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Programmable Logic Controller

# XGT Rnet I/F MODULE

**XGL-RMEA**

User Manual



 **Safety Instructions**

• Read this manual carefully before installing, wiring, operating, servicing or inspecting this equipment.

• Keep this manual within easy reach for quick reference.

**LS** Industrial Systems

\* LS Industrial Systems constantly endeavors to improve its product so that Information in this manual is subject to change without notice.

**XGT Series/2006,10**




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# Safety Instructions

Safety Instructions should always be observed in order to prevent accident or risk with the safe and proper use the product...

Instructions are separated into “Danger”, “Warning” and “Caution”, and the meaning of the terms is as follows;

	<b>Danger</b>	This symbol indicates that serious injury or death may be caused in a moment if some applicable instructions are violated.
	<b>Warning</b>	This symbol indicates the possibility of serious injury or death if some applicable instructions are violated.
	<b>Caution</b>	This symbol indicates the possibility of slight injury or damage to products if some applicable instructions are violated.

■ The marks displayed on the product and in the user’s manual have the following meanings.



This mark is to call a user's attention to actions and operations which may cause dangerous situation. Instructions with this mark shall be carefully read and observed to keep from dangerous situation.



This mark is to call a user's attention to possibility of electric shock under the special conditions.

## ■ Safety Instructions when designing



### Caution

- ▶ I/O signal or communication line shall be designed at least 100mm away from a high-voltage cable or power line to be kept from influence of noise or magnetic field changing . If not, it may cause abnormal operation.
- ▶ Let the product installed free from direct vibration if lots of vibration is expected.
- ▶ Be sure to install the product free from metallic dust which may cause abnormal operation if lots metallic dust is expected.

## ■ Safety Instructions when installing



### Caution

- ▶ Use PLC only in the environment specified in general standard. If not, electric shock, fire, abnormal operation of the product or flames may be caused.
- ▶ Be sure that the module is correctly secured. If the module is not installed correctly, abnormal operation, error or dropping may be caused.

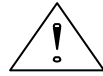
## ■ Safety Instructions when wiring



### Caution

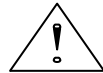
- ▶ Surely use the ground wire of Class 3 for FG terminals, which is exclusively used for PLC. If the terminals not grounded correctly, abnormal operation may be caused.
- ▶ Prior to wiring and connection in PLC, check the rated voltage and terminal arrangement of the product. If other power than rated is connected or wiring is incorrect, it may cause fire or defect.
- ▶ Secure the screws of terminals tightly with specified torque when wiring. If the screws of terminals get loose, short circuit or abnormal operation may be caused.
- ▶ Don't let any foreign materials such as wiring waste inside the module

## ■ Safety Instructions for test-operation or repair



### Warning

- ▶ Don't touch the terminal when powered. Abnormal operation or electric shock may occur.
- ▶ Prior to cleaning or tightening the terminal screws, let the power off.



### Caution

- ▶ Don't remove PCB from the module case nor remodel the module. Defect, abnormal operation, product damage or fire may occur. Prior to installing or disassembling the module, let the power off.
- ▶ The battery shall be exchanged only when the power is On. If it is exchanged while the power is Off, the program may be lost.

## ■ Safety Instructions for waste disposal



### Caution

- ▶ Product waste shall be processed as industrial waste.

## Revision History

Date	Manual number	Remark
'05.3	10310000637	First Edition.
'05.5.19	10310000637	Description of function added (Page: A-1).
'06.6.30	10310000637	Terminologies are edited.

## About User's Manual

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### About User's Manual

Congratulations on purchasing PLC of LS Industrial System Co.,Ltd.

Before use, make sure to carefully read and understand the User's Manual about the functions, performances, installation and programming of the product you purchased in order for correct use and importantly, let the end user and maintenance administrator to be provided with the User's Manual.

The Use's Manual describes the product. If necessary, you may refer to the following description and order accordingly. In addition, you may connect our website(<http://www.lsis.biz/>) and download the information as a PDF file.

#### Relevant User's Manuals

Title	Description	No. of User's Manual
XGK-CPUA/CPUE/CPUH/CPUS	It describes specifications, system structure and EMC spec. correspondence of CPU module, power module, base, I/O module and increase cable	10310000508
XG5000 User's Manual	It describes how to use XG5000 software especially about online functions such as programming, printing, monitoring and debugging by using XGT series products.	10310000512
XGK Series Instructions & Programming	It is the user's manual for programming to explain how to use commands that are used PLC system with XGK CPU.	10310000510

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# Chapter 1 Overview

## 1.1 Introduction

This manual of Rnet I/F module is prepared to describe XGT series of dedicated remote net (**hereinafter referred to as Rnet I/F module**). XGT Rnet I/F module is composed of data link layer and physical layer in OSI 7 layers. Rnet system controls I/O data from the sensor of field level and manages the data conveniently for monitoring, troubleshooting and maintenance through LS HMI of PMU unit. Rnet I/F module supports a speed of 1Mbps, up to 64 stations (including master) and provides convenience of data Tx/Rx for users by means of XG-PD parameters setting, through LS dedicated network. Generally, electric cable is used for Rnet system configuration, however, electric/optic repeater is provided here for the purpose of remote application and reliance improvement for users to configure the system expansively. In addition, XGT Rnet I/F module can configure GM/MK series of Rack type remote, which can be usefully applied to the location where lots of points are required.

## 1.2 Characteristics

XGT Rnet I/F module has the following characteristics;

**Rnet I/F module :**

- ▶ LS dedicated network
- ▶ Convenient with High-speed link parameters setting is available
- ▶ Electric/optic repeater option is provided
- ▶ Remote stage 1 connection service is available through G3L-RREA
- ▶ Program monitoring/editing is available with connecting to CPU through G0L-GWRA
- ▶ Reduced wiring, easy installation
- ▶ Up to 12 units can be installed on 1 basic base
- ▶ Various system configurations are available through basic parameters changes
- ▶ Smart I/O + Rnet system configuration is available

## Chapter 1 Overview

### 1.3 Product information

[Table 1.3.1] Family products of XGT Rnet I/F modules

Classification	Connection cable	Model	Product code	Description	Remarks
Master module	Twisted pair (electric)	XGL-RMEA	47200006	-	XGT Rnet master module
Slave module	Twisted pair (electric)	G3L-RREA	46300143	Installed on GM3/K1000S CPU position	Rack type remote system
		G4L-RREA	46310159	Installed on GM4/K300S CPU position	
		G6L-RREA	46640104	Installed on GM6/K200S CPU position	
		GRL-D22A	47060001	DC input 16 points	Smart I/O Rnet series - Fixed terminal block - 9-pin communication connector
		GRL-D24A	47060002	DC input 32 points	
		GRL-TR2A	47060003	TR output 16 points (0.1A, Sink)	
		GRL-TR4A	47060004	TR output 32 points (0.1A, Sink)	
		GRL-RY2A	47060005	Relay output 16 points	
		GRL-DT4A	47060006	DC input 16 points/ TR output 16 points	
		GRL-D22A(N)	4706000133	DC input 16 points	Smart I/O Rnet series - Fixed terminal block - 5-pin communication connector
		GRL-D24A(N)	4706000233	DC input 32 points	
		GRL-TR2A(N)	4706000333	TR output 16 points (0.1A, Sink)	
		GRL-TR4A(N)	4706000433	TR output 32 points (0.1A, Sink)	
		GRL-RY2A(N)	4706000533	Relay output 16 points	
		GRL-DT4A(N)	4706000633	DC input 16 points/ TR output 16 points	
		Repeater		G0L-FREB	46290016
Signal converter		G0L-FOEA	46290004	For optic/electric signal conversion	Solely
Optic signal distributor (Active coupler)		G0L-FABA	46290001	Base module	-
		G0L-FAPA	46290003	AC power module	-
		G0L-FACA	46290002	Optic interface module	-
		G0L-FADA	46290009	Dummy module	-
Loader I/F module		G0L-GWRA	47060038	For GMWIN/KGLWIN connection	One for one system

#### Notes

- 1) Optic signal distributor is called as Active Coupler.
- 2) As 8 G0L-FACAs can be installed on the optic signal distributor, 3 G0L-FADAs (dummy module) are needed more if 5 G0L-FACAs have been installed.

## Chapter 2 Specifications

## Chapter 2 Specifications

### 2.1 General Specifications

General specifications of XGT series are as shown in Table 2.1.

No.	Item	Specification	Related specifications			
1	Operating temperature	0°C ~ +55°C				
2	Storage temperature	-25°C ~ +70°C				
3	Operating humidity	5 ~ 95%RH, Non-condensing				
4	Storage humidity	5 ~ 95%RH, Non-condensing				
5	Vibration	For discontinuous vibration		IEC 61131-2		
		Frequency	Acceleration		Amplitude	Number
		10 ≤ f < 57 Hz	-		0.075 mm	
		57 ≤ f ≤ 150 Hz	9.8 m/s <sup>2</sup> (1G)		-	
		For continuous vibration			Each 10 times in X, Y, Z directions	
		Frequency	Acceleration			Amplitude
		10 ≤ f < 57 Hz	-			0.035 mm
		57 ≤ f ≤ 150 Hz	4.9 m/s <sup>2</sup> (0.5G)	-		
6	Shock	* Maximum impact acceleration: 147 m/s <sup>2</sup> (15G) * Authorized time: 11 m/s * Pulse wave : Signal half-wave pulse (Each 3 times in X,Y,Z directions)		IEC 61131-2		
7	Noise proof	Square wave impulse noise		±1,500V	Test specification LS Industrial Systems	
		Electrostatic discharging		Voltage: 4kV (contact discharging)	IEC 61131-2, IEC 61000-4-2	
		Radiated electromagnetic		27 ~ 500 MHz, 10 V/m	IEC 61131-2, IEC 61000-4-3	
		Fast Transient /burst noise	Class	Power module	Digital/Analog I/O communication interface	IEC 61131-2, IEC 61000-4-4
Voltage	2 kV		1 kV			
8	Ambient conditions	No corrosive gas or dust				
9	Operating height	2,000 m or less				
10	Pollution degree	2 or less				
11	Cooling type	Natural air cooling				

[Table 2.1] General Specifications

#### Notes

- 1) IEC (International Electrotechnical Commission)  
: An international nongovernmental organization which promotes internationally cooperated standardization in electric/electronic fields, publishes international standards and manages applicable estimation system related with.
- 2) Pollution degree  
: An index indicating pollution degree of the operating environment which decides insulation performance of the devices. For instance, Pollution degree 2 indicates the state generally that only non-conductive pollution occurs. However, this state contains temporary conduction due to dew produced.

## Chapter 2 Specifications

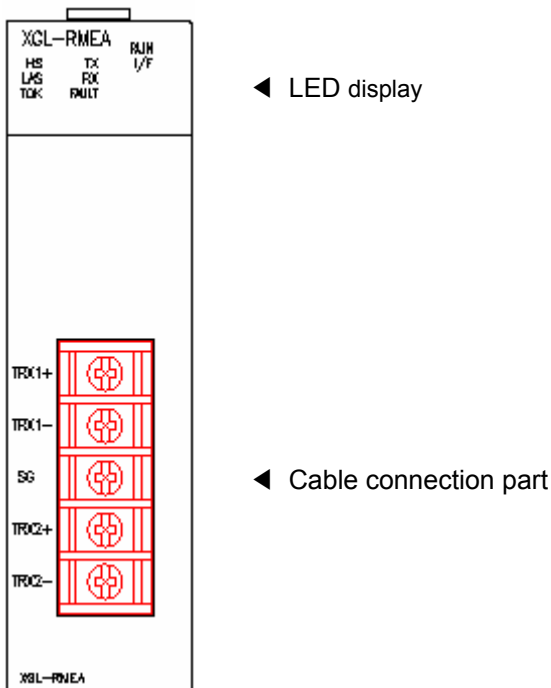
### 2.2 Performance Specifications

Specifications for system configuration of Rnet I/F module are as described below.  
Refer to the table below for system configuration.

Item		Specifications
Transmission Speed		1Mbps (Rnet I/F modules common)
Encoding type		Manchester Biphase-L
Electric	Tx distance (per segment)	Maximum 750m
	Tx distance (If repeater used)	Maximum 750m * (6 repeaters+1) = 5.25km
	Tx route	Twisted pair shielded cable
Maximum stations connected		Master + Slaves = 64 stations (Only 1 master is available in the network.)
Maximum points per station		60 Words
Maximum CPU units available		12
Location available		Basic base ~ Added base 7 stages (XGK-CPUH) Basic base ~ Added base 4 stages (XGK-CPUS)
Maximum protocol size		256 bytes
Access method to service zone		Circulated Token Passing
Communication type		Connection Oriented service Connectionless service
Check of frame error		$CRC\ 16 = X^{15} + X^{14} + X^{13} + \dots + X^2 + X + 1$

**2.3 Structure and Characteristics**

1) LED display



SILK display	LED status	LED details
RUN	On	Normal
	Off	Serious defect, Contact Customer Service Center
I/F	Blinks	Normal
	On/Off	Serious defect, Contact Customer Service Center
High-speed	On	During High-speed link communication service
	Off	Suspend High-speed link communication service
LAS	On	Normal communication
	Blinks	Master module, Contact Customer Service Center
TX	On	Normal
	Off	Check High-speed link parameters
RX	On	Normal
	Off	Check High-speed link parameters
TOK	On	Normal
	Off	Master module, Contact Customer Service Center
FAULT	On/Blinks	Check cable connection and wiring
	Off	Normal

## Chapter 2 Specifications

### 2) Cable connection part

#### (1) Cable specifications (LS cables)

Designations	LIREV-AMESB 2 * 0.64mm 22AWG	Structure
Manufacturer	LS Cables	
Cable type	Shielded twisted pair	
Conductor resistance	59Ω/km (normal temperature)	
Voltage resistance (DC)	500 V/Min (normal temperature)	
Insulated resistance	1,000 MΩ/km or more	
Capacitance	45 pF/m or less (1 kHz)	
Characteristic impedance	120±12Ω (10 MHz)	
Number of cores	2	

#### (2) Cable connection

##### a) Connection with Smart I/O D-sub

XGL-RMEA	Smart I/O D-Sub 9pin	Wiring
TRX1+/TRX2+	TX1/TX2	
TRX1-/TRX2-	RX1/RX2	
SG	9Pin Shield	

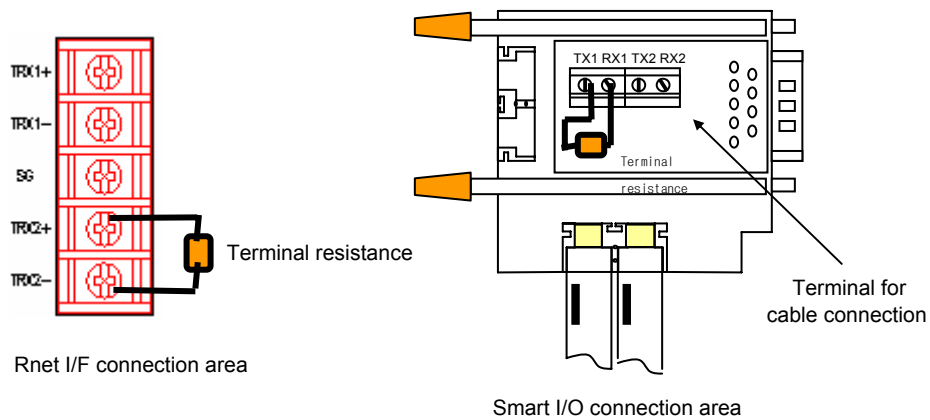
##### b) Smart I/O 5-pin

XGL-RMEA	Smart I/O 5pin	Wiring
TRX1+/TRX2+	Red (TRX+)	
TRX1-/TRX2-	White (TRX-)	
SG	Colorless (SG)	

### 2.4 Terminal resistance

Be sure to install the terminal resistance on the both ends of the line. Connect Smart I/O Rnet with TX1 and RX1, and Rnet I/F module with TRX2+ and TRX2-.

- Resistance value:  $110\Omega$ , 1/2W
- Contact between connector case and terminal resistance is not allowed.



[Fig. 2.4.1] Connection of terminal resistance

## Chapter 3 Installation and Test Operation of the Product

### 3.1 Precautions for Installation

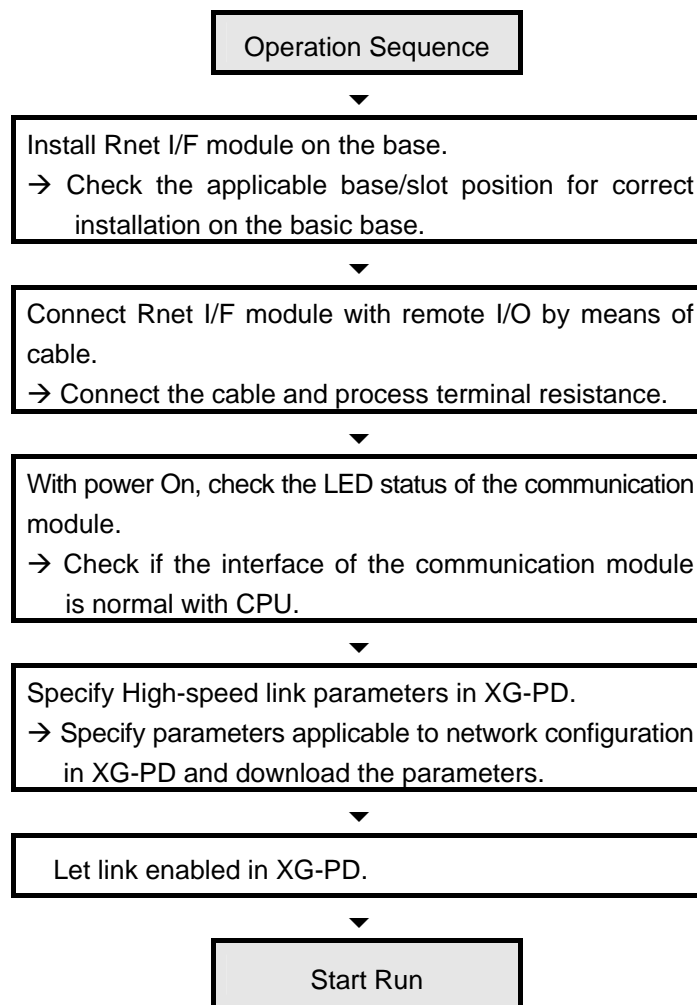
#### 3.1.1 Precautions for installation

For system configuration through Rnet I/F module, carefully make sure of the following items prior to installation.

- 1) Check the basic factors for necessity of configuring the system and select an appropriate communication module.
- 2) Select the cable to be used for this communication module (surely use the standard cable).
- 3) Before the communication module is installed, check with any foreign material on the base connector the module will be installed on and any damage on the connector pin of the module.
- 4) For installation of the module, exactly insert the protuberant part at the bottom of the module with the communication cable disconnected into the base groove and then apply enough strength until its top is locked up with the locking device of the base. If the lock is not applied, it may cause an error on the interface with CPU.

### 3.2 From Setting to Operation

The sequence of the product from installation to operation will be described below. After the product installation is complete, install and configure the system to be operated as specified in the following sequence.



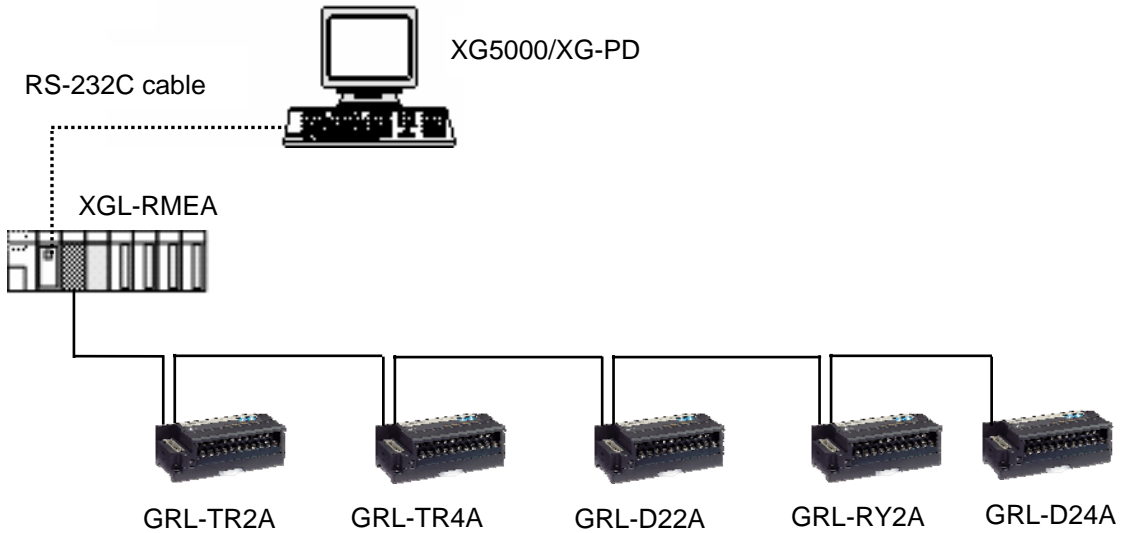
#### Notes

- 1) The station number of the master module is set to 0.
- 2) The station number of the remote I/O should not be set to 0.

## Chapter 4 System Configuration

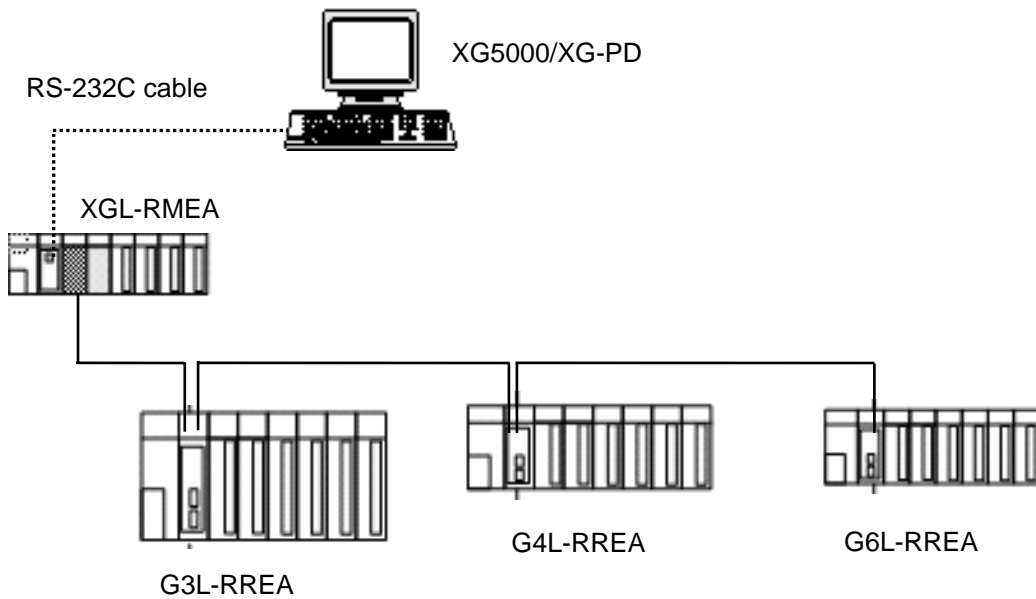
### 4.1 System Configuration of Network

#### 4.1.1 XGL-RMEA + Smart I/O



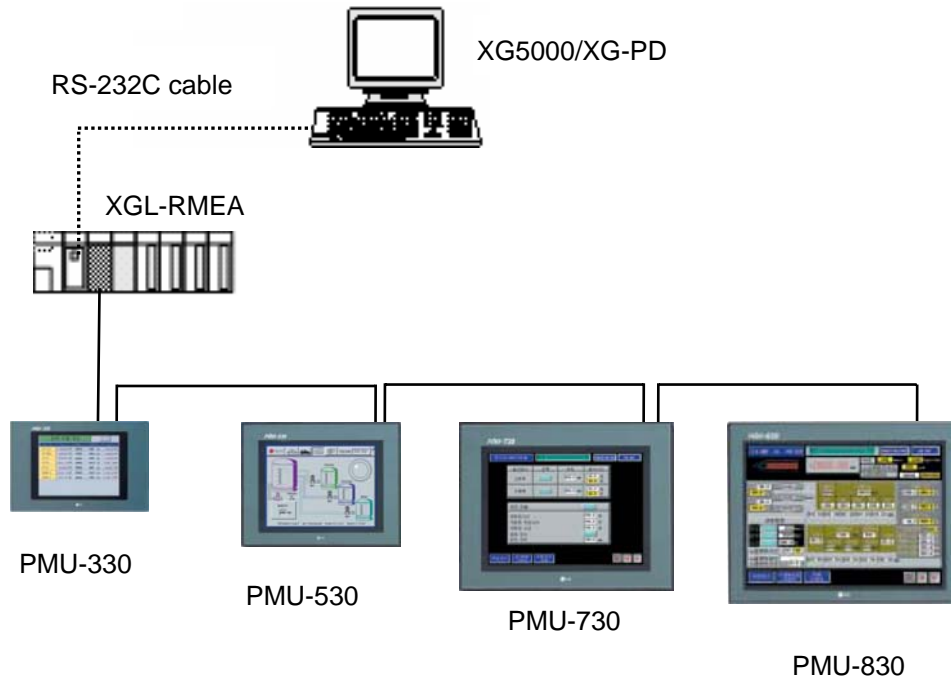
[Fig. 4.1.1] System configuration of Smart I/O

#### 4.1.2 XGL-RMEA + Rack type of remote



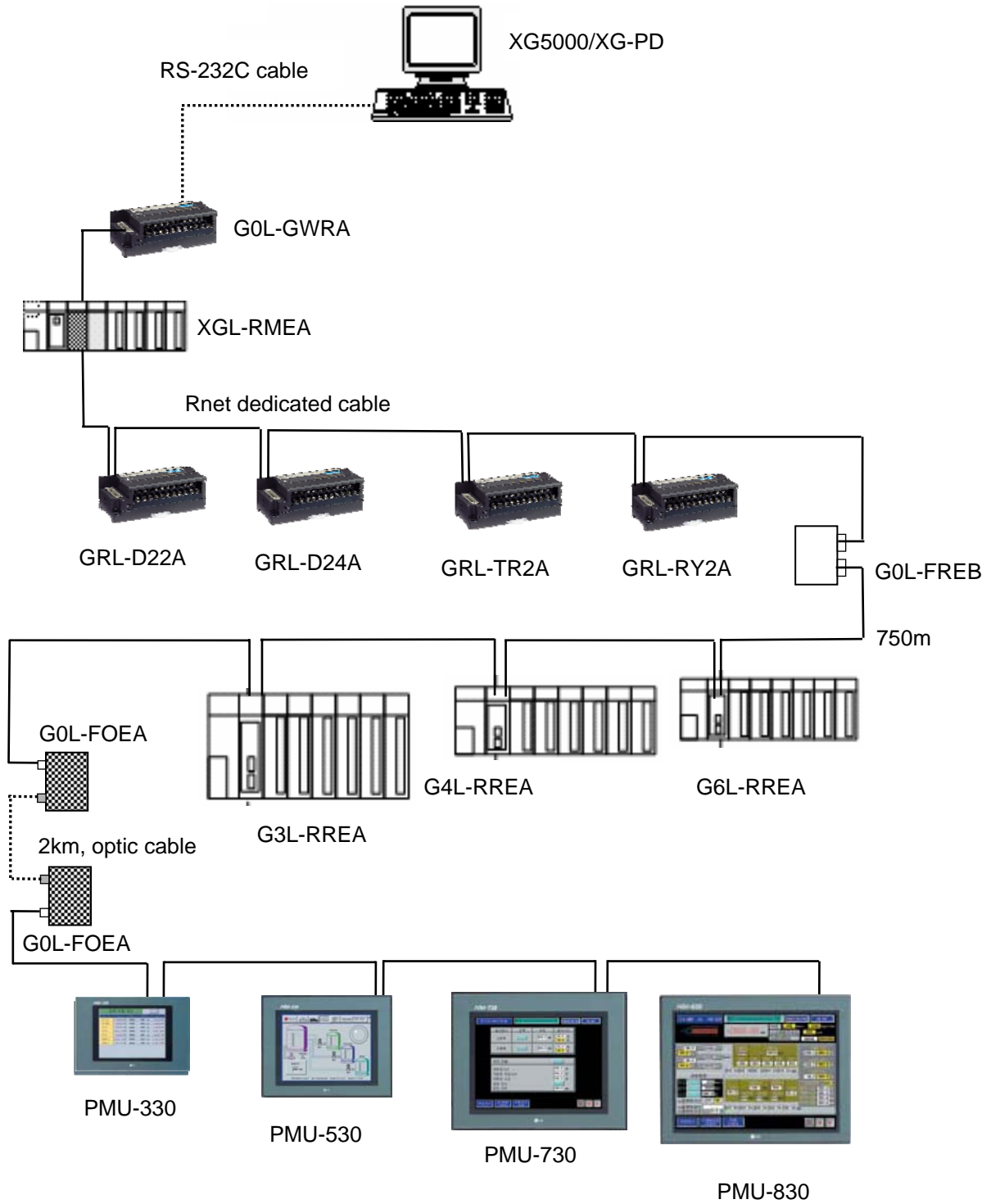
[Fig. 4.1.2] Rack type of remote system

4.1.3 XGL-RMEA + PMU



[Fig. 4.1.3] PMU system

4.1.4 XGL-RMEA + Composite system



[Fig. 4.1.4] Composite system

## Chapter 5 High-speed Link Setting

### 5.1 Introduction

High-speed link specifies the Send/Receive device area and data size between CPU module and the communication module by XG-PD.

High-speed link can be set the function as shown below.

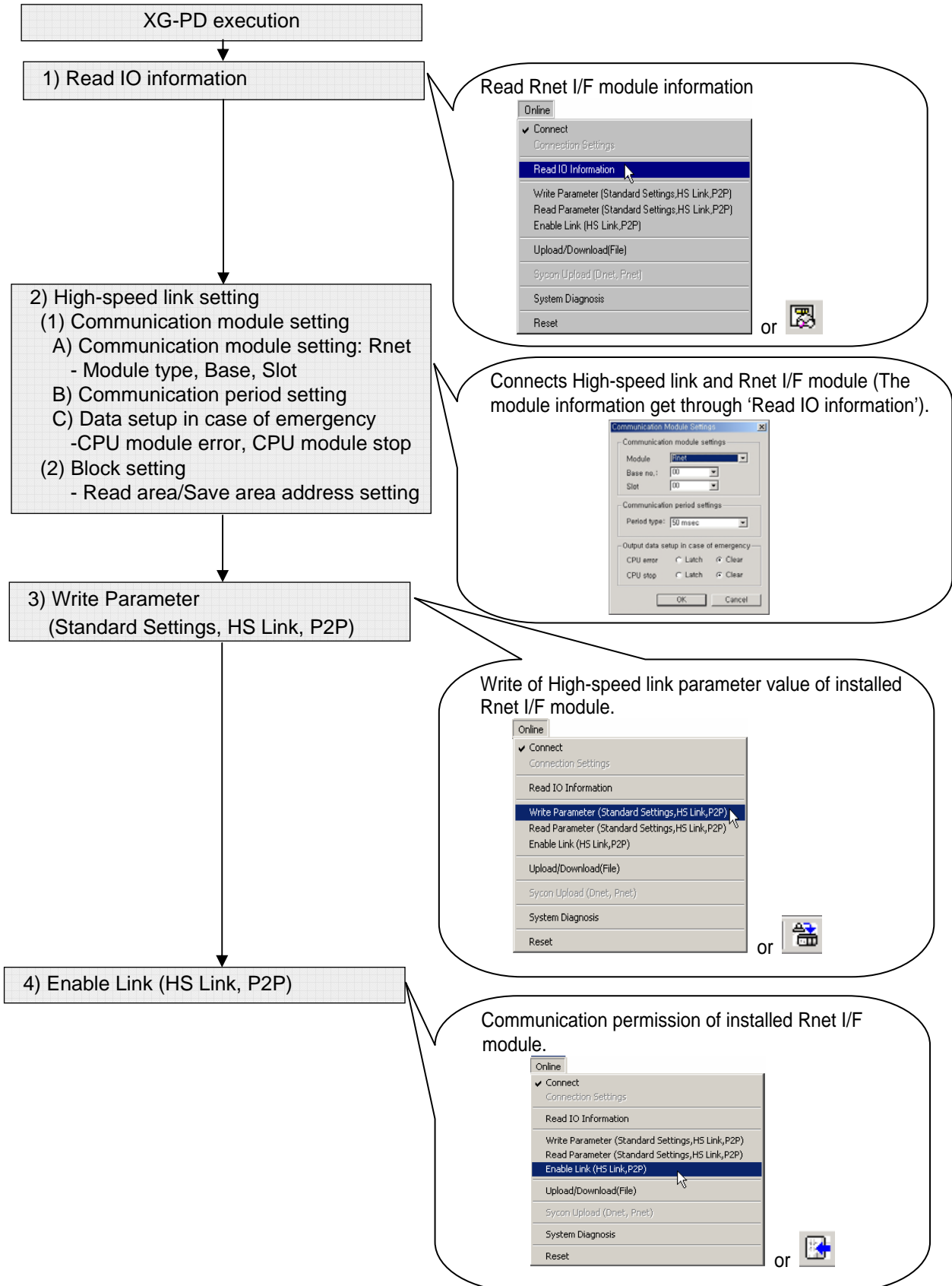
Description		High-speed Link			
Communication module setting	Communication module setting	Module type	Rnet		
		Base no.	Max.: 0 ~ 7 Setting range is different from CPU module.		
		Slot no.	Max.: 0 ~ 11 Setting range is different from Base type.		
	Communication period setting (Period type)	Select among 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 5s, 10s. - Default setting: 50 ms			
	Output data setup in case of emergency	CPU error	Latch	Keep the previous output status.	
			Clear	Clear the output.	
CPU stop		Latch	Keep the previous output status.		
		Clear	Clear the output.		
High-speed link block setting	Station type <sup>*1</sup>	Slave			
	Block type <sup>*1</sup>	Send: Data is transmitted from master module to slave module. Receive: Data is transmitted from slave module to master module.			
	Station No. <sup>*1</sup>	Slave station number (Range: 0 ~ 63)			
	Block No. <sup>*1</sup>	It is not used with Rnet I/F module.			
	Read area (From Master to Slave module)	Address	Head address of the sending device Usable device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR		
		Size <sup>*1</sup> (Byte)	Input/Output point of slave module is displayed Byte. - If input module point is less than 8 bit, it is processed 1 Byte.		
	Save area (From Slave to Master module)	Address	Head address of the receiving device Usable device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR		
		Size <sup>*1</sup> (Byte)	Input/Output point of slave module is displayed in Byte. - If input module point is less than 8 bit, it is dealt with 1 Byte.		
	PLC connection	RS-232C or USB Port of CPU module			
	Control condition	It can control regardless of position of Run mode switch (Run, Stop) of CPU module.			
Max. communication point	60480 points (63 blocks * 120 bytes)				
Max. block number	63 (Setting Range : 0~62)				
Max. point per block	120 bytes (960 points)				
Number of High-speed link setting	Up to 12				

#### Note

- ▶ When High-speed link is edited, parameter has to download again.
- ▶ High-speed link is used per a communication module.
- ▶ CPU module saves the written parameter (Standard, High-speed link, P2P).  
When CPU module is exchanged, parameter in XG-PD has to back-up and then the parameter has to write in CPU module again.

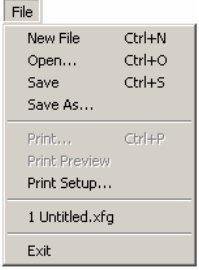




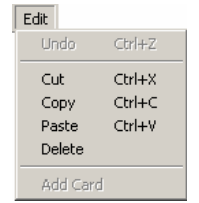




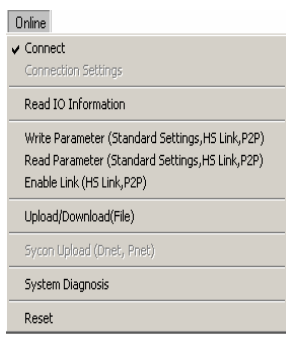







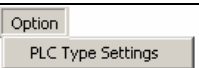
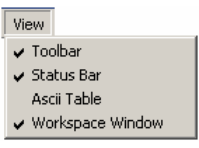
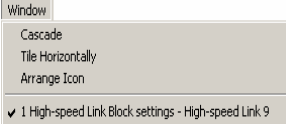
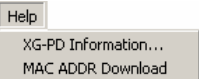

**5.2 How to use XG-PD**

XG-PD usage for Rnet I/F module is as shown below.



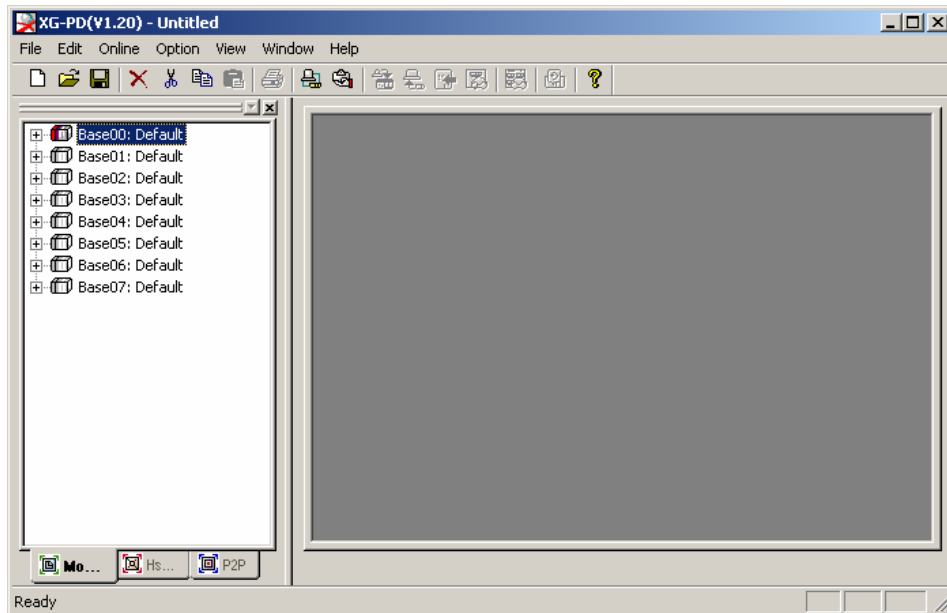
## Chapter 5 High-speed Link Setting

### \* Relation of Menubar and shortcut

Menubar		menu	Icon	Description
File		New File		Create a new file.
		Open		Open an exiting file.
		Save		Save the file.
		Save As	-	Name and save the file.
		Print		Print data.
		Print Preview	-	Preview the data.
		Print Setup...	-	Change the printer settings.
		Edit		Undo
Cut				Delete an existing content and pastes that another part.
Copy				Copy the data in a file.
Paste				Paste the data in a file.
Delete				Delete the data in a file.
Add Card	-			Not used.
Online				Connect
		Connection settings		Connection settings between PLC and the computer.
		Read IO Information		Read the information of PLC.
		Write Parameter		Write parameter to PLC from XG-PD.
		Read Parameter		Read parameter from PLC to XG-PD.
		Enable Link		Enabling the module to communicate via High-speed link or P2P communication.
		Upload/Download (File)	-	Not used.
		SyCon Upload	-	Not used.
		System Diagnosis		Monitoring of communication module's Run status.
		Reset		Reset the PLC.
Option		PLC Type Settings	-	Set the type of CPU module.
View		Toolbar	-	Activate the Toolbar.
		Status Bar	-	Display the Status Bar.
		Ascii Table	-	Display the ASCII and Hexadecimal value.
		Workspace Window	-	Open/Close the parameter window.
Window		Cascade	-	Cascade windows.
		Tile Horizontally	-	Tile the windows horizontally.
		Arrange Icon	-	Not used.
Help		XG-PD Information		Check the XG-PD version information.
		MAC ADDR Download	-	Not used.

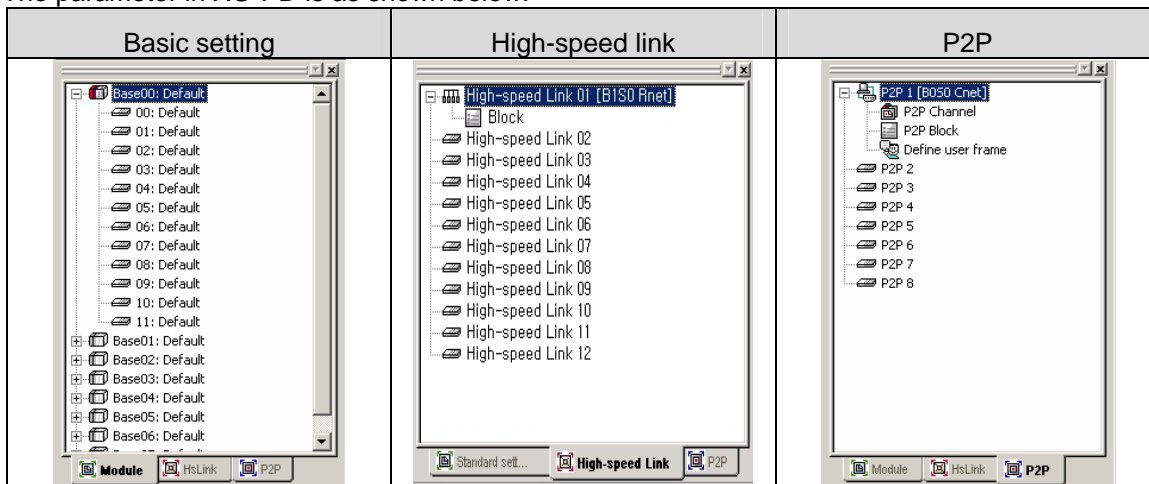
## 5.3 High-speed Link Editing

XG-PD is executed as shown below.



[Standard window]

The parameter in XG-PD is as shown below.



[Parameter window]

Rnet I/F module is set in High-speed link window.

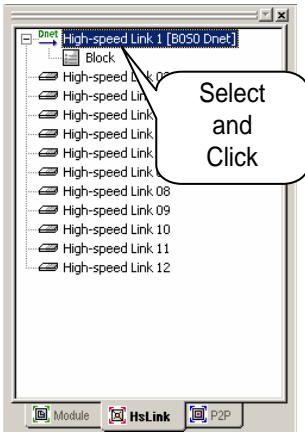
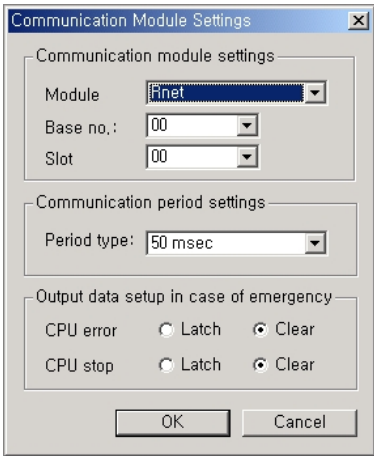
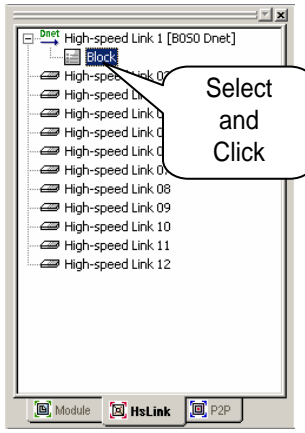
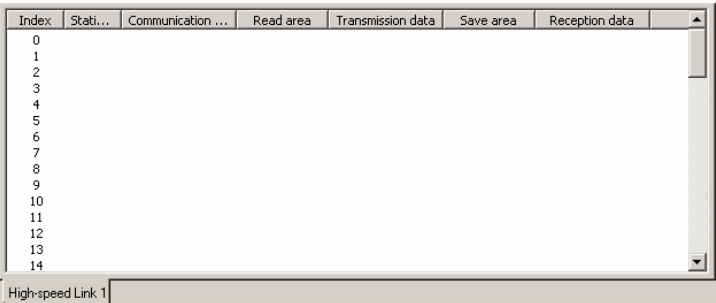
It can use the High-speed link up to maximum 12.

A High-speed link is available per an Rnet I/F module.

## Chapter 5 High-speed Link Setting

### 1) How to use High-speed link window

Parameter is specified at High-speed link window as shown below. There are 2 kinds of parameter setting, Communication module setting and High-speed link block setting.

High-speed link	Parameter setting
	<p>Communication module setting</p> 
	<p>High-speed link block setting</p> 

### Remark

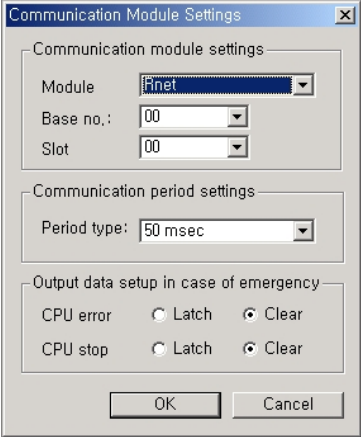
High-speed link1 [B0S0 Rnet] is as shown below.

- 1) High-speed link1: It is a serial number of High-speed link.
- 2) B0: It means Base number. (Example: Expansion base 2 stage - B2, Expansion base 5 stage - B5)
- 3) S0: It means Slot number. (Example: Slot number 5 - S5, Slot number 11 - S11)

## Chapter 5 High-speed Link Setting

### 2) Communication module setting parameter

Communication module parameter setting is as shown below.

Parameter	Setting item		Description	
	Communi- cation module Setting	Module	Rnet	
		Base no.	Setting range: 0 ~ 7 It is different from CPU module.	
		Slot	Setting range: 0 ~ 11 It is different from type of base.	
		Communication period settings (Period type)		Select among the 20ms, 50ms, 100ms, 200ms, 500ms, 1s, 5s, 10s. - Default: 50ms - It is only for transmission data. - Received data is processed every end of program.
	Output data setup in case of emergency	CPU error	Latch	Keep the output status. (But, P device's data is cleared.)
			Clear	Clear all of the output.
		CPU stop	Latch	Keep the output status. (But, P device's data is cleared.)
Clear			Clear all of the output.	

Click **OK** button after the setting is finished.

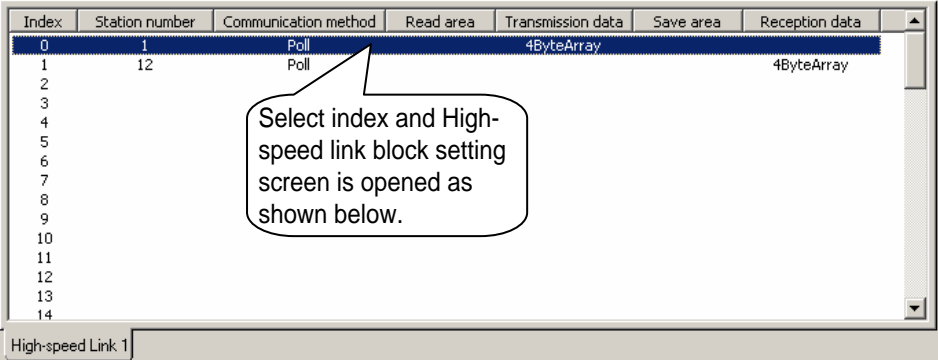
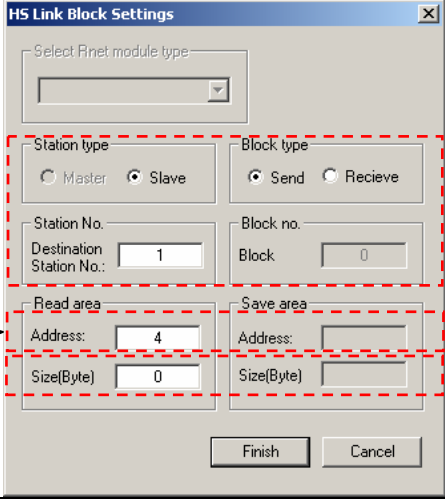
#### Remark

##### Cautions of communication period setting

- Setting value of communication period is applicable to transmission data (CPU module's data → Rnet I/F module). If communication period is longer than the time of changing data at scan program, it might be different from the data which is transmitted to slave module.

# Chapter 5 High-speed Link Setting

- 3) Parameter of High-speed link block setting  
 High-speed link block setting parameter is as shown below.

Classification	Description		
Screen After uploaded the data			
			
High-speed link block editing window	Classification	Description	
	Station type *1	Select slave.	
	Block type *1	Transmission: Data is transmitted from master module to slave module. Reception: Data is transmitted from slave module to master module.	
	Station No. *1	Slave station number (range: 0 ~ 63)	
	Block No. *1	Not used in Rnet I/F module.	
	Read area (Master module → Slave module)	Address	Head address of transmitting device. Usable device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR
		Size *1 (Byte)	Input/Output point of slave module is displayed in Byte. - If input module point is less than 8 bit, it is dealt with 1 Byte.
	Save area (Slave module → Master module)	Address	Head address of receiving device. Usable device: P, M, K, F, T, C, U, Z, L, N, D, R, ZR
Size *1 (Byte)		Input/Output point of slave module is displayed in Byte. - If input module point is less than 8 bit, it is dealt with 1 Byte.	

The priority order of data is the slave module which has lowest station number.

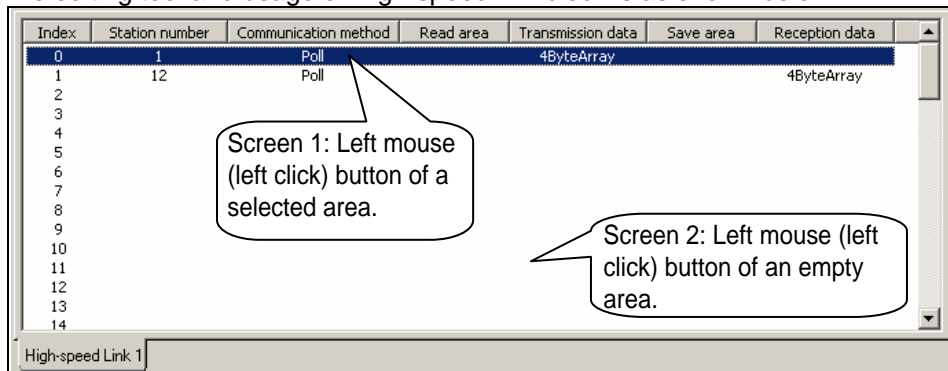
**Remark**

Unit of address setting is Word. But slave module's unit size is Byte. Less than 8 point module is processed by 1 Word when address is specified.

## Chapter 5 High-speed Link Setting

### (3) How to use High-speed link block editing tool

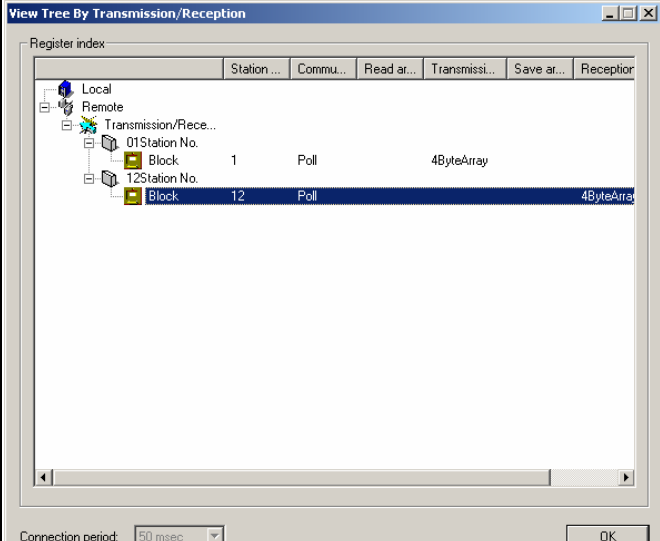
The editing tool and usage of High-speed link block is as shown below.



Index	Station number	Communication method	Read area	Transmission data	Save area	Reception data
0	1	Poll		4ByteArray		
1	12	Poll				4ByteArray
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

Screen 1: Left mouse (left click) button of a selected area.

Screen 2: Left mouse (left click) button of an empty area.

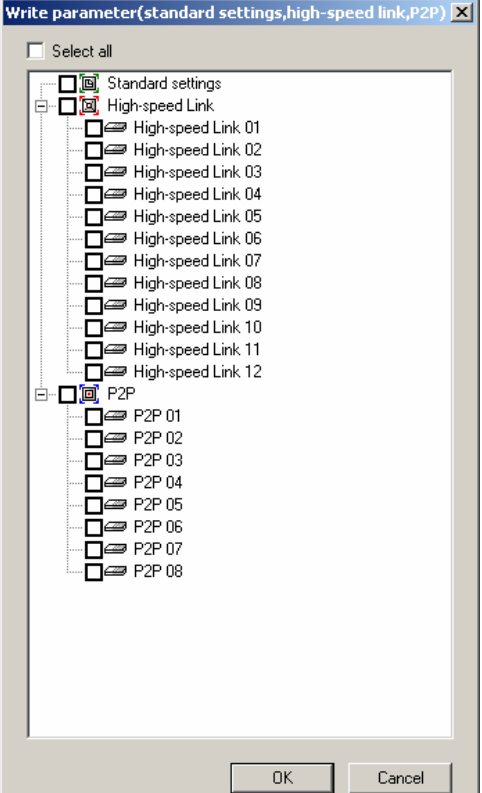
Function	Description
Edit Block	Changes the edited index block.
Copy Block	Copies the edited index block.
Paste Block	Pastes the copied index block.
Delete Block	Deletes the edited index block.
Lump Setup	Read/Save area is specified in a lump when the slave module's data size is regular.
View Tree by Transmission/Reception	<p>Display by Tree structure.</p>  <p>Connection period: 50 msec</p>

Screen 1: Left mouse (left click) button of a selected area.

Screen 2: Left mouse (left click) button of an empty area.

5.4 Read and Write of High-speed Link

The screen is used for read/write of High-speed link's parameter.

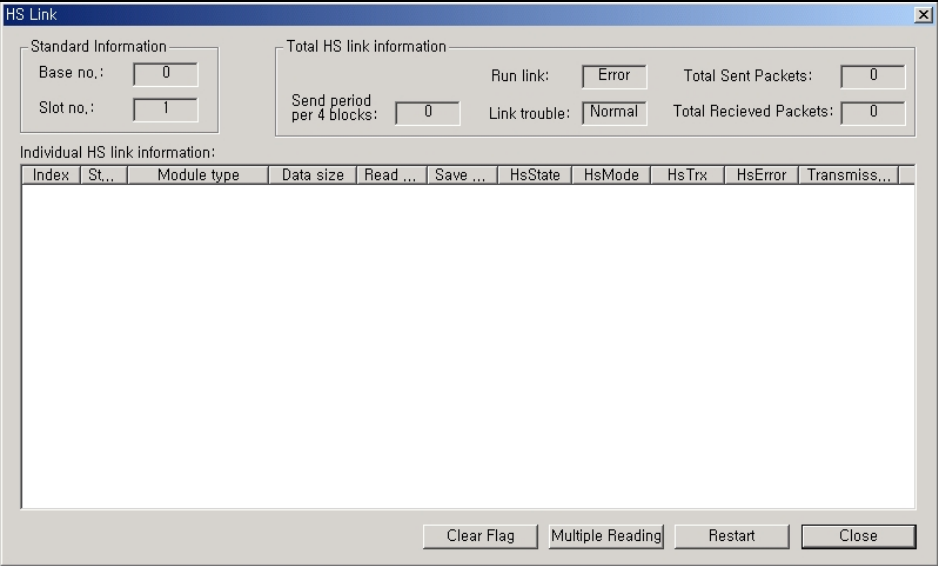
Configuration	Description
	<ol style="list-style-type: none"> <li>1) High-speed link is available up to 12 for installed Rnet I/F module. <ul style="list-style-type: none"> <li>- It can be used up to 12 with the other communication module which use High-speed link.</li> </ul> </li> <li>2) It can read/write for each High-speed parameter. <ul style="list-style-type: none"> <li>- Check the box to set the High-speed link.</li> </ul> </li> <li>3) Read/Write of High-speed link parameter is not affected to CPU's Run mode.</li> </ol>

If a High-speed link parameter is written to a CPU module, the CPU module saves the data. If CPU module is exchanged, the High-speed link parameter has to backup from the CPU module. The parameter has to re-write in exchanged CPU module.

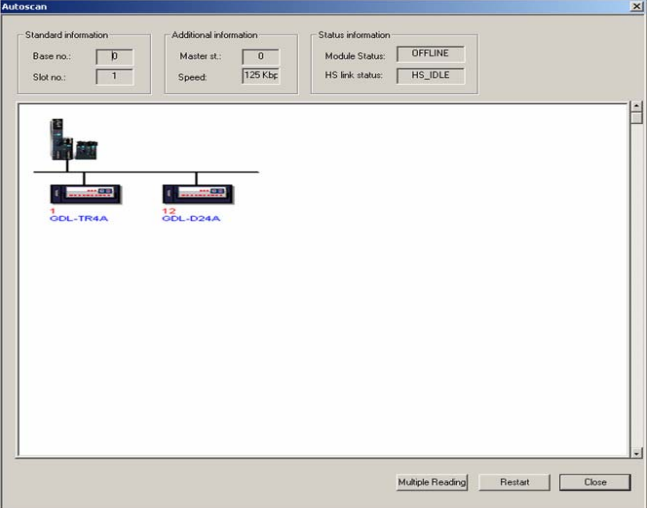




## Chapter 5 High-speed Link Setting

### 2) HS link

Menu	Screen configuration and description		
HS (High-speed) link information			
	Standard information	Base no.	Base number of communication module which is connected with High-speed link.
		Slot no.	Slot number of communication module which is connected with High-speed link.
	Total HS link information	Run link	Normal: All the slave modules communicate normally.
		Link trouble	Error: Error is occurred in slave station after Run link becomes normal status.
		Send period per 4 blocks	Transmission scanning time of the maximum blocks (4 blocks) at a time.
		Total Sent Packets	Not used.
		Total Received Packets	Not used.
	Individual HS link information	Index	Serial number.
		Station number	Slave module's station number which is existed in network.
		Module type	Module type which is used for setting up of high-speed parameter.
		Data size	Data size of transmitting data from master module to slave module.
		Read area	A device to transmit data from master to slave module.
		Save area	A device to transmit data from slave to master module.
HsState		Display of communication status between master and slave module.	
HsMode		RUN: Normal communication status between master and slave module. STOP: Abnormal communication status between master and slave module.	
HsTrx		Transmission/reception information between master and slave module.	
HsError	Error is displayed while High-speed link data is processed.		
Transmission/Reception count	Not used.		

3) Autoscan

Menu	Screen configuration and description
Autoscan	
	<p>Communication status of the slave module is displayed as shown below.</p> <p>1) Connected communication : </p> <p>2) Disconnected communication: </p> <p>But, it is not shown about GRL-TR4A.</p>

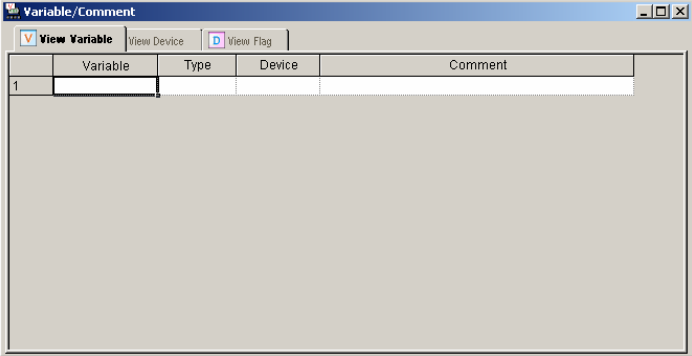
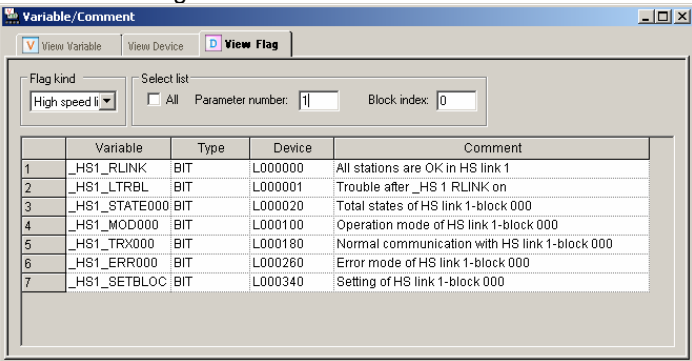
## 5.6 High-speed Link Information

High-speed link swaps the data among master module and all slave modules. It provides the flag of High-speed link operation status classified by individual station or total station. It is useful when checking the reliability of Transmission/Reception data and finding cause of error. Flag kinds and usage is as shown below.

Classification	Run-Link	Link-Trouble	Transmission /Reception status	Operation mode	Error	High-speed link status
Information type	All		Respectively			
Flag name (x=High-speed link number)	_HSxRLINK	_HSxLTRBL	_HSxTRX[n] (n=0..63)	_HSxMOD[n] (n=0..63)	_HSxERR[n] (n=0..63)	_HSxSTATE[n] (n=0..63)
Data type	Bit	Bit	Bit Array	Bit Array	Bit Array	Bit Array
Monitoring	Available	Available	Availability	Availability	Availability	Availability
Program use	Available	Availability	Availability	Availability	Availability	Availability

[Table] Function of High-speed link information

The way of selecting flag is as shown below.

Setting sequence	<p>XG-5000 → Project window → Variable/Comment</p> 																																							
How to use	<p>Select View Flag.</p>  <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th>Variable</th> <th>Type</th> <th>Device</th> <th>Comment</th> </tr> </thead> <tbody> <tr><td>1</td><td>_HS1_RLINK</td><td>BIT</td><td>L000000</td><td>All stations are OK in HS link 1</td></tr> <tr><td>2</td><td>_HS1_LTRBL</td><td>BIT</td><td>L000001</td><td>Trouble after _HS 1 RLINK on</td></tr> <tr><td>3</td><td>_HS1_STATE000</td><td>BIT</td><td>L000020</td><td>Total states of HS link 1-block 000</td></tr> <tr><td>4</td><td>_HS1_MOD000</td><td>BIT</td><td>L000100</td><td>Operation mode of HS link 1-block 000</td></tr> <tr><td>5</td><td>_HS1_TRX000</td><td>BIT</td><td>L000180</td><td>Normal communication with HS link 1-block 000</td></tr> <tr><td>6</td><td>_HS1_ERR000</td><td>BIT</td><td>L000260</td><td>Error mode of HS link 1-block 000</td></tr> <tr><td>7</td><td>_HS1_SETBLOC</td><td>BIT</td><td>L000340</td><td>Setting of HS link 1-block 000</td></tr> </tbody> </table>	Variable	Type	Device	Comment	1	_HS1_RLINK	BIT	L000000	All stations are OK in HS link 1	2	_HS1_LTRBL	BIT	L000001	Trouble after _HS 1 RLINK on	3	_HS1_STATE000	BIT	L000020	Total states of HS link 1-block 000	4	_HS1_MOD000	BIT	L000100	Operation mode of HS link 1-block 000	5	_HS1_TRX000	BIT	L000180	Normal communication with HS link 1-block 000	6	_HS1_ERR000	BIT	L000260	Error mode of HS link 1-block 000	7	_HS1_SETBLOC	BIT	L000340	Setting of HS link 1-block 000
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## Chapter 5 High-speed Link Setting

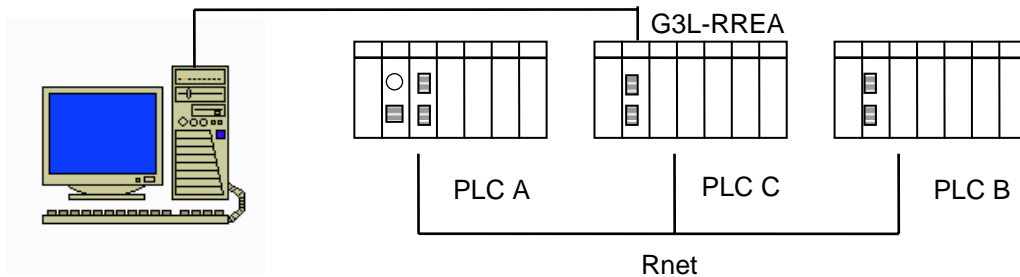
Monitoring of flag and device's value is as shown below.

Setting sequence	<p>XG5000 → Project window → Variable/Comment</p> <table border="1"> <thead> <tr> <th></th> <th>Variable</th> <th>Type</th> <th>Device</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>HS1_RLINK</td> <td>BIT</td> <td>L000000</td> <td>All stations are OK in HS link 1</td> </tr> <tr> <td>2</td> <td>HS1_LTRBL</td> <td>BIT</td> <td>L000001</td> <td>Trouble after _HS 1 RLINK on</td> </tr> <tr> <td>3</td> <td>HS1_STATE000</td> <td>BIT</td> <td>L000020</td> <td>Total states of HS link 1-block 000</td> </tr> <tr> <td>4</td> <td>HS1_MOD000</td> <td>BIT</td> <td>L000100</td> <td>Operation mode of HS link 1-block 000</td> </tr> <tr> <td>5</td> <td>HS1_TRX000</td> <td>BIT</td> <td>L000180</td> <td>Normal communication with HS link 1-block 000</td> </tr> <tr> <td>6</td> <td>HS1_ERR000</td> <td>BIT</td> <td>L000260</td> <td>Error mode of HS link 1-block 000</td> </tr> <tr> <td>7</td> <td>HS1_SETBLOC</td> <td>BIT</td> <td>L000340</td> <td>Setting of HS link 1-block 000</td> </tr> </tbody> </table>		Variable	Type	Device	Comment	1	HS1_RLINK	BIT	L000000	All stations are OK in HS link 1	2	HS1_LTRBL	BIT	L000001	Trouble after _HS 1 RLINK on	3	HS1_STATE000	BIT	L000020	Total states of HS link 1-block 000	4	HS1_MOD000	BIT	L000100	Operation mode of HS link 1-block 000	5	HS1_TRX000	BIT	L000180	Normal communication with HS link 1-block 000	6	HS1_ERR000	BIT	L000260	Error mode of HS link 1-block 000	7	HS1_SETBLOC	BIT	L000340	Setting of HS link 1-block 000																							
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How to use	<p>XG5000 → View → Variable Monitoring Window</p> <table border="1"> <thead> <tr> <th></th> <th>PLC</th> <th>Type</th> <th>Device</th> <th>Value</th> <th>Variable</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>NewPLC</td> <td>BIT</td> <td>L000000</td> <td>10</td> <td>_HS1_RLINK</td> <td>All stations are OK in HS link 1</td> </tr> <tr> <td>2</td> <td>NewPLC</td> <td>BIT</td> <td>L000001</td> <td>10</td> <td>_HS1_LTRBL</td> <td>Trouble after _HS 1 RLINK on</td> </tr> <tr> <td>3</td> <td>NewPLC</td> <td>BIT</td> <td>L000020</td> <td>10</td> <td>_HS1_STATE000</td> <td>Total states of HS link 1-block 000</td> </tr> <tr> <td>4</td> <td>NewPLC</td> <td>BIT</td> <td>L000100</td> <td>10</td> <td>_HS1_MOD000</td> <td>Operation mode of HS link 1-block 000</td> </tr> <tr> <td>5</td> <td>NewPLC</td> <td>BIT</td> <td>L000180</td> <td>10</td> <td>_HS1_TRX000</td> <td>Normal communication with HS link 1-block 000</td> </tr> <tr> <td>6</td> <td>NewPLC</td> <td>BIT</td> <td>L000260</td> <td>10</td> <td>_HS1_ERR000</td> <td>Error mode of HS link 1-block 000</td> </tr> <tr> <td>7</td> <td>NewPLC</td> <td>BIT</td> <td>L000340</td> <td>10</td> <td>_HS1_SETBLOCK</td> <td>Setting of HS link 1-block 000</td> </tr> <tr> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>- Select variable in Variable/Comment screen and then Drag/Drop the variable to Variable Monitoring Window. The value is appeared in variable Monitoring Window.</p>		PLC	Type	Device	Value	Variable	Comment	1	NewPLC	BIT	L000000	10	_HS1_RLINK	All stations are OK in HS link 1	2	NewPLC	BIT	L000001	10	_HS1_LTRBL	Trouble after _HS 1 RLINK on	3	NewPLC	BIT	L000020	10	_HS1_STATE000	Total states of HS link 1-block 000	4	NewPLC	BIT	L000100	10	_HS1_MOD000	Operation mode of HS link 1-block 000	5	NewPLC	BIT	L000180	10	_HS1_TRX000	Normal communication with HS link 1-block 000	6	NewPLC	BIT	L000260	10	_HS1_ERR000	Error mode of HS link 1-block 000	7	NewPLC	BIT	L000340	10	_HS1_SETBLOCK	Setting of HS link 1-block 000	8						
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1	NewPLC	BIT	L000000	10	_HS1_RLINK	All stations are OK in HS link 1																																																										
2	NewPLC	BIT	L000001	10	_HS1_LTRBL	Trouble after _HS 1 RLINK on																																																										
3	NewPLC	BIT	L000020	10	_HS1_STATE000	Total states of HS link 1-block 000																																																										
4	NewPLC	BIT	L000100	10	_HS1_MOD000	Operation mode of HS link 1-block 000																																																										
5	NewPLC	BIT	L000180	10	_HS1_TRX000	Normal communication with HS link 1-block 000																																																										
6	NewPLC	BIT	L000260	10	_HS1_ERR000	Error mode of HS link 1-block 000																																																										
7	NewPLC	BIT	L000340	10	_HS1_SETBLOCK	Setting of HS link 1-block 000																																																										
8																																																																

### Chapter 6 Remote Communication Control

#### 6.1 Introduction

This function is for programming, download of user program, program debugging, monitoring, etc in the network system where PLCs are connected with XGT communication module by remote control without moving the physical connection status of program tool (XG5000/XG-PD). Especially it is convenient for easy access to each PLC from a place without repositioning when network-connected devices are separated far. Communication service function creates the following path to attain its purpose.



[Fig. 6.1.1] Remote connection network

A network is supposed where RS-232C cable is connected with G3L-RREA module, PLC A with the master and PLC C with Rnet remote I/F module each other in the program tool (XG5000, XG-PD) of the computer. In order to access the contents of PLC A station in the figure above, select the station no. of PLC A's communication module (destination station no. to connect) and the slot no. of G3L-RREA (slot no.0 where RREA's communication module presently connected is installed) to remote-connect with RS-232C via Rnet with remote 1 connection of the program tool.

This status as processed identically to connection with RS-232C cable as moved to PLC A station is available to execute all functions of programming, download, debugging and monitoring. With this remote communication service, easy access to PLC position in the distance is available without moving thereto, which is useful for maintenance of PLC system.

#### Notes

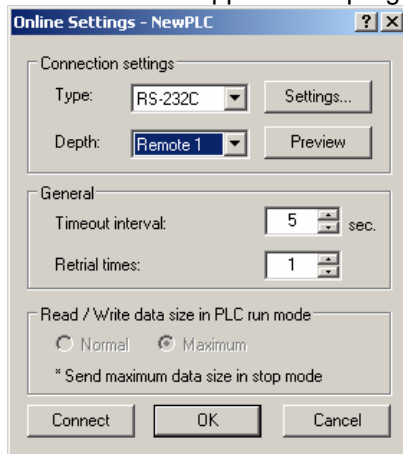
- 1) Rnet I/F modules for which remote 1 connection is available are **G3L-RREA** and **G0L-GWRA**.

### 6.2 Remote connection example of XG5000/XG-PD

The remote 1 connection is available for both XG-PD and XG5000.

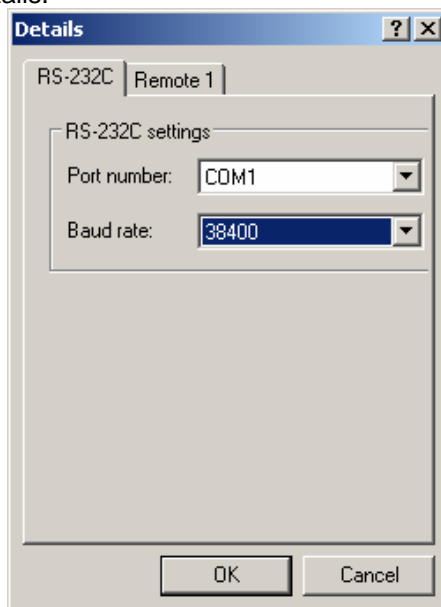
#### 6.2.1 Remote 1 connection

For remote 1 connection, XG5000 (or XG-PD) shall be in off-line status. In this status, select “Online – Connection Settings” from the menu on the upper of the program.



[Fig. 6.2.1] Online Settings

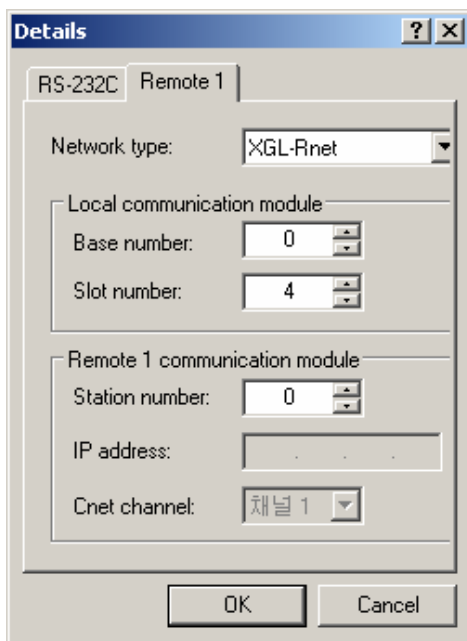
On the communication options setting menu, set “Connection Depth” to Remote 1, and select “Settings” to specify the details.



[Fig. 6.2.2] Details screen of RS-232C

## Chapter 6 Remote Communication Control

Item		Details
RS-232C setting	Port number	Set the port RS-232C is connected with.
	Baud rate	Set the data communication speed via RS-232C to "38400".



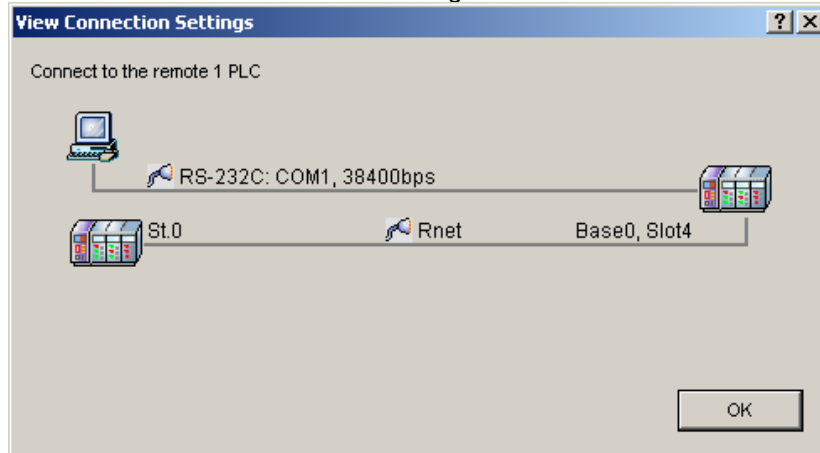
[Fig. 6.2.3] Details screen of remote 1

Item		Details
Network type		Select applicable network module. Select XGT-Rnet here.
Local communication module	Base number	Select the base no. of the communication module installed on the master to be connected with destination station by stage 1 connection.
	Slot number	Select the slot no. of the communication module installed on the master to be connected with destination station by stage 1 connection.
Remote 1 communication module	Station number	Select the station no. of the communication module installed on destination station's PLC to be connected by stage 1. (select station 0)
	IP address	Specify if Ethernet I/F module is used.
	Cnet channel	Specify if Cnet I/F module is used.

Click [Preview] on the communication setting window in order to OK settings of remote 1 connection.

## Chapter 6 Remote Communication Control

Select “Preview” button on “Connection Settings” window to see the remote 1 PLC configuration.



[Fig. 6.2.4] Details screen of connection setting

After setting, click [OK] to escape from the option screen, and then execute the online connection. If connection fails, the following message will appear.



[Fig. 6.2.5] Remote 1 connection failed

The connection setting or communication cable could be abnormal. Check the cable connection and connection setting.

The following message will appear if the PLC type connected to the stage 1 is different from the current project's CPU type. It should be changed the CPU type to connect with.



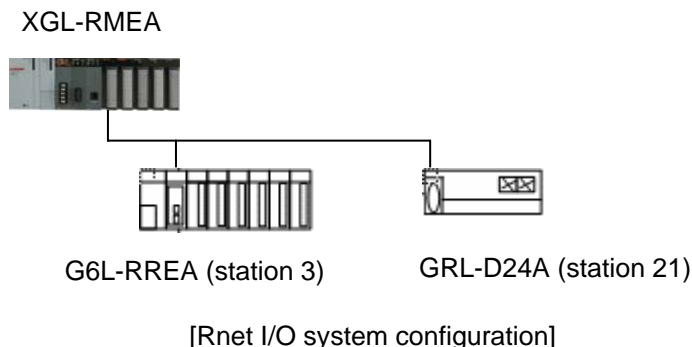
[Fig. 6.2.6] [CPU type is incorrect]

Completion status of a stage 1 connection is a local connection that is the same with RS-232C cable connection. All online menus are available.

## Chapter 7 Program Example

### 7.1 XG5000 program

How to set High-speed link parameters in Rnet system will be described below.



Tx/Rx structure	Station no.	Slave	Read Area (XGT)	Save Area (XGT)
Master	3	G6L-RREA	M0000 (8 words)	P0000
			-	-
	21	GRL-D24A	-	-
			-	D00300 (2 words)

[Table 7.1.1] Tx/Rx map of High-speed link

In the example, XGT CPU transmits 8-word (M0000~M0007) data of M0000 area to G6L-RREA's Slot no.0 (P0000 is I/O address of G6L-RREA), and saves the data of GRL-D24A's 32-point input contact on D00300 area of XGT CPU.

A) High-speed link parameters setting

In the system shown in [Fig. 7.1.1], user is to prepare data Tx/Rx map in order to let the stations exchange data as in [Table 7.1.1]. And for data Tx/Rx as in [Table 7.1.1], High-speed link parameters shall be prepared and downloaded onto PLC as in the sequence described below so to start High-speed link.

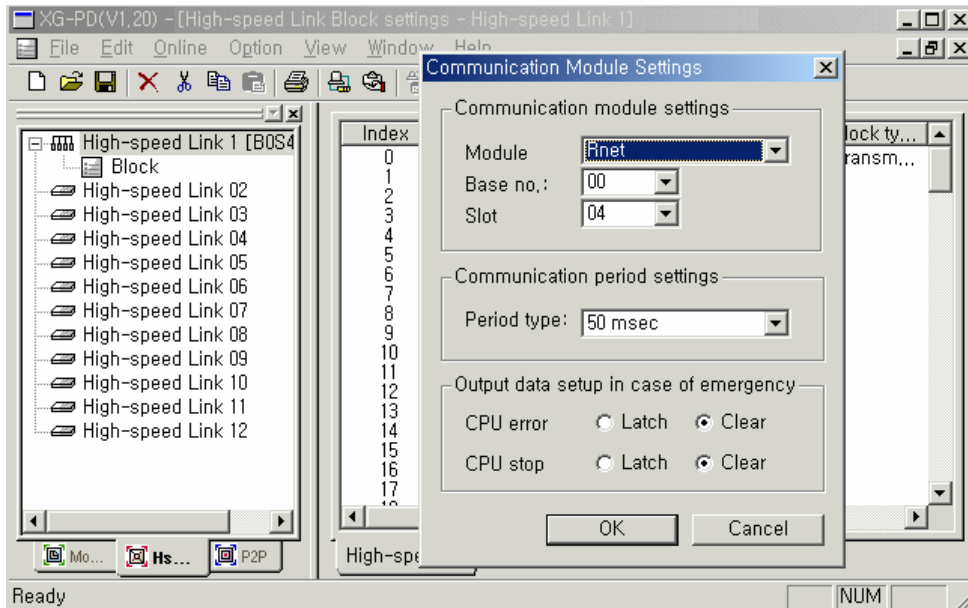
- A. Prepare data Tx/Rx map
- B. Local-connect XG-PD with XGT CPU
- C. On XG-PD's High-speed link parameters setting option, set applicable parameters
- D. Write parameters on the Online menu
- E. Select Link Enable setting on the Online menu to set High-speed Link Enable applicable to setting number

## Chapter 7 Program Example

- F. Use the diagnosis service to check High-speed link status
- G. If any error occurs during the procedures above, execute again from A

High-speed link parameters for example system shall be set as described below.

On the High-speed link setting screen as shown in [Fig.7.1.2], select one among 12 High-speed link parameters to register modules.



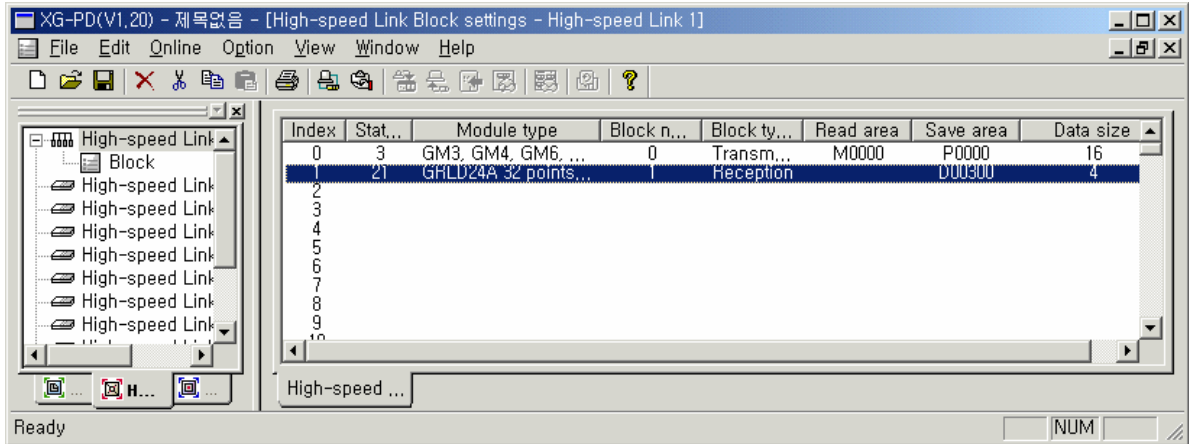
[Fig. 7.1.2] Setting of communication module and communication period

Select the type of Rnet and base/slot positions identical to communication module to be used.

After High-speed link setting, specify Tx/Rx parameters on the [Fig.7.1.3] register list screen starting from item no. 0 one by one. If data is to be transmitted to G6L-RREA, it shall be set as applicable to Tx/Rx data map.

## Chapter 7 Program Example

The parameter setting result is as follow.



[Fig. 7.1.3] Setting of High-speed link register list

If High-speed link parameters are downloaded during operation of High-speed link, Link enabled will be automatically disabled, and then enabled after downloading is complete.

## Appendix

### A.1 Terminology

**1) Master Module**

Rnet I/F module to be installed on I/O location of the basic base.

**2) Slave Module (RSM : Rnet Slave Module)**

Rnet I/F module and single module to be installed on CPU location of the basic base.

**3) Local Station**

Station directly connected with XG-5000, XG-PD in the same network including CPU for user to download, monitoring and debug programs.

**4) Remote Station**

Contrary to local station, it is the destination station to communicate with local station.

**5) Remote I/O Station**

I/O area where remote communication module instead of PLC CPU receives I/O data from master station and refreshes I/O module installed on remote station in PLC system.

**6) Rnet**

Fieldbus, as the lowest network to connect control device with relay device has adopted 3 layers among OSI's 7 layers. The 3 layers are composed of physical layer configured with H2(1Mbps electric), H1 (31.23Kbbs electric), optic/wireless, etc., data link layer with Scheduled and Circulated Token bus and application layer in charge of application function where user layer is adopted additionally.

**7) Token**

It is a right to send data of self-station by access right control over Physical Medium.

**8) Rnet Station no.**

Station no. of the communication module to which Rnet standard is applied.

**Station no. of XGT-RMEA is always set to '0'.**

**9) Repeater**

It is used to extend cable length in electric communication network, which extends communication distance by revival and amplification of electric communication signals.

**10) Manchester Biphase-L**

It is a data modulating method used in Rnet. Data is sent as encoded by Manchester-I Code and the data received as encoded by Manchester is converted as decoded.

**11) Reset**

It is used to initialize if an error occurs on the communication module. It operates Reset operation selecting the [Online] → [Reset] icon by XG-PD. Then PLC do Restart operation to initialize.

## Appendix

### A.2 List of HS Link Flags

No.	Keyword	Type	Detail	Description
L000000	_HS1_RLINK	Bit	HS link parameter No.1's all stations normally operated	Displays all stations normally operated as specified in HS link parameter, which will be On if 1. There is no error with all stations specified in parameter in RUN mode 2. All data block is in normal communication as specified in parameter. 3. The parameter specified in each station itself is in normal communication. Run_link will be kept On if once On until stopped by link disable.
L000001	_HS1_LTRBL	Bit	After _HS1RLINK is ON, abnormal status displayed	This flag will be On if the station specified in parameter and the data block's communication status are as described below with _HSmRLINK flag On. 1. When the station specified in parameter is not in RUN mode, 2. When the station specified in parameter is in error, 3. When data block's communication status specified in parameter is unstable, The link trouble will be On if one of those conditions 1,2 and 3 above occurs. And if such a condition is back to normal, it will be Off.
L000020 ~ L00009F	_HS1_STATE[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k's general status displayed	Displays the general status of the communication information for the specified parameter's respective data blocks. _HS1_STATE[k]=_HS1_MOD[k]&_HS1_TRX[k]&(~_HSm_ERR[k])
L000100 ~ L00017F	_HS1_MOD[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k station's Run operation mode	Displays the operation mode of the station specified in parameter's data block k.
L000180 ~ L00025F	_HS1_TRX[k] (k=000~127)	Bit Array	Normal communication displayed with HS link parameter No.1, Block No.k station	Displays the communication status of parameter's data block k to check if normal as specified.
L000260 ~ L00033F	_HS1_ERR[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k station's Run error mode	Displays the communication status of parameter's data block k to check for any error.
L000340 ~ L00041F	_HS1_SETBLO CK[k]	Bit Array	HS link parameter No.1, Block No.k setting displayed	Displays the setting status of parameter's data block k.

[Table 1] List of communication flags based on HS link number (HS link No. 1 ~ 12)

## Appendix

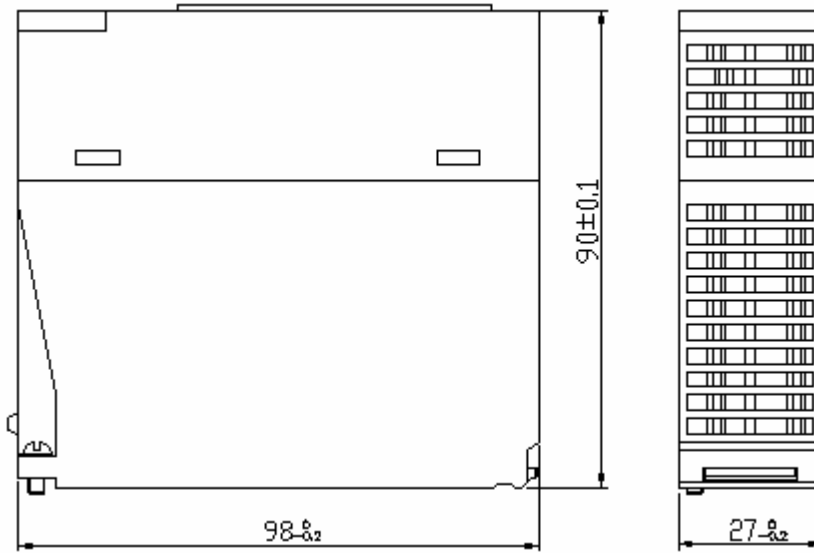
### Notes

HS link No.	L area address	Remarks
2	L000500~L00099F	Compared with HS link of 1 in [Table 1], other HS link station number's flag address will be simply calculated as follows;  * Calculation formula: $\text{L area address} = \text{L000000} + 500 \times (\text{HS link No.} - 1)$ In order to use HS link flag for program and monitoring, use the flag map registered in XG5000 for convenient application.
3	L001000~L00149F	
4	L001500~L00199F	
5	L002000~L00249F	
6	L002500~L00299F	
7	L003000~L00349F	
8	L003500~L00399F	
9	L004000~L00449F	
10	L004500~L00499F	
11	L005000~L00549F	

Example) K as a block number is displayed through 8 words by 16 for 1 word for the information of 128 blocks from 000 to 127.  
 For example, block information of 16~31, 32~47, 48~63, 64~79, 80~95, 96~111, 112~127 will be displayed in L00011, L00012, L00013, L00014, L00015, L00016, L00017 from block 0 to block 15 for mode information (\_HS1\_MOD). Thus, the mode information of the block No. 55 will be displayed in L000137.

A.3 External Dimensions

Unit: mm



## Warranty

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### Warranty

#### 1. Warranty Period

The product purchased will be guaranteed for a period of 18 months upon manufactured

#### 2. Warranty Coverage

Against the defect found during the Warranty Period specified above, this product will be repaired or exchanged partially. However, please understand that such cases as described below will be excluded from the Warranty Coverage.

- (1) If the defect is caused by unsuitable condition, environment and treatment or other reason than specified in the user's manual.
- (2) If the defect is caused by other parts than LS product.
- (3) If the product is remodeled or repaired by others than LS or its designated service center
- (4) If the product is used with other procedures than originally intended.
- (5) If the defect is caused by a reason unexpected under the scientific and technical standard when released from LS.
- (6) If the defect is caused by a natural calamity or fire which LS is not responsible for.

3. Since the warranty details above are to guarantee the PLC unit only, the customers are strongly recommended to use the product after due consideration of safety for system configuration or product application.