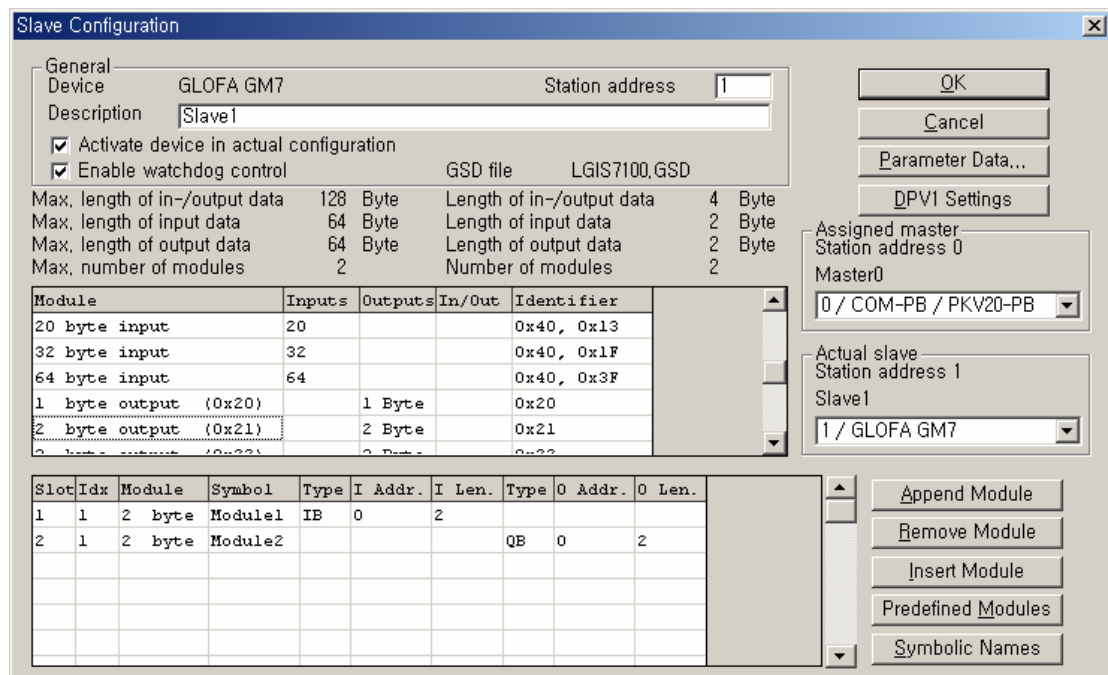
- Parameter to user interface:**
 - Startup behavior after system initialisation:
 - ☐ Automatic release of the communication by the device
 - ☒ Controlled release of the communication by the application program
 - User program monitoring:
 - Watchdog time: 1000 ms
- Parameter to process data interface:**
 - Addressing mode:
 - ☒ Byte addresses
 - ☐ Word addresses
 - Storage format (word module):
 - ☐ Big Endian (MSB-LSB)
 - ☒ Little Endian (LSB-MSB)
 - Handshake of the process data:
 - ☐ Bus synchronous, device controlled
 - ☐ Buffered, device controlled
 - ☐ No consistence, uncontrolled
 - ☒ Buffered, host controlled
 - ☐ Bus synchronous, host controlled
 - ☐ Buffered, extended host controlled
- Hardware parameter:**
 - ☒ 2 kB dual-port memory
 - ☐ 8 kB dual-port memory
 - ☐ 16 kB dual-port memory

Buttons: OK, Cancel.

• Slave Configuration

Settings → Slave Configuration selection (Input 2 byte, Output 2 byte)

I/O size should be the same as high speed link setting in KGLWIN.



The Slave Configuration dialog box contains the following sections:

- General:**
 - Device: GLOFA GM7
 - Station address: 1
 - Description: Slave1
 - ☒ Activate device in actual configuration
 - ☒ Enable watchdog control
 - GSD file: LGIS7100.GSD
- Max. length of in-/output data:**

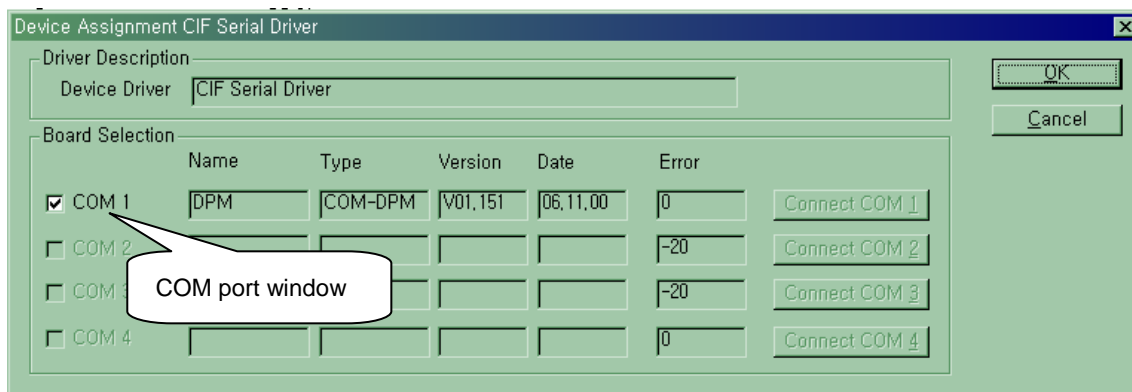
Max. length of in-/output data	128 Byte	Length of in-/output data	4 Byte
Max. length of input data	64 Byte	Length of input data	2 Byte
Max. length of output data	64 Byte	Length of output data	2 Byte
Max. number of modules	2	Number of modules	2
- Module List:**

Module	Inputs	Outputs	In/Out	Identifier
20 byte input	20			0x40, 0x13
32 byte input	32			0x40, 0x1F
64 byte input	64			0x40, 0x3F
1 byte output (0x20)		1 Byte		0x20
2 byte output (0x21)		2 Byte		0x21
2 byte output (0x22)		2 Byte		0x22
- Assigned master:**
 - Station address 0: Master0
 - 0 / COM-PB / PKV20-PB
- Actual slave:**
 - Station address 1: Slave1
 - 1 / GLOFA GM7
- Module Configuration Table:**

Slot	Idx	Module	Symbol	Type	I Addr.	I Len.	Type	O Addr.	O Len.
1	1	2 byte	Module1	IB	0	2			
2	1	2 byte	Module2				QB	0	2
- Buttons:** OK, Cancel, Parameter Data..., DPV1 Settings, Append Module, Remove Module, Insert Module, Predefined Modules, Symbolic Names.

- Device Assignment

Settings → Device Assignment → COM port designation → OK

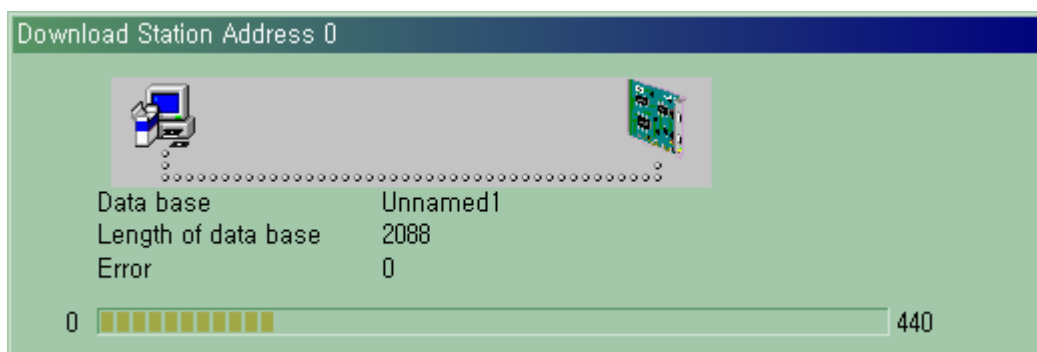


- COM port selection : After selecting Connect COM1 or Connect COM2, if the window appears on the left COM1,COM2, select the window and then select OK.

- Download

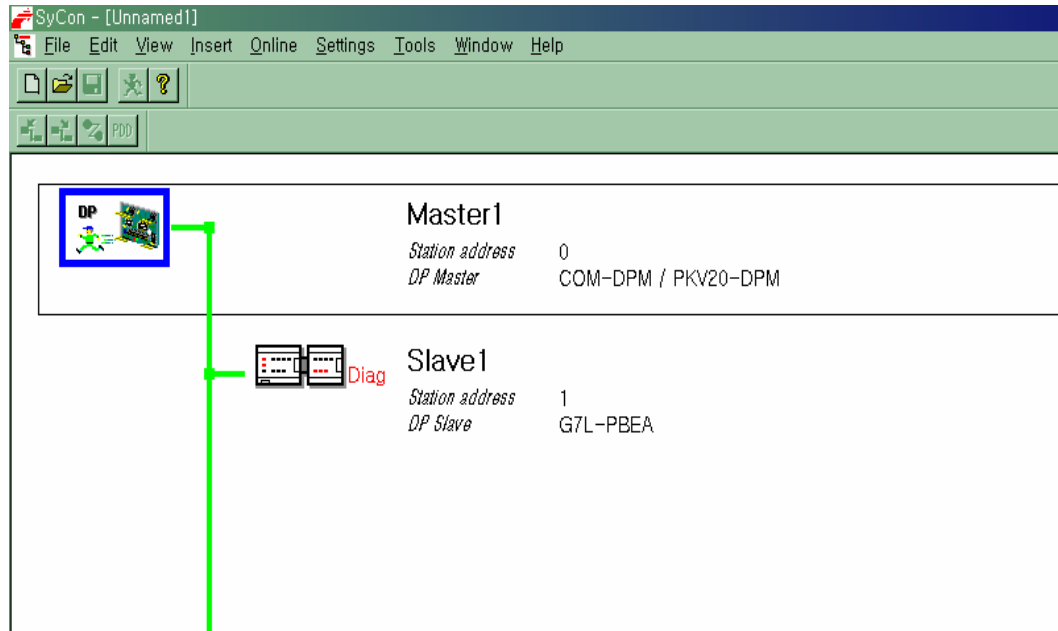
Online → Download

In case of Error, check the Configuration cable and connector.



- Communication opening verification

Online → Start Communication → Start Debug Mode



Point

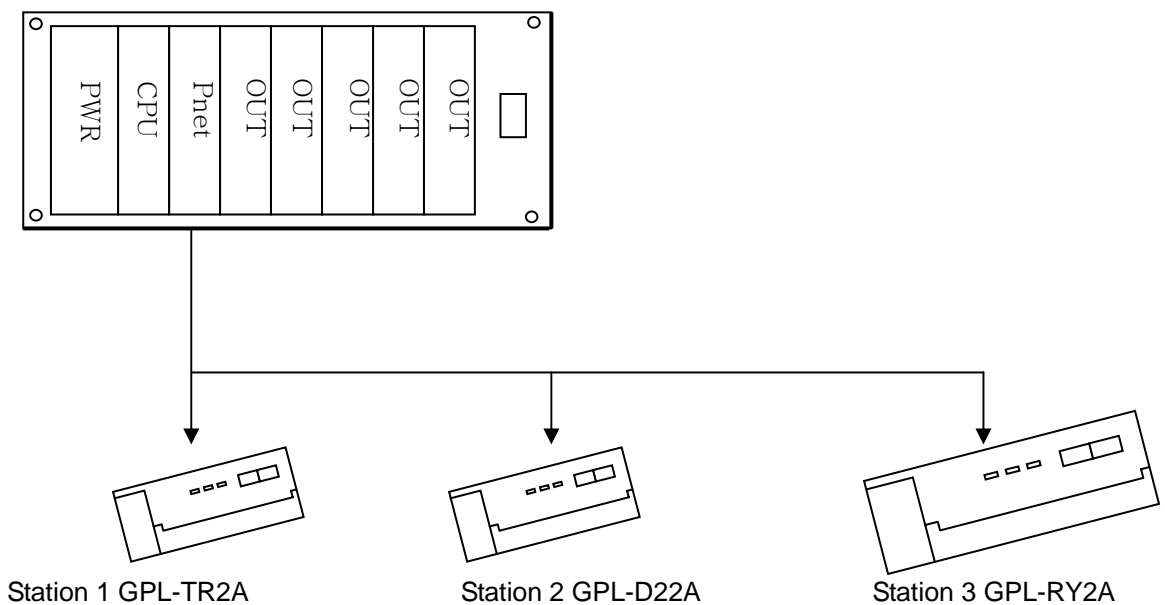
- 1) The size of sending area and receiving area is total I/O contact number created in KGLWIN.
When setting K80S Slave in SyCon, the I/O contact number in Slave Setting should be the same as high speed link setting size of KGLWIN program.
- 2) G4L-PUEA 1EA and GM7-PBEA 1EA are created in order and when setting the sending area of master as P004, receiving area as P002,
 - * Sending area : P004
 - * Receiving area : P002
 - * Sending area size : 2 bytes
 - * Receiving area size : 2 bytes
 - * P004의 data -> output to K80S Slave module
 - * K80S Slave module input -> saved in P002
- 3) When using K80S as slave, set KGLWIN program in advance and open the communication by SyCon.

6.2.4 Pnet master slave communication in Smart I/O

Example 4

Communication module(Station 0) G4L-PUEA is installed in Master-K base slot, Smart I/O module(GPL-TR2A, GPL-D22A, GPL-RY2A) as slave, respectively. This is the program example for sending/receiving the data from Station 0 (master) to Station 1(GPL-TR2A), Station 2(GPL-D22A), Station 3(GPL-RY2A). (Refer to I/O configuration map.)

K300S master (Station 0, Pnet 0slot)

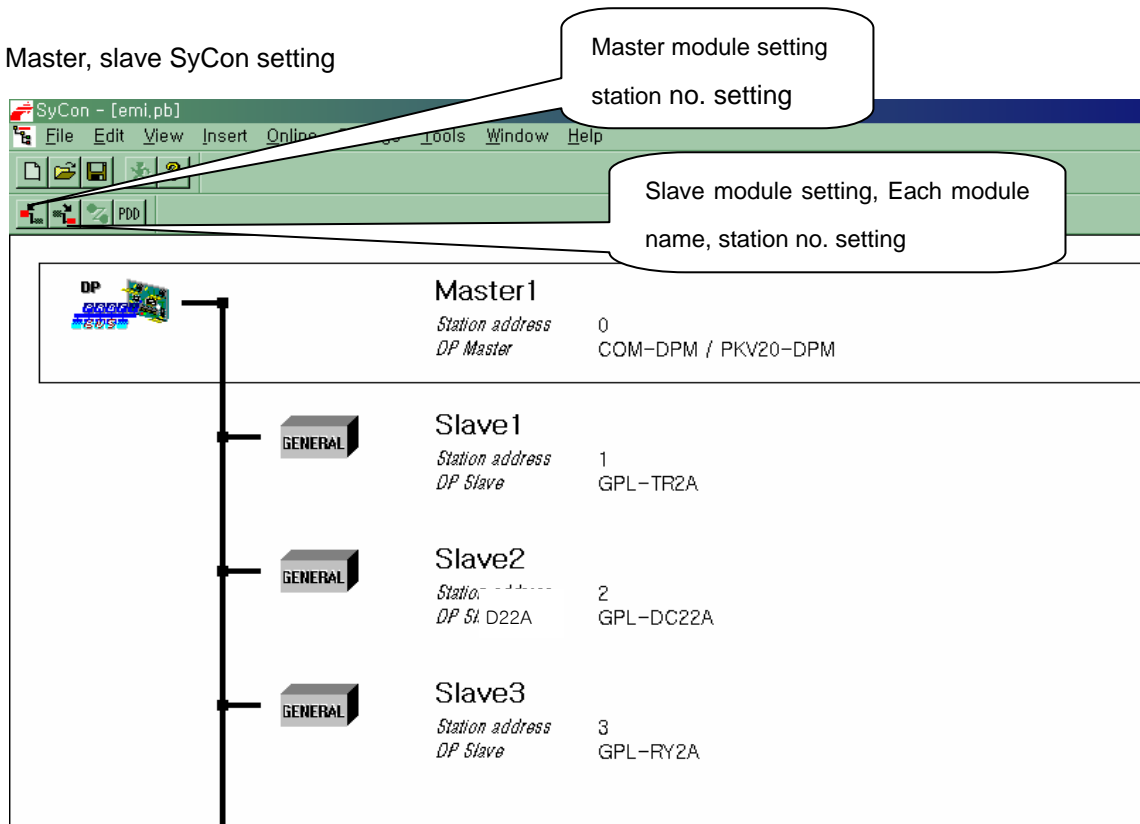


• I/O configuration map

Sending/receiving configuration		Reading area	Saving area	Size(byte)
K300S(Station 0) (master)	Sending: Station 1 & 3	P004	-	4
	Receiving: Station 2	-	M000	2
GPL-TR2A (Station 1)	Receiving: K300S Station 0	P004	-	2
GPL-D22A (Station 2)	Sending: K300S Station 0	-	M000	2
GPL-RY2A (Station 3)	Receiving: K300S Station 0	P005	-	2

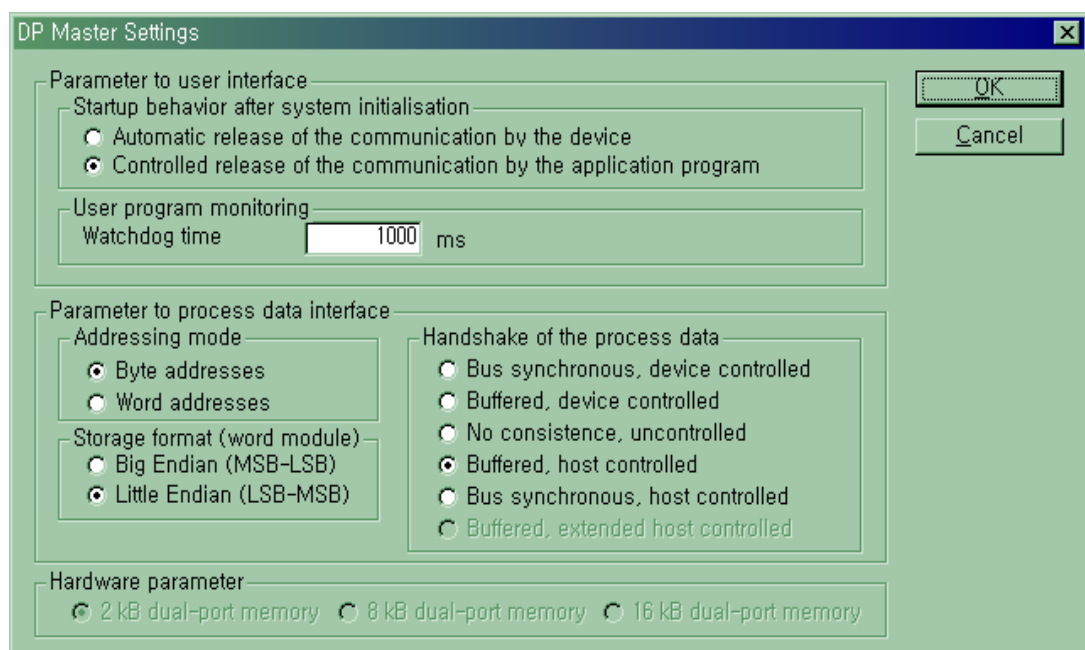
1) High speed link parameter setting in K300S(Station 0)

- Master, slave SyCon setting



- Master Setting

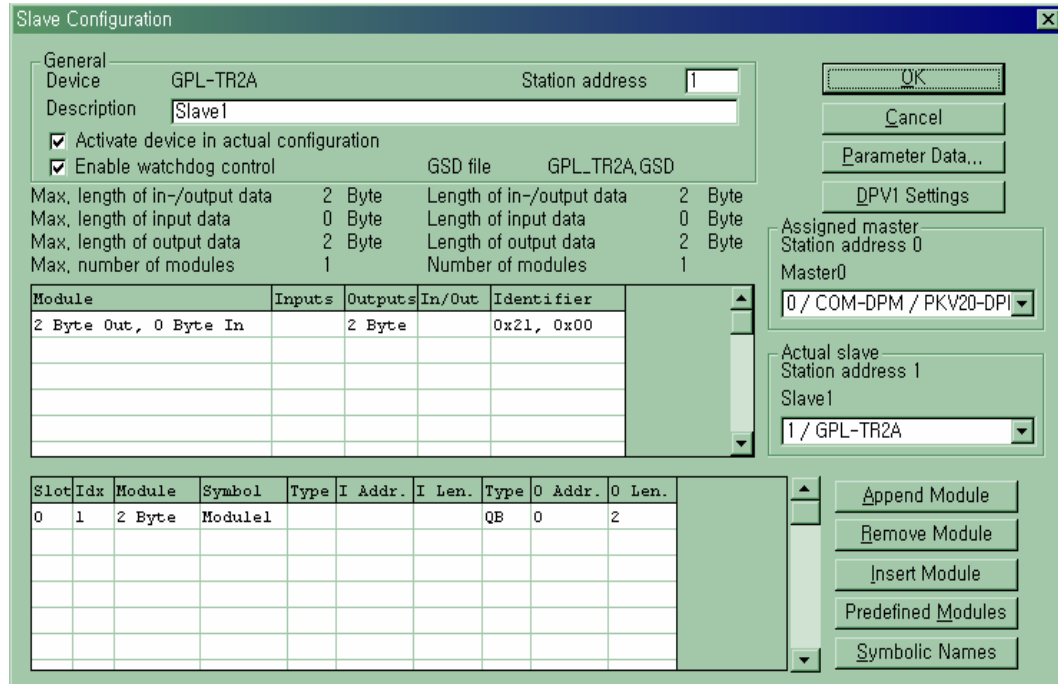
Settings → Master Settings selection (set as basic value in LGIS SyCon.)



- Slave Configuration

Settings —→ Slave Configuration selection

Basic I/O score is set in SmartI/O GSD file.



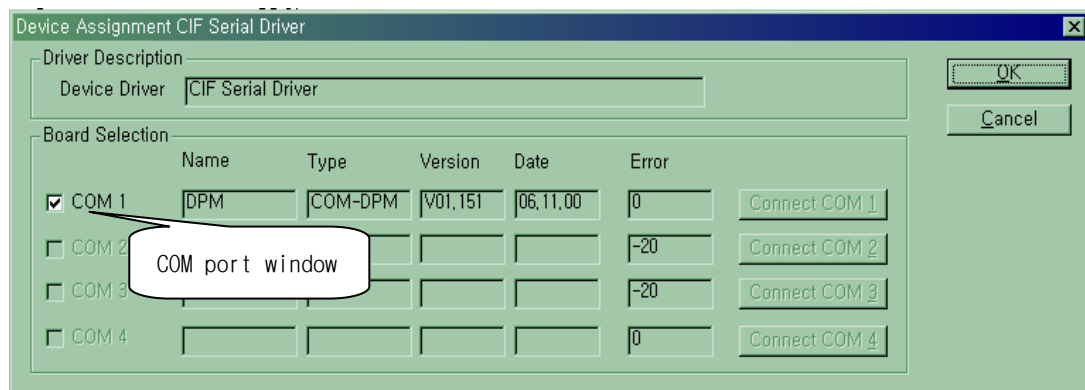
The Slave Configuration dialog box is used to set up a slave device. It includes fields for Device (GPL-TR2A), Station address (1), and Description (Slave1). There are checkboxes for 'Activate device in actual configuration' and 'Enable watchdog control'. A table shows I/O data lengths and module counts. A module list table is also present.

Module	Inputs	Outputs	In/Out	Identifier
2 Byte Out, 0 Byte In		2 Byte		0x21, 0x00

Slot	Idx	Module	Symbol	Type	I Addr.	I Len.	Type	O Addr.	O Len.
0	1	2 Byte	Module1				QB	0	2

- Device Assignment

Settings —→ Device Assignment —→ COM port selection —→ OK



The Device Assignment CIF Serial Driver dialog box shows the driver description (CIF Serial Driver) and a board selection table. A callout points to the COM port selection area.

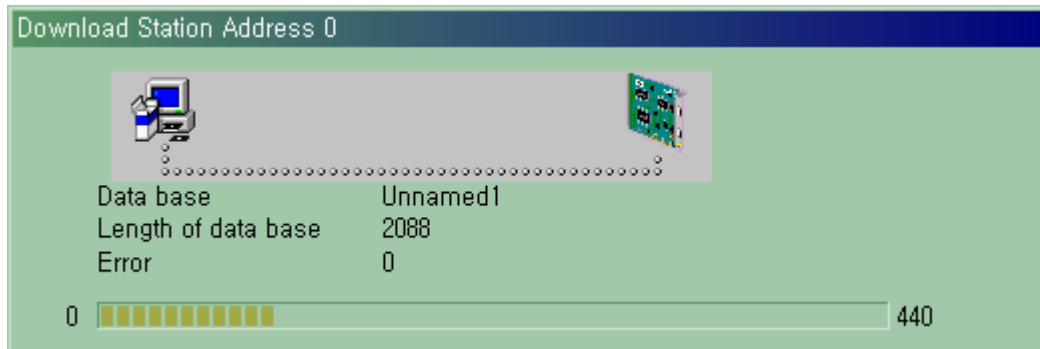
	Name	Type	Version	Date	Error	
<input checked="" type="checkbox"/> COM 1	DPM	COM-DPM	V01.151	06.11.00	0	Connect COM 1
<input type="checkbox"/> COM 2					-20	Connect COM 2
<input type="checkbox"/> COM 3					-20	Connect COM 3
<input type="checkbox"/> COM 4					0	Connect COM 4

- COM port selection : After selecting Connect COM1 or Connect COM2, if the window appears in the left side COM1,COM2, select the window and then select OK.

- Download

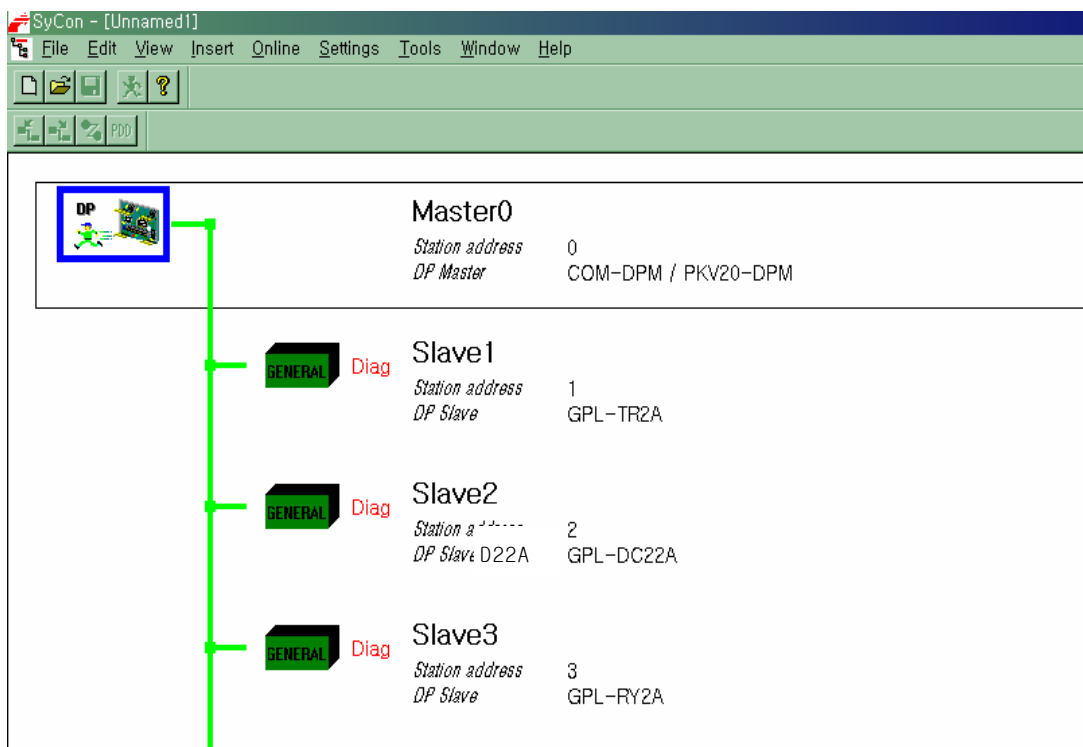
Online ———> Download

In case of Error, check Configuration cable and connector.



- Communication opening verification

Online ———> Start Communication ———> Start Debug Mode



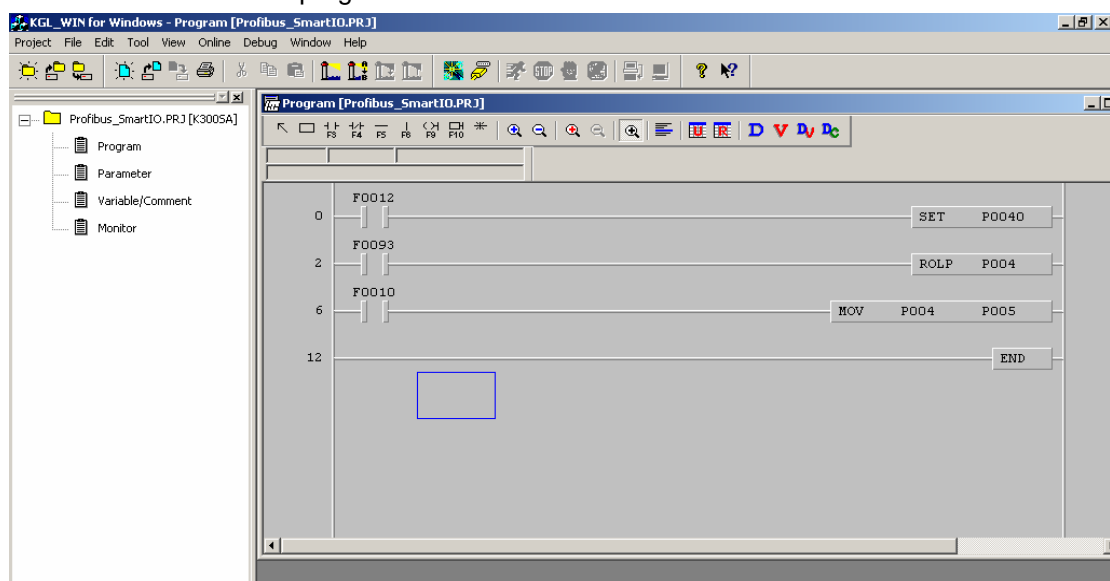
- If the communication between master and slave is opened normally, the connection line between master and slave is green-colored and if not opened, the line is red-colored.
(If the red-colored line is displayed, check the communication cable and connector.)

Point

- 1) The I/O contact size of sending area and receiving area should be set as the same as that of KGLWIN program and SyCon.
When selecting Smart I/O module in SyCon, the sending/receiving area size of each module shall be set automatically. (available to verify in Slave Setting window.)
- 2) G4L-PU EA 1EA and GPL-TR2A(16points), GPL-D22A(16points), GPL-RY2A (16points) are created in order and when setting the sending area as P004, receiving area as M000,
 - * Sending area : P004
 - * Receiving area : M000
 - * Sending area size : 4 bytes(total output contact number)
 - * Receiving area size : 2 bytes(total input contact number)
 - * P004 data -> output to GPL-TR2A
 - * P005 data -> output to GPL-RY2A
 - * GPL-D22A input -> saved in M000.
- 3) It doesn't matter which one is set in advance between GMWIN program and SyCon.

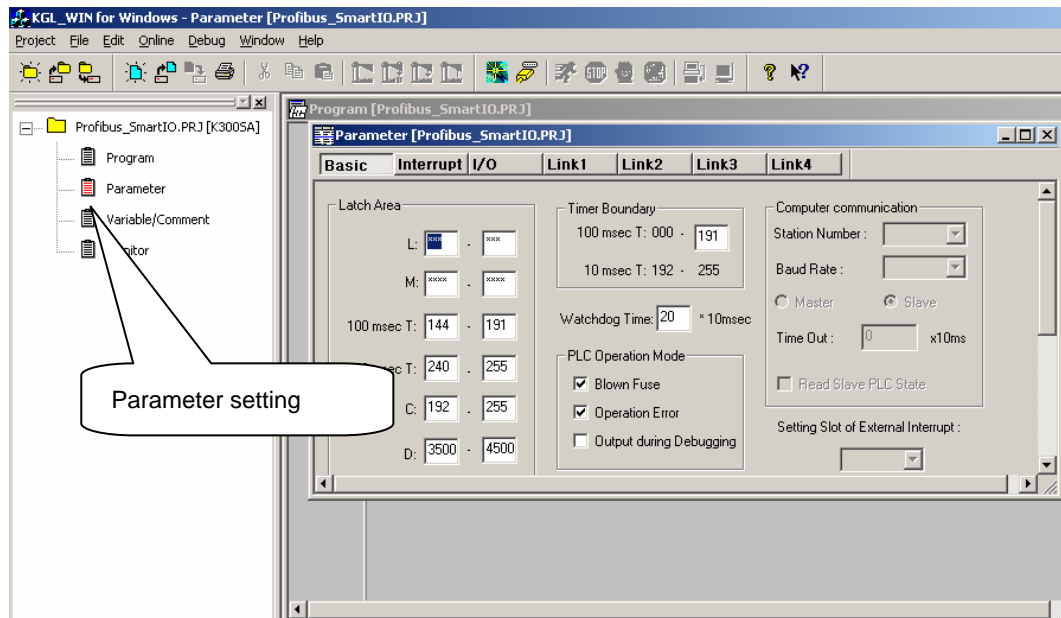
2) High speed link parameter setting in K300S(Station 0)

• Master module KGLWIN program

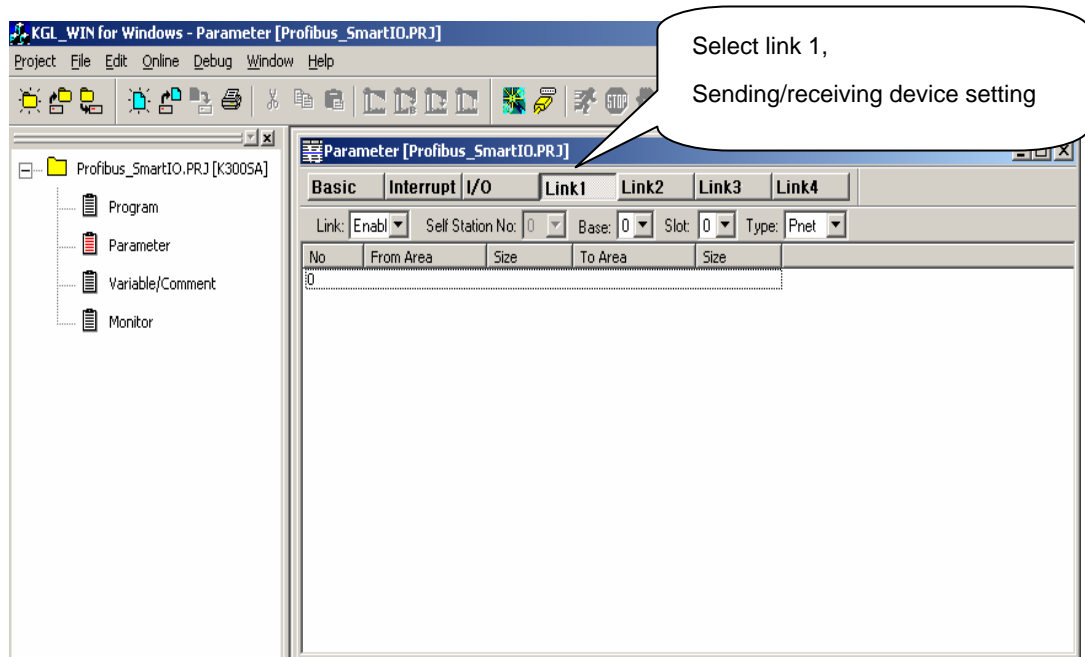


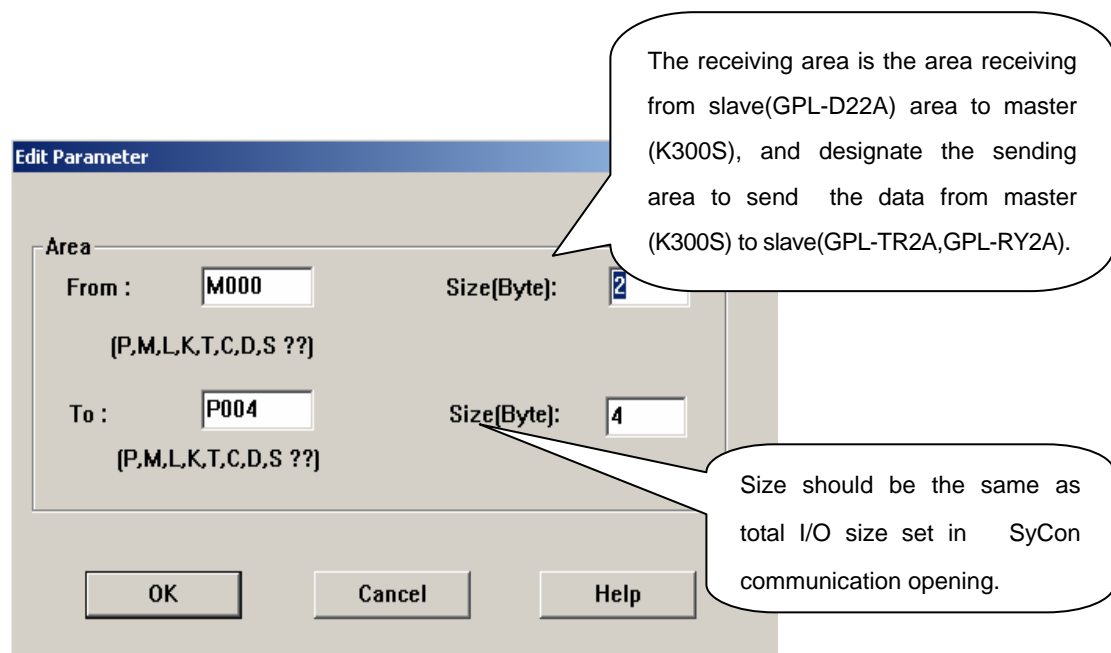
- Master module 'link information' setting

Parameter → link window generation (available to use any link.)



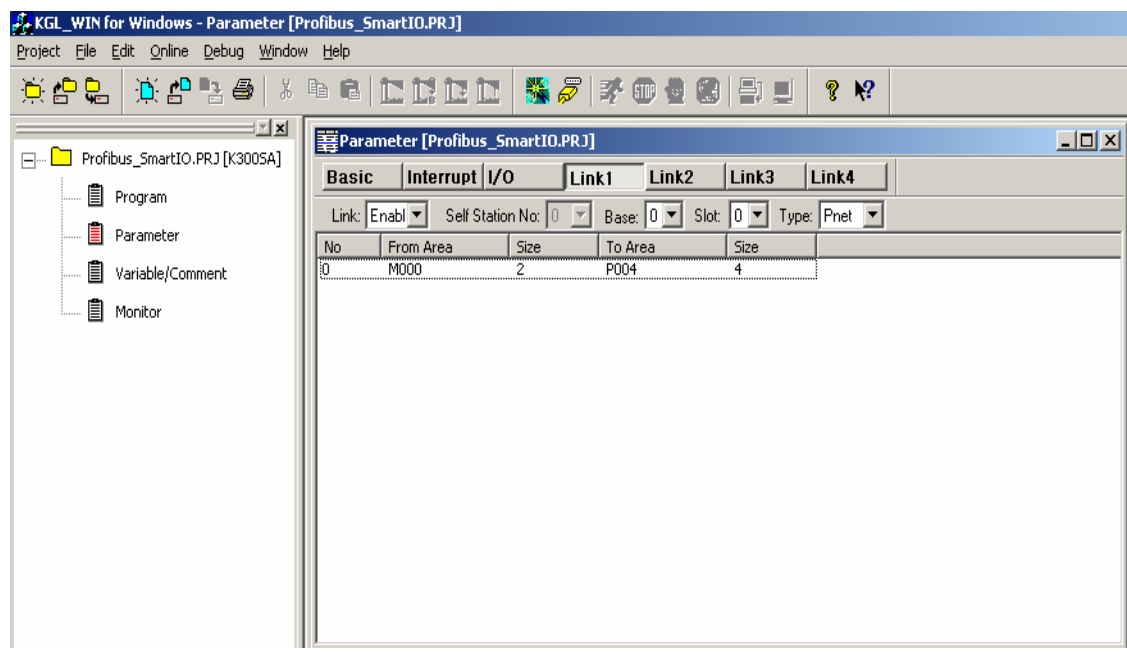
- Sending/receiving parameter setting to Smart I/O(Station 1,2station, 3station) slave





- This is the example of setting the sending area (4byte for P004), receiving area (2byte for M000).

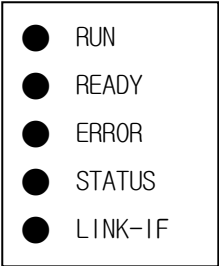
- Master module 'high speed link 1' setting completion screen



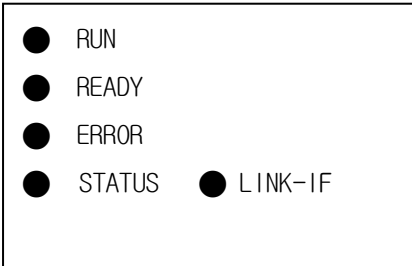
CHAPTER 7 DIAGNOSIS FUNCTION

7.1 LED

Master station : indicates 'run' by 5 LED.



G3/4L-PUEA/PUEB

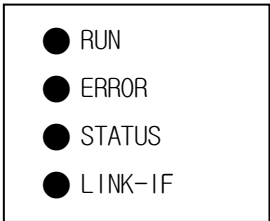


G6L-PUEA/PUEB

Classification	State	Meaning
RUN	On	Normal communication
	Blink	Parameter error
	Off	Communication stop
READY	On	Normal module
	Blink	Abnormal Hardware/Software
	Off	Abnormal Hardware
ERROR	On	Communication line error
	Off	No error in communication line
STATUS	On	Token secured
	Off	Yield token to other master
LINK-IF	On/Off	PLC body and interface abnormal
	Blink	PLC body and interface normal

Table 7.1 Master LED status indication

Slave station : indicates 'run' by 4 LEDs.



G7L-PBEA

Classification	State	Meaning
RUN	On	Normal communication
	Off	Parameter error or communication stop
ERROR	On	Abnormal hardware/software
	Off	Normal module
STATUS	On/Off	Abnormal software
	Blink	Normal software
LINK-IF	On/Off	Abnormal PLC body and interface
	Blink	Normal PLC body and interface

Table 7.2 slave LED status indication

CHAPTER 8 INSTALLATION AND STARTUP

8.1 Installation

8.1.1 Notices in installation

- It is available to install max. 4 Pnet communication module in GM1, GM2, GM3, K1000S PLC main base.
 - It is available to install max. 2 Pnet communication module in GM4, K300S PLC main base.
(available to install max. 4 of GM4 CPUB type, max. 8 of GM4 CPUC type.)
 - It is available to install max. 2 Pnet communication module in GM6 PLC main base.
 - It is available to install max. 1 Pnet communication module in GM7, K80S, K120S PLC main base.
-
- 1) Check the necessary basic elements for configuration and select the proper communication module.
 - 2) Select the cable to be used for communication module.
 - 3) When installing this communication module, check if there is a foreign material in the base connector to install or if the connector pin of module is damaged.
 - 4) This communication module should be installed in the base in the state that PLC power is not applied.
 - 5) All communication module can not be installed in the extended base and is required to select the slot position close to CPU in the main base to install.
 - 6) When installing this module, insert the protruded part of module in the base groove correctly in the state not connecting the communication cable and apply the sufficient force until the upper side is locked completely with lock device of the base. If the lock device is not locked, it may cause the error in the interface with CPU.

8.1.2 Cable installation

For Profibus cable, the Shielded Twisted Pair Cable should be used. Table 8.1 and Table 8.2 shows cable specification and max. transmission distance according to speed and cable type.

Cable characteristic	Type A	Type B
Impedance	135 – 165 Ω (f= 3 to 20 MHz)	100 – 130 Ω (f > 100 KHz)
Capacity	< 30 pF/m	< 60 pF/m
Resistance	< 110 Ω /Km	-
Conductor Area	$\geq 0.34 \text{ mm}^2$ (22 AWG)	$\geq 0.22 \text{ mm}^2$ (24 AWG)

Table 8.1 Cable Specification

Baud rate (kbit/s)	9.6	19.2	93.75	187.5	500	1500	3000	6000	12000
Cable Type A	1200	1200	1200	1000	400	200	100	100	100
Cable Type B	1200	1200	1200	600	200	70	-	-	-

Table 8.2 Transmission distance according to Cable and Speed

Note) For Transmission distance, assuming that max. signal attenuation is 6dB.

1) General notices

- Termination treatment of vertical section is needed.
- In case that the distance is far between stations, it is possible to extend the segment through repeater. (max. 9 repeater, 10 segment), available to connect 32 stations per segment (incl. repeater), max. 126 stations. (Repeater does not have station no.). The extended segment having no station is available.
- Generally, connect the red cable to no.3 pin TXD/RXD-positive and the green cable to no.8 pin TXD/RXD-negative. Shield shall be connected to the housing of connector.
- Use the cable that shield density is more than 80%.
- The ends of cable shield should be grounded.
- If the ground potential difference between stations is big, a great amount of current may flow through the shield. In this case, install the cable to make the ground potential difference equal separately.
For high speed more than 1.5Mbps, special cares should be taken.
- Use the special connector having the inductor inside.
- Spur Line is not allowed to use.
- In case of 12Mbps, keep the distance more than 1m between stations.

2) Termination treatment

- Each segment should do the termination treatment for both ends. If there are several segments, it is required to do the termination treatment for each segment.
- 3 resistances are necessary for termination.
- If possible, install the master at the end of one side.

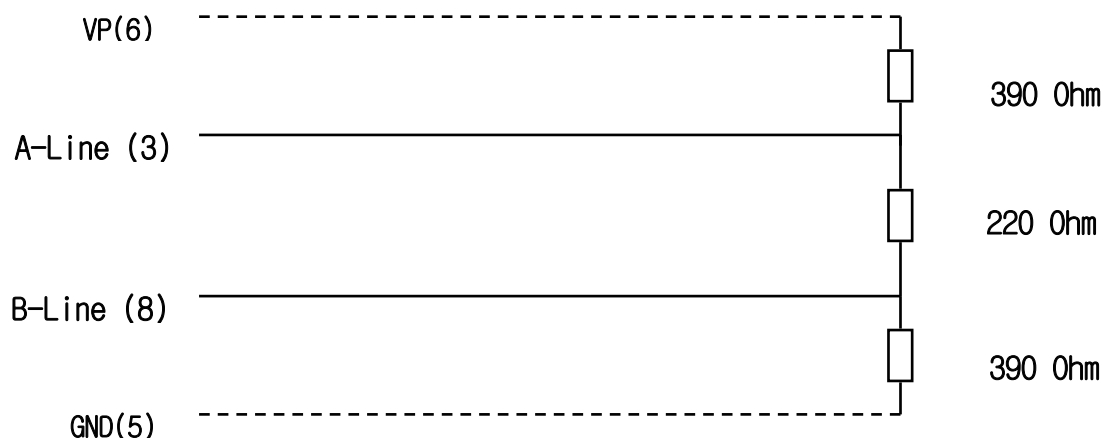


Figure 8.1 Vertical section treatment

8.2 Startup

Each segment should be connected by vertical resistance. If there is no vertical resistance, it may cause the error in communication. After connecting the communication cable, apply the power and observe the LED active state and if it is normal action, download the relevant program to PLC by GMWIN and execute the program.

8.2.1 Notices in system configuration

- 1) High speed link station no. of all other station including this module should be different. If connected with overlapping station no., it may cause the error in communication which results in preventing the normal communication.
- 2) Use the communication cable with the designated specification. If used the cable except the designated one, it may cause the serious obstacle in communication.
- 3) Before installing communication cable, check if the cable is disconnected or cutoff.
- 4) Tighten the communication cable connector strongly to fix the cable connection tightly. If cable connection is not stable, it may cause the serious obstacle in communication.
- 5) In case of connecting communication cable in long distance, the cable in wiring should be far from the power line or inductive noise.
- 6) If LED is not active normally, check the trouble cause by referring to 'CHAPTER 9, Trouble shooting' of this user's manual and if the trouble continues to happen, please contact to A/S center.

8.2.2 Checklist before Startup

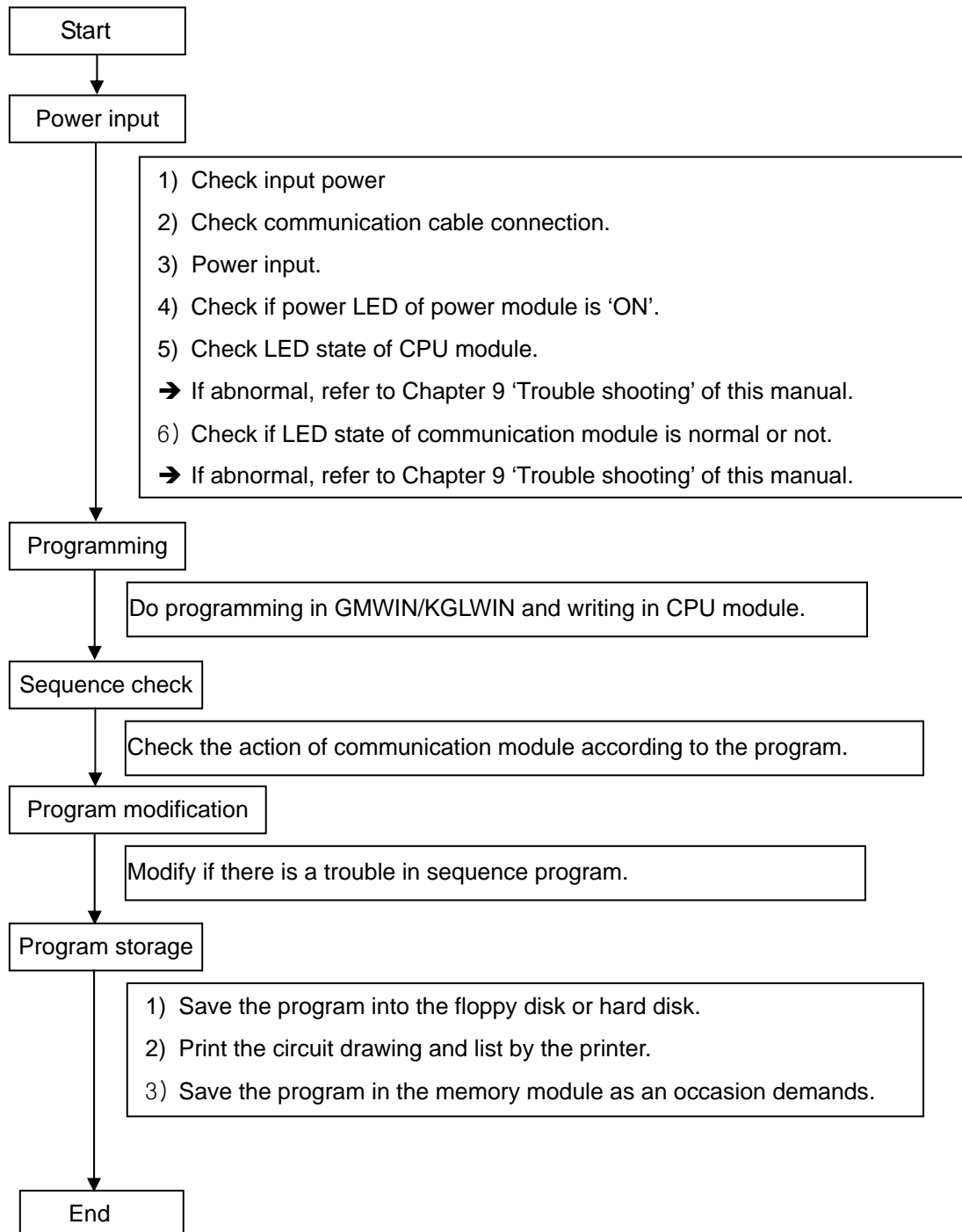
Here describes the items to be checked before startup of communication module.

- 1) Communication module to be installed in PLC

Checklist	Description
Basic S/W installation and checking	<ul style="list-style-type: none">- Check if GMWIN installation and action is good.- Check if frame editor installation and action is good.
Communication cable connection (only in case of connecting the cable)	<ul style="list-style-type: none">- Check if the connection communication cable and tab condition is good.- Check if the connection of each cable is open loop type.
Module installation	<ul style="list-style-type: none">- Check if the communication module is installed in the main base correctly.
Switch checking	<ul style="list-style-type: none">- Check if action mode switch is 0:RUN (switch value 0).

2) Startup procedure

Here describes the procedure from completion of PLC installation to startup.



8.3 Maintenance & Checking

8.3.1 Daily Checking

The following table shows the check details to be carried out daily.

Checking items		Description	Judgment criteria	Action
Cable connection state		Cable loosening	No loosening	Tighten the cable
Terminal connection state		Screw loosening	No loosening	Tighten the terminal screw
		Approach between compressing terminal	Proper interval	Correction
Master LED	RUN	'ON' check	ON (OFF is abnormal)	
	READY	'ON' check	ON (OFF is abnormal)	
	ERROR	'OFF' check	OFF (ON is abnormal)	
	STATUS	Generally, 'ON' check	Only one of all network master module should be 'ON'.	
	LINK-IF	Blink	Blink (ON or OFF is abnormal)	
Slave LED	RUN	'ON' check	ON (OFF is abnormal)	
	ERROR	'OFF' check	OFF (ON is abnormal)	
	STATUS	Blink	Blink (ON or OFF is abnormal)	
	LINK-IF	Blink	Blink (ON or OFF is abnormal)	

Table 8.3 Daily checking items

8.3.2 Regular Checking

Check the following items once or twice within 6 months and take necessary actions as follows :

Checking items		Checking method	Judgment criteria	Action
Surrounding environment	Temperature	Measured by thermometer/humidifier	0~55 °C	Adjust acc. to general spec. (Ex: environment standard inside control panel if using it inside control panel)
	Humidity		5~95 %RH	
	Pollution	Measure the corrosive gas	No corrosive gas	
Module state	Loosening, shaking	Move the communication module.	Strong attachment	Screw tightening
	Dust, foreign materials	Visual examination	No attachment	
Connection state	Terminal screw loosening	Tightening by the driver	No loosening	Tightening
	Approach of compressed terminal	Visual examination	Proper interval	Correction
	Connector loosening	Visual examination	No loosening	Connector fixing screw tightening
Power voltage check		Measure the voltage between AC 110/220V terminal	AC 85~132VAC 170~264V	Change the supply power.

Table 8.4 Regular checking items

CHAPTER 9 TROUBLE SHOOTING

Here describes a variety of error occurring during system operation, the causes, the detection methods and actions.

9.1 Basic procedure of Trouble shooting

In order to increase the reliability of system, it is important to use the reliable device and at the same time, the important thing is how fast to take the actions by any ways in case of error occurrence.

The most important thing to operate the system promptly, is to detect the trouble occurrence cause and take the actions immediately. The basic items to be considered in such trouble shooting are as follows :

1) Checking by the naked eyes

Check the following items by the naked eyes.

- Machinery active state (stop state, active state)
- Power apply state
- I/O device state
- Wiring condition (I/O cable, extended or communication cable)
- After checking the display status of each indicators (RUN LED, READY LED, ERROR LED, STATUS LED, LINK-IF LED), connect the peripheral device to check the PLC active state or program contents.

2) Trouble detection

Observe how the trouble is changed by the following operation.

- Place the key switch on STOP mode and turn the power ON/OFF.

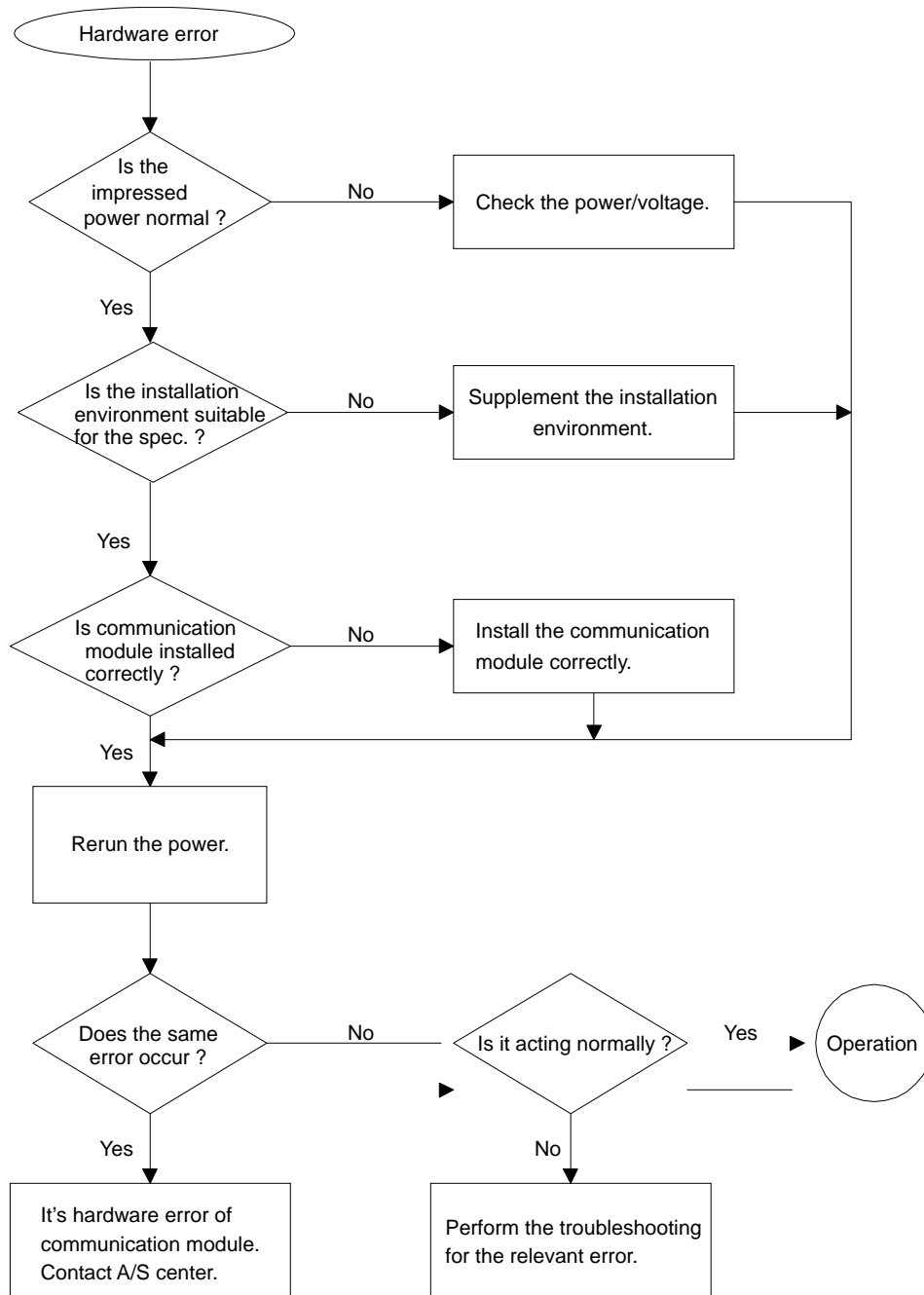
3) Range limitation

Estimate what is the trouble cause by using the above method among the following causes :

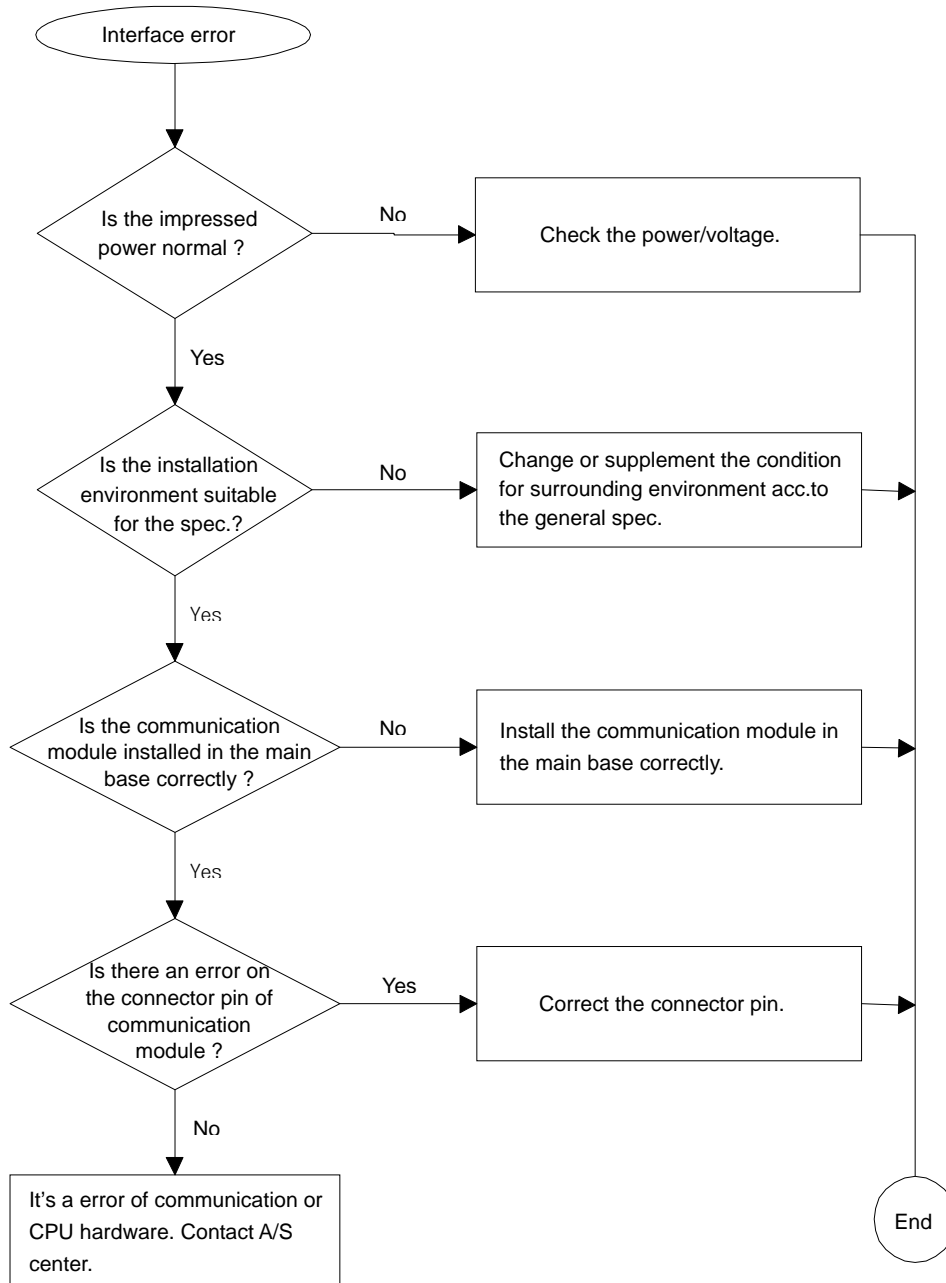
- PLC itself ? Or external cause ?
- I/O section ? Or others ?
- PLC program ?

Here describes the error type or the actions for the detection method and error code, by dividing it per phenomena.

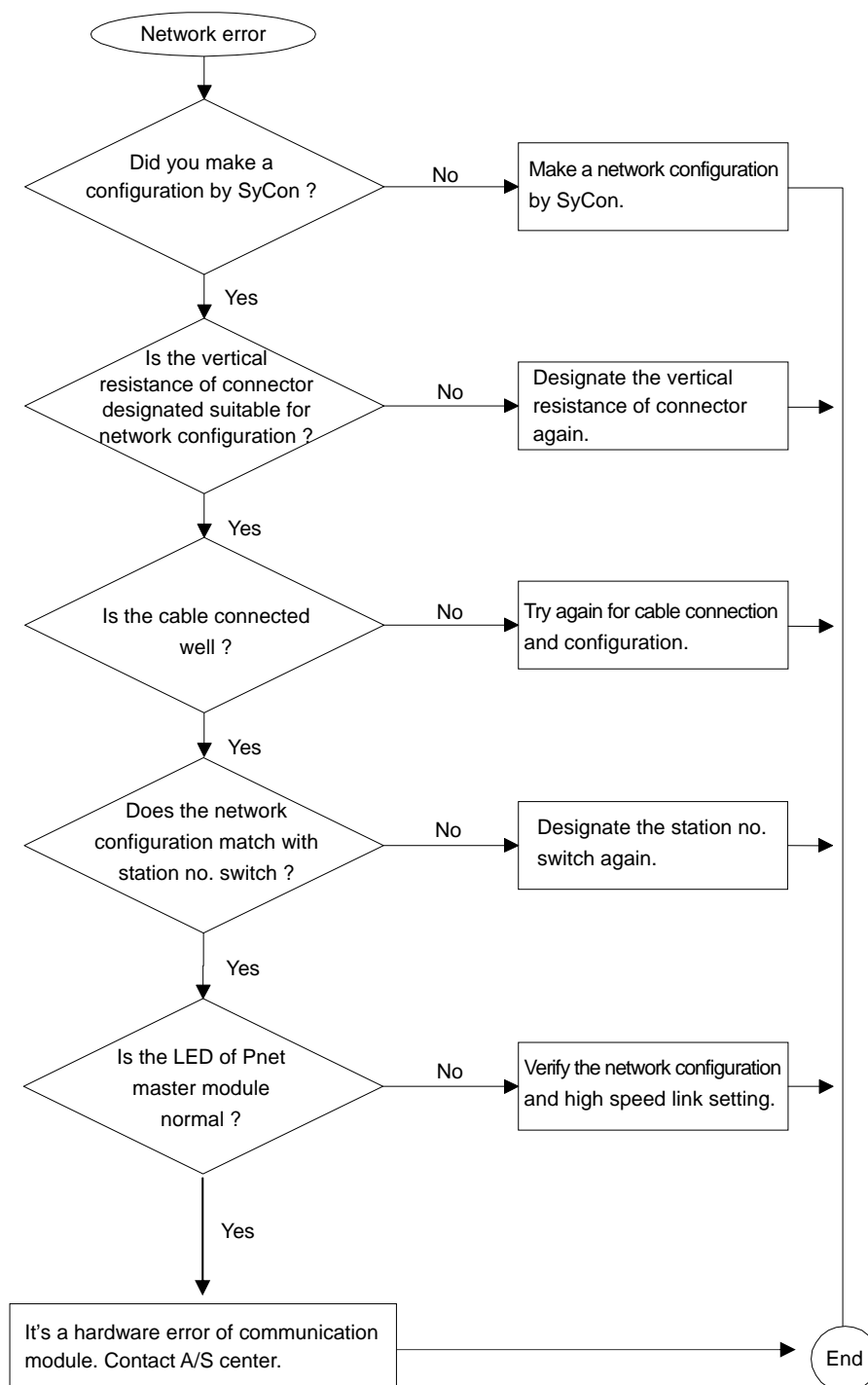
9.1.1 Hardware Error



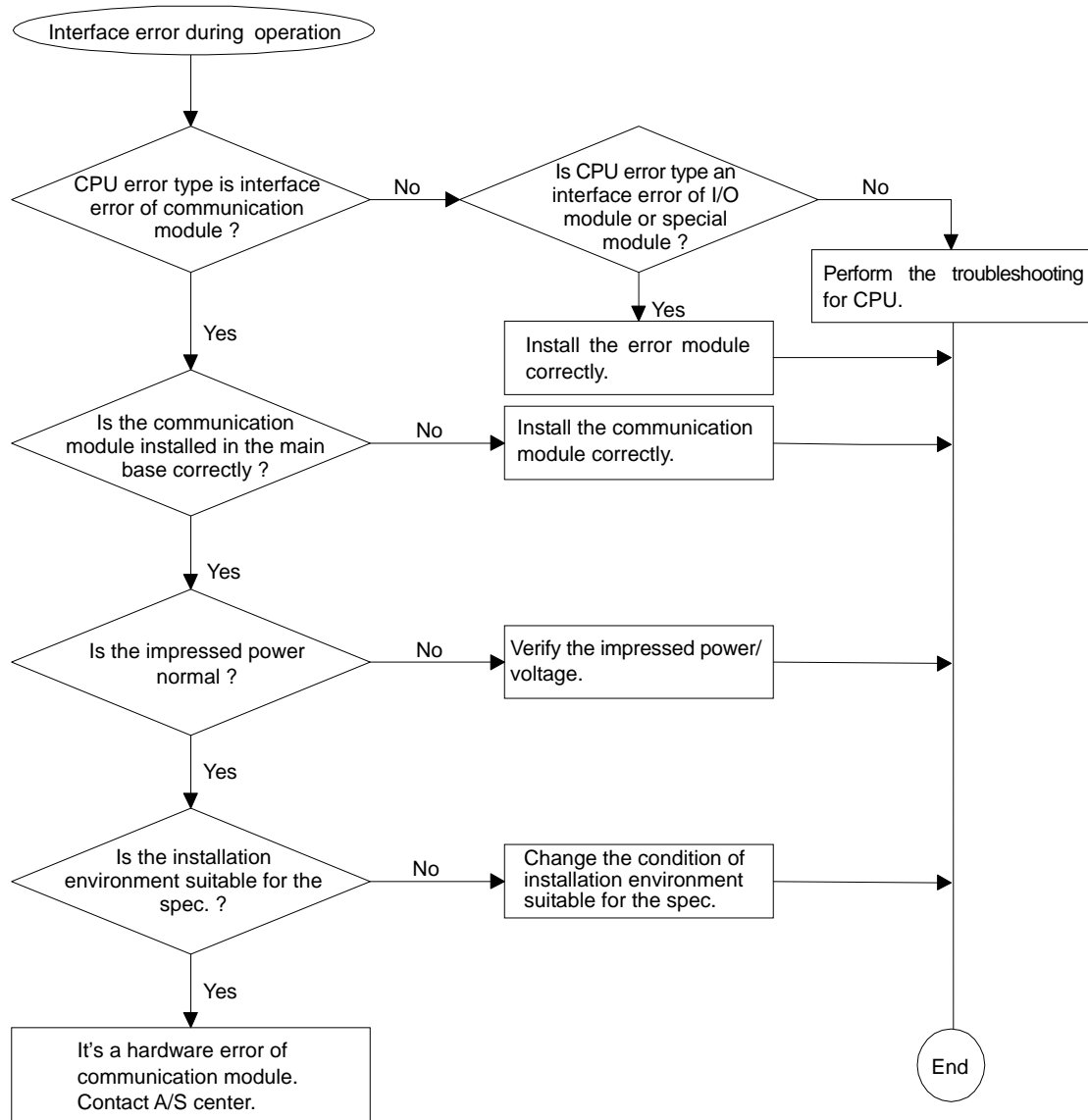
9.1.2 Interface Error



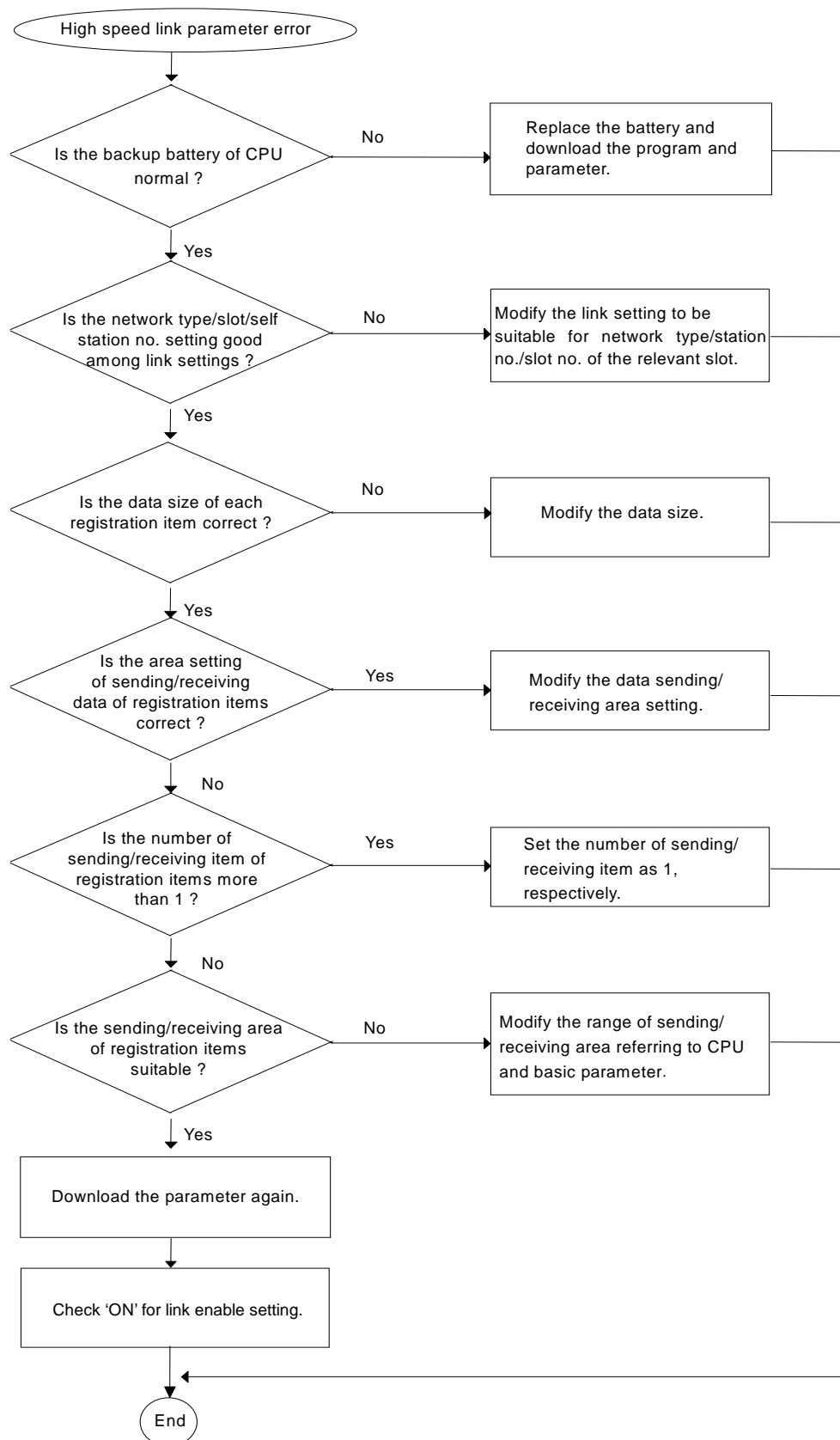
9.1.3 Network Error



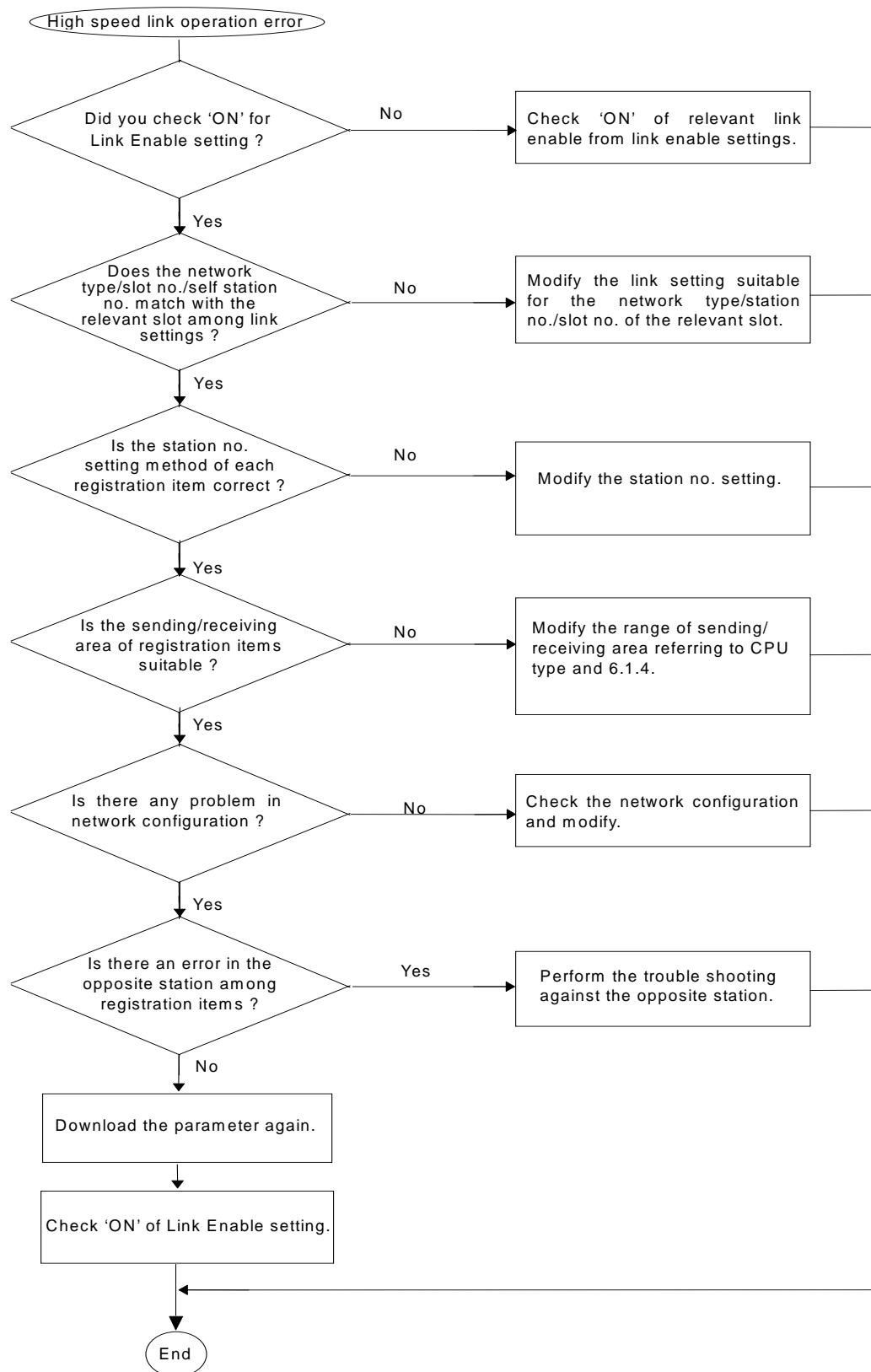
9.1.4 CPU and Interface Error during Operation



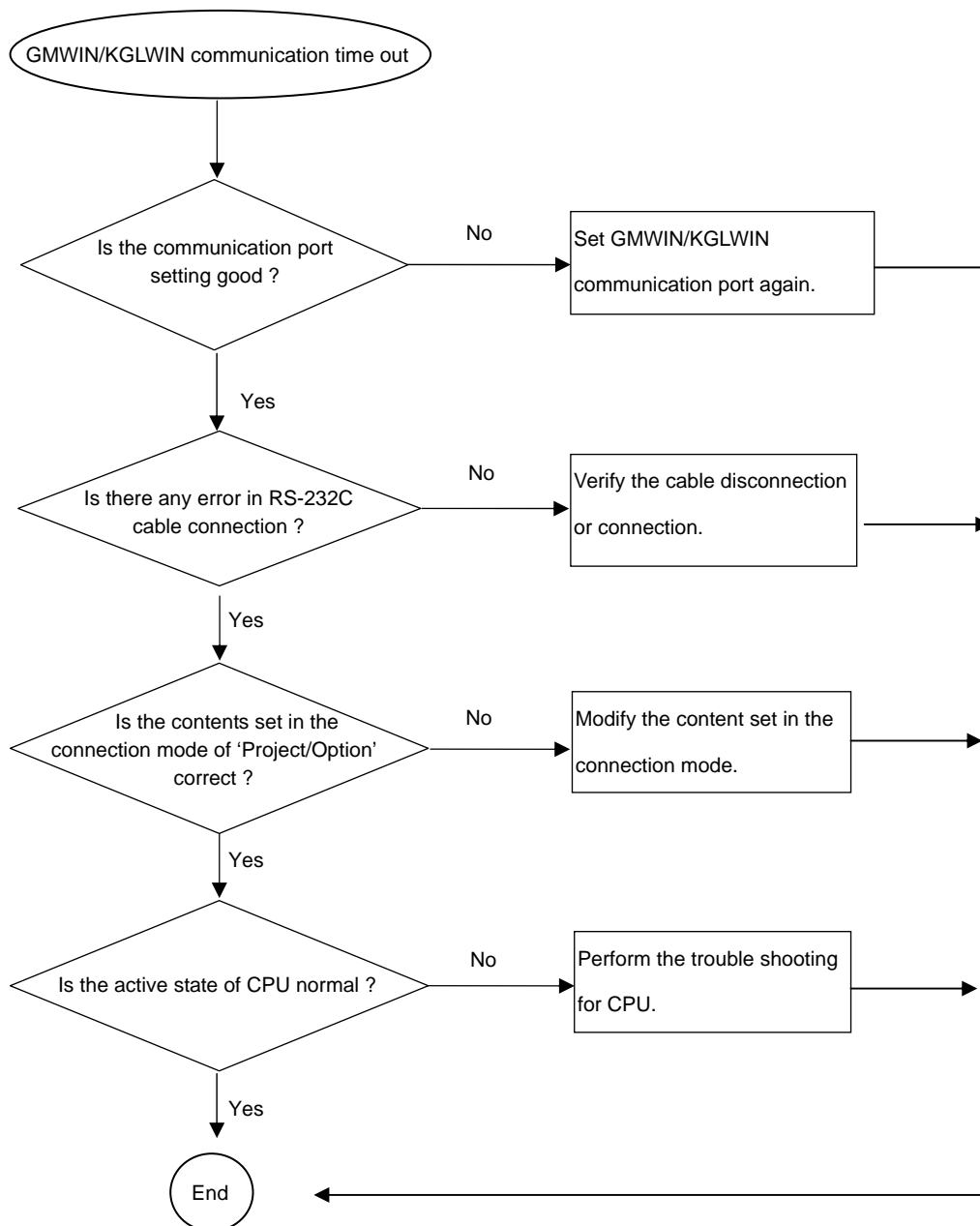
9.1.5 High speed link parameter error



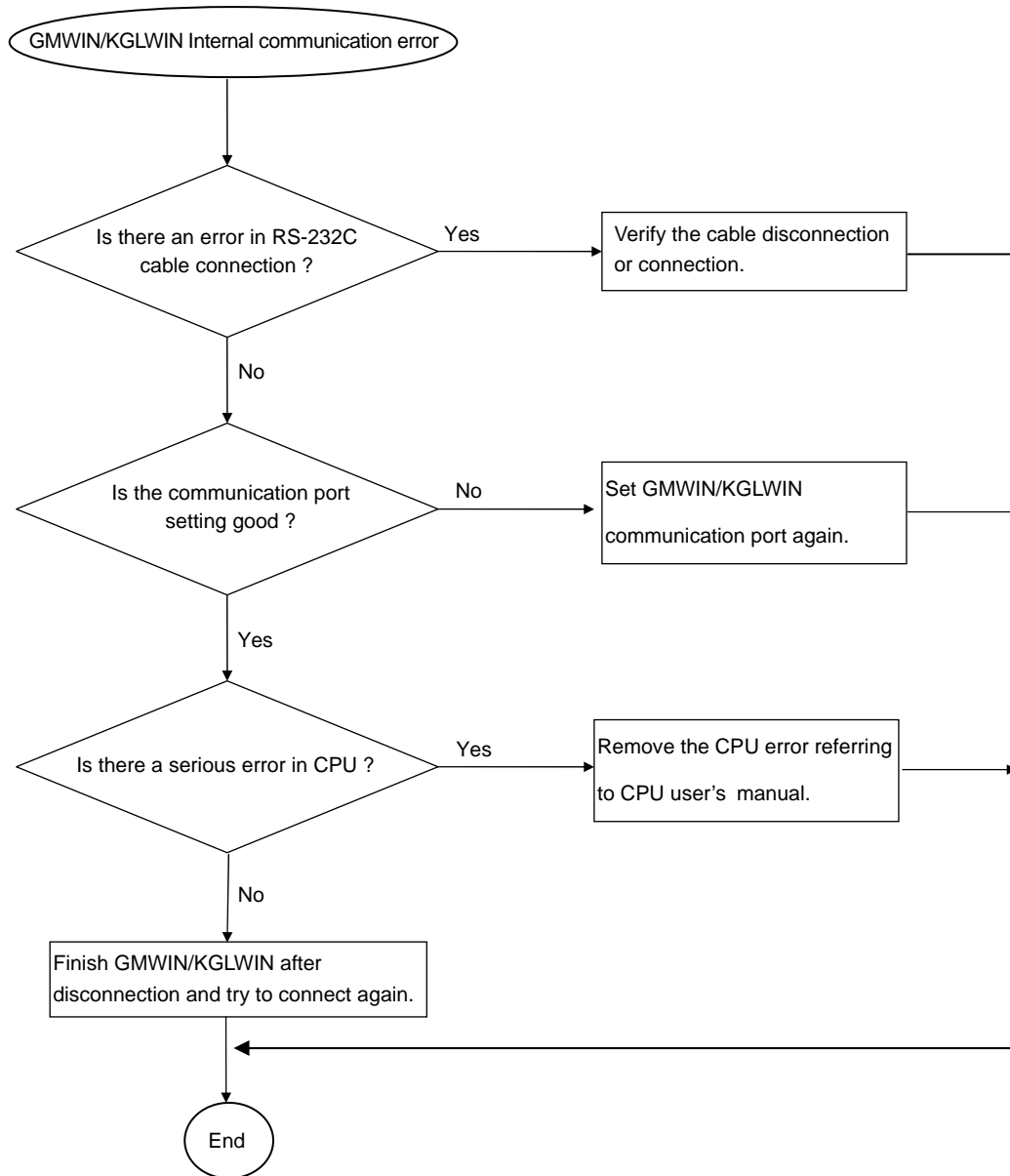
9.1.6 High speed link operation error



9.1.7 GMWIN/KGLWIN Communication Time Out



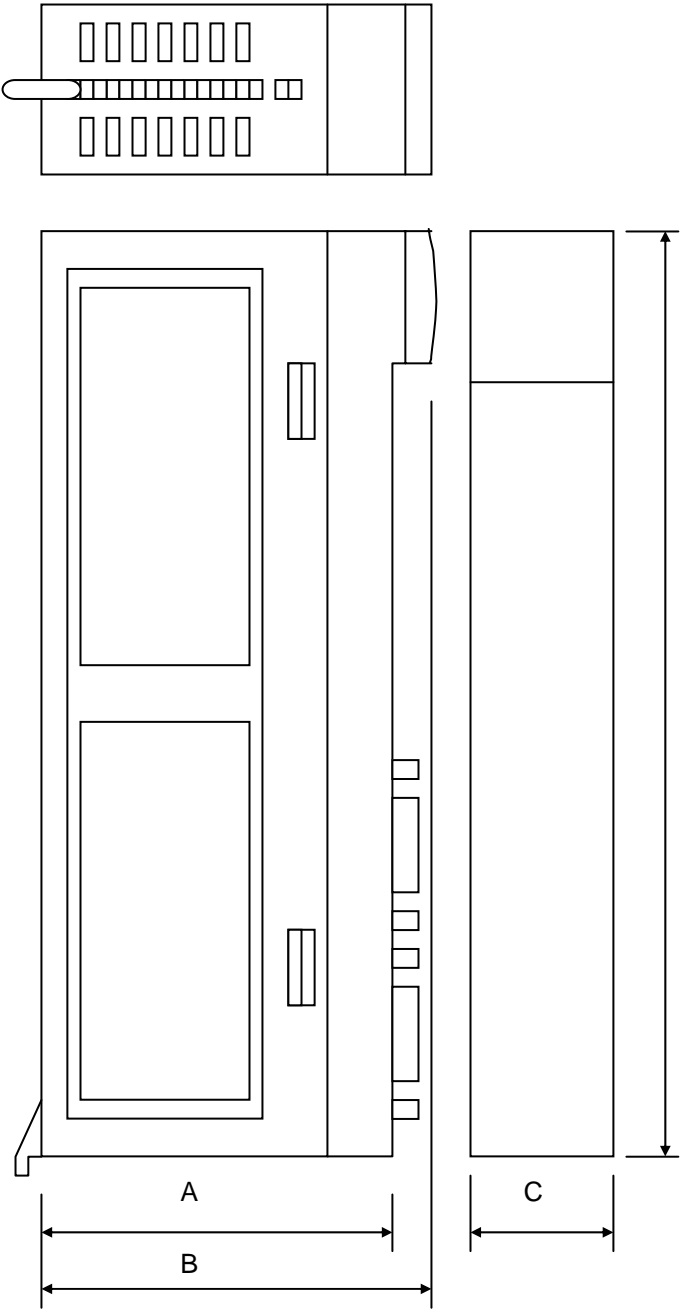
9.1.8 GMWIN/KGLWIN Internal Communication Error



CHAPTER 10 EXTERNAL DIMENSION

1) G3L-PUEA/B, G4L-PUEA/B

Dimension Unit : mm

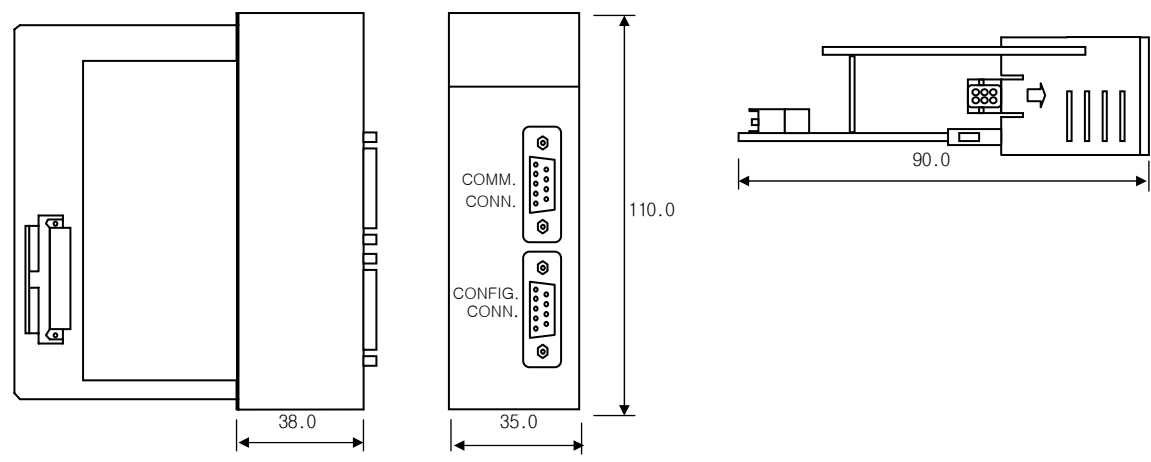


Class	G3L-PUEA/B	G4L-PUEA/B
A	118	107
B	130.5	121.5
C	35	35
D	250	135

D

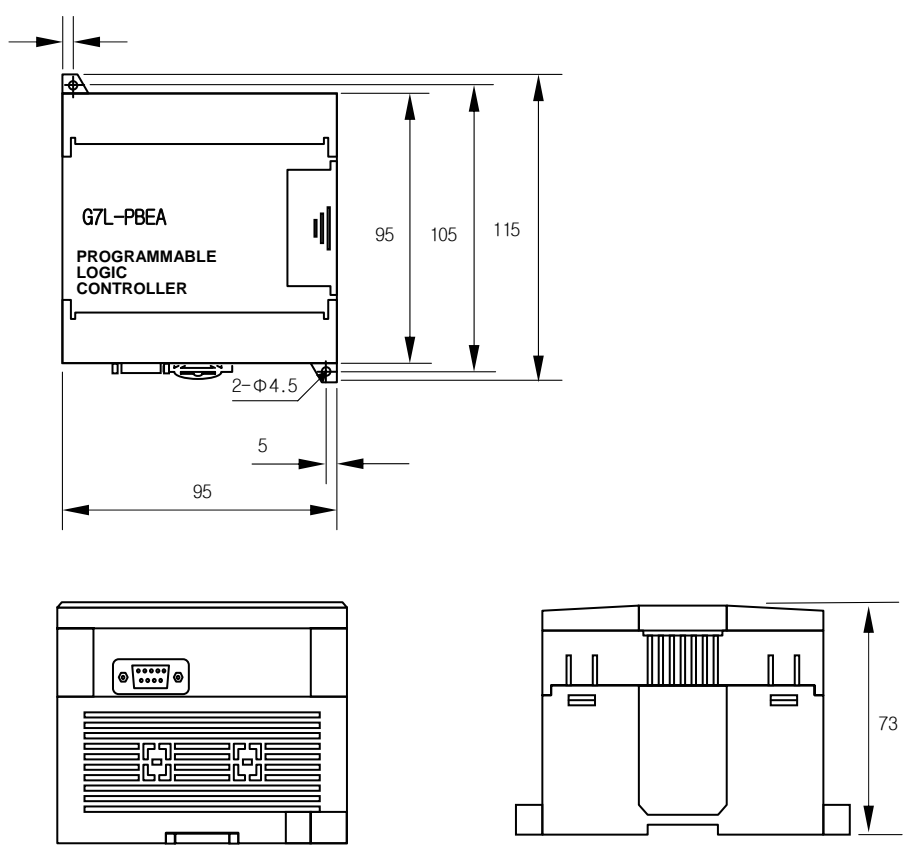
2) G6L-PUEA/B

Dimension Unit : mm



3) G7L-PBEA

Dimension Unit : mm



WARRANTY

WARRANTY

1. Warranty Period

The warranty period for the purchased product is 18 months from the manufactured date.

2. Warranty Range

For the troubles occurred during the warranty period on the above, a partial replacement or repair is available.

But the following cases are excluded from the warranty range.

- (1) Troubles by improper condition, environment or treatment other than those described in the user's manual
- (2) Troubles by the cause from other manufacturer's product
- (3) In case of modification or repair out of the LGIS or the branches designated by LGIS
- (4) In case of using the method other than the original method.
- (5) Troubles by the unexpected reason in the level of science technology at the time of project release.
- (6) In case that LGIS is not responsible for (such as nature disaster, fire etc.)

3. As this warranty means the warranty only for PLC unit body, it is required to use the product, considering the safety in case of system configuration or product application.

■ **HQ** : 9F East LG Twin Bldg. 20, Yoido-dong, Youngdungpo-gu, Seoul, Korea (150-721)

■ **Training**

- LGIS Institute TEL:(043)268-2631~2 FAX:(043)268-2633~4
- Seoul training center TEL:1544-2080 FAX:(02)3660-7021

■ **Internet Technology consulting**

- <http://www.lgis.com> (English)

The specification of this product is subject to change for the quality improvement without prior notice.

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